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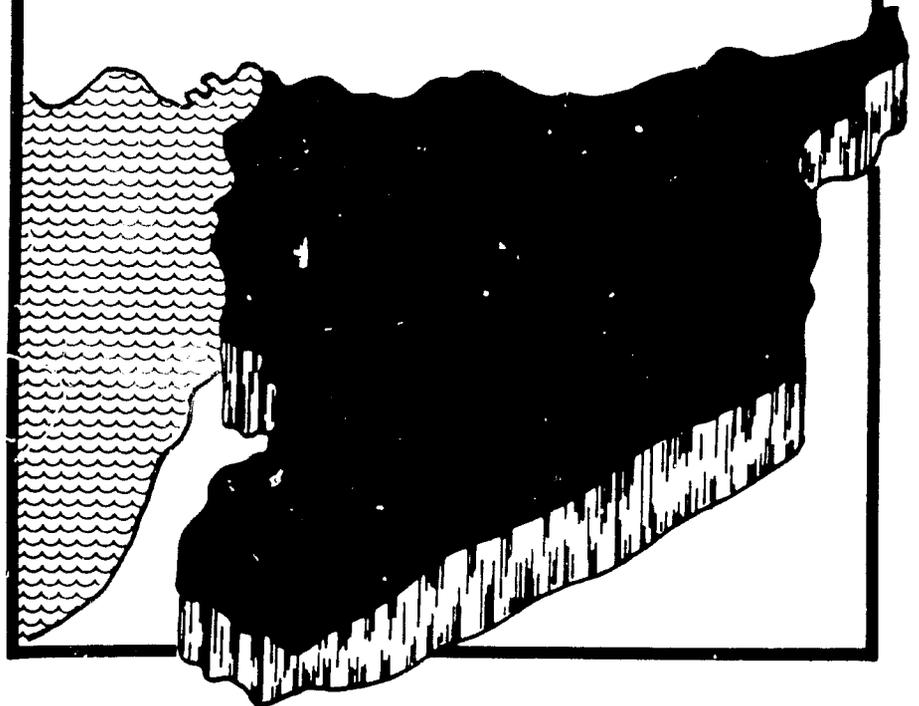
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MINISTRY OF TRANSPORT

SYRIAN ARAB REPUBLIC

**COMPREHENSIVE
TRANSPORT STUDY
FINAL REPORT
MARCH 1981**



VOLUME II TRANSPORT DEMAND

LOUIS BERGER INTERNATIONAL, INC.

in association with

TIPPETTS-ABBETT-McCARTHY-STRATTON

This volume is one of seven produced as the Final Report for the Syrian Comprehensive Transport Study. The complete set of volumes is as follows:

- Volume I** – Executive Summary
- Volume II** – Transport Demand
- Volume III** – Railways
- Volume IV** – Roads and Road Transport
- Volume V** – Ports and Shipping
- Volume VI** – Other Modes and Related Industries
(Aviation, Pipelines, and Construction
and Storage Industries)
- Volume VII** – Transport Sector Plans

VOLUME II

TRANSPORT DEMAND

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CHAPTER 1

THE TRANSPORT SYSTEM – AN OVERALL VIEW

THE TRANS

Introduction

The transport system of Syria is above all determined by the topographical features, the locations of natural resources, and the economic conditions of the country. The western region comprises the coastal plains on the Mediterranean, the central plains on the plateau, and the south, which is centered in Damascus. The area between the Euphrates and Tigris valleys is the northeast of Jerireh. There are the two major economic regions where most of the urban centers are located and linked by the transport arteries. The extensive desert in the central-southeast constitutes a large expanse of barren land between the two major economic regions.

The natural transport corridors are over the coastal plains and the central fertile belt for north-south movements; and in the Euphrates River valley and in the gap in the mountains between Homs and Tartous for east-west transportation.

The Damascus-Beirut and Aleppo-Lattakia routes have to cross the mountains, and those from Damascus or Homs to Deir Ez Zor and Baghdad have to traverse the desert. During the 1970s, the discovery and exploitation of oil deposits in the extreme northeast and of phosphates in the central desert area together with other external and internal factors led to a rapid development of the economy. This, together with general ordinary industrial and agricultural growth, stimulated extensive expansion of the transport system with large scale investments in road, rail, port, and other transport facilities.

The present task is to continue developing transport within the economic development plans and objectives in a more rational and effective way.

The system comprises a relatively extensive road network: two railway networks, one domestic pipeline system and two international pipelines, two ports for dry cargo, and one port for petroleum products. The major surface transport arteries link the urban centers and economic areas between north and south and between west and east. The system witnessed rapid expansion in the 1970s in infrastructure as well as in vehicles and facilities of all modes.

Expansion of the Transport System

Between 1970 and 1977-1979, the length of paved roads and of rail lines increased by 60 percent, or by 6 to 7 percent per

annum. The volume of traffic carried by road and rail rose at a much faster rate, by 85 percent and 258 percent per annum respectively.

Meanwhile, the combined import and export tonnages handled at Lattakia and Tartous expanded by more than 40 percent. The new port of Tartous has been developed since the middle 1960s to relieve the traffic pressures at Lattakia, the traditional port of the country. These transport and traffic magnitudes and rates of increase are to be compared with the growth of GDP, which doubled in 1970-1979, and of population, which increased by 43 percent during the same period.

Structure of Transport

The transport system is by far dominated by road transport. In 1977, road vehicles carried about 95 percent of the total inter-city freight volume estimated at 8 billion ton-kilometers, while the railways carried only 5 percent. In passenger traffic, estimated at 8 billion passenger-kilometers in the same year, the share of roads was 97 percent, while that of the railways was only 3 percent.

The railways are handicapped by some inconvenient routes laid out in the past, and by the fact that they are divided into two separate systems with different gauges. Under the present Government policy and programs for railway development and utilization, the share of the railways in total traffic is expected to increase significantly in the next five years, especially when the construction of the Damascus-Homs line is completed.

Inland water transport is insignificant, as the only large river, the Euphrates, is too shallow for navigation. Civil aviation has had also limited development as distances between major urban centers of Syria are generally short. The domestic oil pipelines consist of two systems: one, from the extreme northeast to the Port of Tartous, carries crude oil from Karatchok oil fields for export. The other system consists of three pipelines for moving oil products from Homs refinery to Aleppo-Lattakia and Damascus. One international pipeline is for moving oil from Iraq to the ports of Baniyas and Tripoli (in Lebanon) for shipment overseas and for supply of crude oil to the Homs refinery. The other international pipeline, the TAP line from Saudi Arabia in transit to Saida (in Lebanon), is presently not in operation. The pipelines to Tartous and Baniyas are also used for the import of crude oil and petroleum products.

Road Network

The road network of Syria is greatly concentrated in the western part of the country, has limited inter-regional links,

and exhibits an imbalance between primary roads on the one hand and secondary-tertiary and rural roads on the other. Of the total length of 17,770 kilometers as of 1979, 12,570 kilometers, or 77 percent, was paved. The proportion of paved road to the total is much higher in the western areas than in the northeast and in the steppe-desert region of the central-southeast. The density of the roads relative to area is much higher in the west than in the other two regions. The road mileage grew at about 6 percent per annum during the 1970s, which is less than the growth of road traffic. This is reflected in the much faster increase in road vehicles than roads.

The Damascus-Aleppo axis is the core of the road network. Other highways include the coastal road from Lattakia to Tartous, and the roads from Damascus to Tanf, from Tartous to Homs to Tadmur, and from Lattakia to Aleppo to Deir E. Zor. The volume of traffic is very heavy on the Damascus-Aleppo highway with 5,000 to 10,000 vehicles per day. Most of the other arteries have traffic of 1,500 to 3,000 per day. On most of these highways, trucks account for 30 to 50 percent of total traffic.

The number of registered road vehicles witnessed a much faster growth in the 1970s from a total of 49,588 in 1970 to 196,500 in 1979, representing a gain of 16.5 percent a year. The numbers of cars, buses, trucks, and pickups each increased by 90 to 100 percent during 1970-1979. Again, most of the vehicles are registered in the western parts of the country.

Railways

The railways comprise two systems. The northern system, with standard gauge, has an operational length of 1,374 kilometers radiating from Aleppo to Al Kamishli and the Iraqi border in the east, to Homs and Tartous in the south, to Lattakia in the west, and to the Turkish border in the north. The southern system, with a length of 342 kilometers, is part of the narrow gauge Hijaz railway and has connections to Jordan and Lebanon but not to the northern cities. At present, a rail link is under construction between Damascus and Homs. Owing to deficiencies in operation and equipment and the separation of the two systems because of their different gauges, the railways have not been able to compete effectively with road transport, even for relatively long distance and bulky hauls.

Ports

The main ports are Lattakia, Tartous, and Banias. Lattakia is for general cargo and exports. The Port of Tartous, opened in 1965, is for general cargo, phosphates, and Syrian crude oil exports. Banias is for export of Iraqi crude oil in transit and import of foreign crude oil. Only Lattakia is used for passengers in significant numbers.

Since 1973, there have been sharp increases in the cargo traffic at both Lattakia and Tartous, in part due to the increased transit trade from Europe to the Arab Gulf countries with the oil boom. Port congestion has been a serious problem. The shipment of Iraqi crude oil by pipeline for export through Banias was interrupted in 1977-1978 but resumed early in 1979. The volume of non-oil imports considerably exceeds that of exports at the two major ports. The primary commodity exported at Lattakia is cotton, mostly from the northeast region; that at Tartous is phosphates, mined near Tadmur. By and large, Lattakia is better equipped for general goods, whereas facilities at Tartous are developed largely for handling bulky goods. The roll on/roll off and container traffic have been expanding rapidly at the ports for both Syrian imports and transit shipments. Both ports are now undergoing major expansion programs.

Major Transport Corridors and System Framework

The transport arteries are along the following major corridors:

1. Aleppo-Damascus-Dera'a
2. Lattakia-Aleppo-Deir Ez Zor-Albu Kamal (2a)
or Al Kamishli (2b)
3. Lattakia-Tartous-Lebanon border
4. Tartous-Homs-Tadmur-Deir Ez Zor
5. Damascus-Tadmur-Deir Ez Zor
6. Aleppo-Kara Kozak-Tal Mir-Ya'roubia (project)
7. Damascus-Tanf

The corridors (1) and (3) run in the north-south direction; the section of corridor (2b) from Aleppo to Albu Kamal is in northwest-southeast direction; all of the other corridors are in the a general west-east direction. Most of the arteries to the east of the Aleppo-Damascus corridor are newly constructed, reconstructed, or under construction. This reflects the greatly increased development efforts and resource base in the northeast, which has been considerably enhanced with the discovery of oil and the daming of the Euphrates River.

The Aleppo-Damascus links constitute the central axis of the total system and Aleppo is the pivotal point between the west and the northeast, the two major economic areas, and between the north-south routes and the west-east routes. It is at the apex of the Aleppo-Dera'a-Albu Kamal triangle enclosing the desert region.

This central corridor is served by both highways and railways and is travelled by very heavy traffic. Some sections of the highways are four-lane asphalted roads (Aleppo-Saraqeb, Damascus-Qtaif), some other sections are being reconstructed into four-lane highways (Damascus-Dera'a).

A new two-lane highway is being added to this existing two-lane road between Damascus and Homs. The gauge difference and separation between the northern and the Hijaz railways handicaps the rail transportation between Damascus and Homs. However, a new rail link is being constructed between the two cities. The Homs-Hama rail section is under reconstruction. The improvement of the Aleppo-Hama section is scheduled for 1985. It appears that the concentration of economic and transport activities in the western part of the country has shown no mitigation but tends to be increasing despite the Government's stated policy of more inter-regional balance in the location of economic activities.

The Lattakia-Aleppo-Deir Ez Zor-Al Kamishli and Albu Kamal corridor comprises a railway and a parallel highway. The Aleppo-Al Kamishli railway was completed in 1976, and the Lattakia-Jisr Al Shughour rail section was opened to traffic in 1975. The Aleppo-Al Raqqa section of the highway has been reconstructed to standard; the Al Raqqa-Deir Ez Zor road section is being improved and the Deir Ez Zor-Albu Kamal sections are being studied. This is a main corridor for transportation between the west and the northeast and a major route for Iraqi transit movements.

The Lattakia-Tartous corridor is currently served by a road. A railway is being planned. The coastal region is developing relatively rapidly, with the port facilities, the favorable rainfall and land resources for agriculture, the high density of population, and the increased commercial and industrial activities.

The Tartous-Homs-Deir Ez Zor corridor comprises a major highway program and a railway program. The Tartous-Homs highway is being constructed into a four-lane highway. The road from Homs to Tadmur is being improved, and the Tadmur-Deir Ez Zor road is under construction.

The Tartous-Homs railway was completed in 1979. A three-prong railway project is being constructed between Damascus, Homs, and Tadmur. After it is completed, there will be rail links between Homs and Tadmur and between Damascus and Tadmur. The railway and road projects when completed, will provide direct links from Tartous and Damascus to Deir Ez Zor across the desert and further to Al Kamishli in the extreme northeast,

with a much shorter distance than through Aleppo around the desert borders. Meanwhile, the route from Tartous to Tanf will be greatly facilitated for Iraqi transit traffic.

Corridors (2) and (7) provide connections to Iraq. A rail link between Deir Ez Zor and Albu Kamal is expected to be constructed, and a road between Tadmur and Albu Kamal has been studied. When completed, the new overland routes will greatly facilitate the transit traffic to and from Iraq. Part of the Iraqi production of sulfur and phosphates, which is now under development, would use these facilities for shipments overseas.

Thus, an extensive and integrated transport system is in the making with links between the two major regions of the west and the northeast, within the western region, and between the three sub-regions of the northwest, the south, and the seaboard. The system will form a broad transport belt with railways and parallel highways around the western and northern periphery of steppe-desert region of the central southeast part of the country.

The peripneral transport belt has its apex at Aleppo and two arms extending to Dera'a and Albu Kamal. The two arms are to be crossed by the major traverse corridors of Damascus-Tadmur-Deir Ez Zor-Al Kamishli, Homs-Tadmur-Deir Ez Zor, and Aleppo-Kara Kozak-Tal Mir-Ya'roubia. The long-distance routes are supplemented by shorter links, such as Damascus-Tanf, Damascus-Lebanon border, Aleppo-Jarablus, and Al Raqqa-Tal Abiad roads.

CHAPTER 2

POPULATION

Chapter 2

POPULATION

2.1 GENERAL

In order to forecast transport demand, Syria's population and its distribution have been forecast by the Consultants for the 1979-2000 study period. These projections have been used to forecast traffic growth.

The recent trend of population growth, the structure of the computer model used for the project, and the preliminary population forecasts are discussed below. The population analysis and the design of the model were focused on the purposes of this study. In particular, emphasis was placed on overall growth and distribution trends as opposed to component analysis, except where components could be expected to have a significant impact on the population level and distribution by 2000 (for example, urban migration).

2.2 SOURCES OF INFORMATION

The study of population has received increasing attention in the last few years. As a result, considerable analysis has already been undertaken in Syria. The data and trends used in the population model were formulated by studying all available published population materials, both data and analyses, and interviewing those persons most closely involved with the study of population.

The 1960 Census of Population was the first modern source of population data in Syria. It was the first comprehensive survey of the population in all regions of the country. As such, it formed the foundation upon which later trend analyses were developed.

The 1970 Census of Population is the most recent comprehensive population survey. In conjunction with the 1960 census, it has been used to investigate growth trends for the 1960s. Additionally, it has been used for component analyses. The Consultants have used the 1970 census to establish the base year (1970) population data of the model.

The ten-year growth trends in the major cities are presented in Table 2.1. The figures are net annual average growth rates, including both natural growth and migration effects.

The 1976 population Census by Sample was the next major source of population data. It is not as comprehensive as the 1960 or

Table 2.1

AVERAGE ANNUAL POPULATION GROWTH RATES
OF MAJOR CITIES, 1960-1970

<u>City</u>	<u>Growth Rate</u> <u>(%)</u>
Damascus	4.67
Aleppo	4.16
Homs	4.61
Hama	3.50
Lattakia	6.40
Deir Ez Zor	4.64
Al Raqqa	9.82
Idleb	3.83
Al Hassakeh	5.67
Tartous	6.87
Al Suweida	4.98
Dera'a	4.81

Sources: 1960 and 1970 Censuses,

1970 censuses, but it does provide valuable information for trend analysis. In particular, the urban and rural population levels in each Mohafaza can be compared with the corresponding levels from the 1970 census to calculate the annual growth rates for the 1970-1976 period. These rates include both natural growth and migration. The results are presented in Table 2.2.

Additionally, computer tabulations from the 1976 Census by Sample presented migration data. However, a complete migration analysis was not possible with the available data; the 1976 Census by Sample showed the origins and destinations of migrants, but it did not identify the time period during which migration occurred. Consequently, the data did not permit the derivation of annual rates of migration (this was later achieved by the calibration of the model). The computer tables did provide a good indication of the directions and relative magnitudes of migration.

The 1976-1977 Follow-up Demographic Survey conducted by the Central Bureau of Statistics is another important source of population data. It provides age-specific fertility and mortality rates for urban and rural areas and further data for the directions and relative magnitudes of migration.

The annual Statistical Abstracts published by the Central Bureau of Statistics were used as secondary sources of data since they summarize and extrapolate from the 1960 and 1970 censuses.

The Central Bureau of Statistics has recently developed a series of forecasts of population growth. The projections of the model have been compared with the Central Bureau of Statistics forecast for the year 2000; the major differences are noted in Section 2.7.

In September 1978, the Central Bureau of Statistics and the United Nations Fund for Population Activities held a seminar on population trends in Syria. The papers presented at the seminar were published as "Factors of Population Growth and Their Future Trends." These papers have provided valuable insights into the population trends and their underlying component elements.

The final publication that provided a major contribution to this population analysis was the Revised Draft Report (June 1979) by James D. Williams for the Agricultural Sector Assessment. It is titled "A Demographic Overview of Human Resources in the Syrian Arab Republic with Emphasis on National Projections, Rural and Urban Differentials, and Internal

Table 2.2

AVERAGE ANNUAL GROWTH RATES, 1970-1975 (BY MOHAFAZA)

<u>Mohafaza</u>		<u>Growth Rate</u> <u>(%)</u>
Damascus City	Urban	4.32
	Rural	-
	Total	4.32
Damascus Govenorate	Urban	3.98
	Rural	3.06
	Total	3.34
Quneitra	Urban	-
	Rural	1.93
	Total	1.93
Dera'a	Urban	4.28
	Rural	2.64
	Total	2.89
Al Suweida	Urban	1.20
	Rural	1.75
	Total	1.60
Homs	Urban	4.38
	Rural	2.50
	Total	3.39
Hama	Urban	3.98
	Rural	3.23
	Total	3.49
Tartous	Urban	4.46
	Rural	3.93
	Total	4.03
Lattakia	Urban	4.45
	Rural	3.84
	Total	4.07
Idleb	Urban	3.35
	Rural	3.96
	Total	3.83
Aleppo	Urban	4.68
	Rural	1.58
	Total	3.30

Table 2.2 (Continued)

AVERAGE ANNUAL GROWTH RATES, 1970-1976 (BY MOHAFAZA)

<u>Mohafaza</u>		<u>Growth Rates</u> <u>(%)</u>	
<u>Al Raqqa</u>			
	Urban	13.85	
	Rural	0.37	
	Total		3.21
 Deir Ez Zor			
	Urban	3.22	
	Rural	2.22	
	Total		2.53
 Al Hassakeh			
	Urban	4.16	
	Rural	2.00	
	Total		2.46
 Syria			
	Urban	4.45	
	Rural	2.61	
	Total		3.43

Sources: 1970 Census and 1976-1977 Census by Sample.

Table 2.3

WILLIAMS' POPULATION PROJECTIONS

<u>Year</u>	<u>Total Population</u> <u>(000)</u>	<u>Ending Growth Rate</u> <u>(%)</u>
1975	7,438	3.52
1980	8,979	3.84
1985	10,781	3.73
1990	12,774	3.45
1995	14,922	3.16
2000	17,085	2.74

Migration." In addition to being inherently valuable because of the quality of its discussion, the report also formulates national population projections and growth rates to the year 2000. These are presented in Table 2.3 and are compared with the model's results in Section 2.7.

The disadvantages to early incorporation of assumptions are also quite significant. The earlier assumptions are made the more numerous they need be and the more numerous are the opportunities for error. Similarly, the earlier and more numerous the assumptions, the more complex is the model and the more extensive are the data requirements, both for calibrating the model and for forecasting.

Finally, the longer the modelled causation process, the more numerous are the causation steps and quantifications (that is, assumed relationships).

There are comparable advantages and disadvantages to incorporating assumptions late in the causation process. The major drawback is usually the limited usefulness of the model beyond the value of its results. In particular, it cannot directly illustrate sensitivity to changes in underlying components.

The more important advantages to late incorporation of assumptions are the limited number of assumptions required, the limited data requirements, and the limited opportunities for error. This last factor was a dominant concern in the design of the Consultants' model.

Population changes in an area result from both natural growth and migration. There are considerable data on natural growth rates that are relatively accurate. The understanding of migration, on the other hand, suffers from a severe lack of data and analysis. Consequently, the single most important objective in the design of the model has been to quantify migration as accurately as possible. In the absence of explicit migration data, this has been accomplished by postulating a level of migration and testing and calibrating this over a period for which beginning and ending populations are known.

The major risk of this technique is in "over-fitting," which occurs when "true" underlying trends are distorted in order to make a model fit available data. This is usually camouflaged by errors that cancel each other out during the calibration period but that may not do so during later periods. The risk of over-fitting can be minimized by simplifying the model and calibration process, thereby decreasing the opportunities for camouflaged errors. For this reason, the Consultants' model

incorporates assumptions at the latest step in the causation process. Natural growth is represented by the highest level and most reliable data-net natural growth rates.

The model's structure and the results of its calibration are described in the next two sections.

Interviews were conducted with those persons who have been most closely involved with population analysis. The interviews helped the Consultants identify data sources, familiarize themselves with methodologies employed and results obtained, and most important, understand population trends and their underlying causes.¹

Based on the preceding survey of available data and analyses, the interviews, analysis of the primary data, and calibration of the model, the Consultants formulated current natural growth rates for each Mohafaza for urban and rural areas and projected the changes in these rates to the year 2000, as presented in Table 2.4.

2.3 METHODOLOGY

In the design of a simulation model, one of the first and most critical decisions to be made is where to incorporate the assumptions in the causation process. An example of the causation process for population growth (in simplified form) illustrated in Figure 2.1.

A population forecasting model could be designed to begin with assumptions across any level and calculate each subsequent step "up" the causation process leading to the absolute population growth. Incorporating assumptions early has both advantages and disadvantages. It forces the explicit recognition and quantification of causative factors that might otherwise be overlooked. Also, if an accurate model of the causation process

¹ Special acknowledgement must be made to the contribution of Mr. Muhammad Hallak, the deputy director-general of the Central Bureau of Statistics. He has been conducting analyses of regional fertility and mortality rates and has kindly shared his conclusions and worksheets with the Consultants. Mr. Hallak's work formed the foundation upon which the regional natural growth rates used in the model were developed. However, the Consultants alone bear responsibility for the adaptation of his work to the model's format and, hence, to the resulting projections.

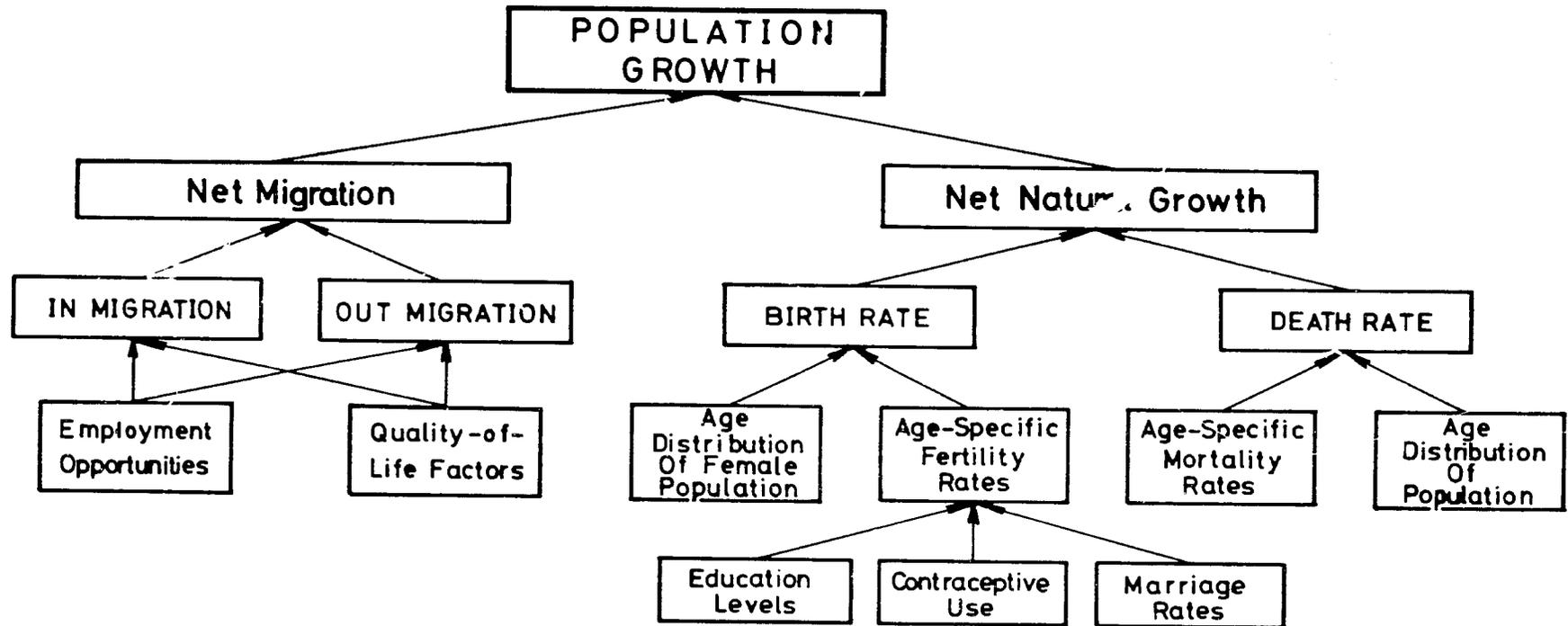
Table 2.4

ASSUMED NET NATURAL GROWTH RATES

	<u>1971-</u> <u>1975</u>	<u>1976-</u> <u>1980</u>	<u>1981-</u> <u>1985</u>	<u>1986-</u> <u>1990</u>	<u>1991-</u> <u>1995</u>	<u>1996-</u> <u>2000</u>
Greater Damascus						
Urban	3.2	3.2	3.2	3.1	2.9	2.7
Rural	4.2	4.2	4.2	4.0	3.8	3.6
Damascus Govenorate						
Urban	3.3	3.3	3.3	3.2	3.0	.8
Rural	4.2	4.2	4.2	4.0	3.8	3.6
Quneitra						
Urban	3.7	3.7	3.7	3.5	3.3	3.1
Rural	4.2	4.2	4.2	4.0	3.8	3.6
Dera'a						
Urban	3.7	3.7	3.7	3.5	3.3	3.1
Rural	4.2	4.2	4.2	4.0	3.8	3.6
Al Suweida						
Urban	3.4	3.4	3.4	3.3	3.1	2.9
Rural	4.2	4.2	4.2	4.0	3.8	3.6
Homs						
Urban	3.2	3.2	3.2	3.1	2.9	2.7
Rural	3.7	3.7	3.7	3.7	3.5	3.3
Hama						
Urban	3.2	3.2	3.2	3.1	2.9	2.7
Rural	4.0	4.0	4.0	3.9	3.7	3.5
Tartous						
Urban	3.3	3.3	3.3	3.2	3.0	2.8
Rural	4.2	4.2	4.2	4.0	3.8	3.6
Lattakia						
Urban	3.2	3.2	3.2	3.1	2.9	2.7
Rural	4.2	4.2	4.2	4.0	3.8	3.6
Idleb						
Urban	3.3	3.3	3.3	3.2	3.0	2.8
Rural	4.2	4.2	4.2	4.0	3.8	3.6
Aleppo						
Urban	3.2	3.2	3.2	3.1	2.9	2.7
Rural	3.8	3.8	3.8	3.7	3.5	3.3
Al Raqqa						
Urban	3.5	3.5	3.5	3.4	3.2	3.0
Rural	3.9	3.9	3.9	3.8	3.6	3.4
Deir Ez Zor						
Urban	3.3	3.3	3.3	3.2	3.0	2.8
Rural	3.9	3.9	3.9	3.8	3.6	3.4
Al Hassakeh						
Urban	3.3	3.3	3.3	3.2	3.0	2.8
Rural	3.9	3.9	3.9	3.8	3.6	3.4

Source: Consultants' estimates.

THE CAUSATION PROCESS (SIMPLIFIED)
FOR POPULATION GROWTH



could be developed, the benefits to policy analysis would be excellent, for it would permit quantification of the impact of changes in controllable policies (such as the effect of greater availability of contraceptives on population growth). However, the ability to create such a model forms a very big "if."

2.4 STRUCTURE OF THE MODEL

The model is organized in a straightforward step-by-step approach. Each year the new population is calculated from the old in three stages. First, the net natural growth rates for urban and rural populations in each Mohafaza are applied to the old populations in each Mantika to calculate the new pre-migration populations. Next, migration impacts are calculated for each Mantika. Finally, adjustments are made for population movements not accounted for in the migration equations.

The net natural growth rates used for the projections are presented in Table 2.4. The assumption implicit in their use is that growth rates for urban and rural populations are consistent throughout each Mohafaza. This is unquestionably an oversimplification. However, data are not available for its refinement, and its impact on national traffic projections would be minimal. The projected declines in the natural growth rates were estimated by the Consultants from the analyses discussed earlier.

Migration impacts are calculated in three steps. Outmigration is calculated by applying urban and rural migration rates to each Mantika. Net external (international) migration is next subtracted from the total number of migrants. Then the remaining migrants are allocated to urban areas with populations greater than 15,000 in proportion to their populations and coefficients of attraction.

Thus, the coefficient of attraction times the population is the measurement of a city's drawing power to migrants. Each city's share of immigration is in direct proportion to its share of the total drawing power of all urban areas. A coefficient of 1.0 is neutral, causing a natural attraction in proportion to population. Higher coefficients simulate increased drawing power; lower coefficients note decreased attractiveness.

The Consultants have retained the definition of urban area as used by the Central Bureau of Statistics - all cities with 1970 populations greater than 20,000 and all "Centers of Mantika," when existent. For migration effects, however, only cities of more than 15,000 are assumed to attract migrants.

Adjustments are of two types - unusual circumstances (such as Quneitra) and migration trends that differ from the standard equations used. Two adjustments were made for the Quneitra Mohafaza. In 1973 the model simulates a 6 percent exodus of the population. This amount was determined by the calibration process and applied to a population base already reduced in 1967.

The date and extent of repopulation of the Quneitra Mohafaza is uncertain. For simplicity, the model assumes that the Mohafaza is repopulated to the 1960 levels, as follows:

Population (in 000)

<u>Mantika</u>	<u>Urban</u>		<u>Rural</u>		<u>Total</u>
	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>	
Quneitra	8.6	8.5	31.6	29.6	78.3
	0	0	17.0	16.0	33.1

The year 1987 was arbitrarily selected as the year for repopulation. Normal growth patterns were continued after that year.

The final adjustments were designed to compensate for the oversimplification of the migration equations. They adjust the urban/rural migration impacts in several Mohafazat as determined by the calibration process.

Two adjustments were made to the official administrative boundaries in order to reflect the most realistic traffic zones. First, the Damascus city Mohafaza was expanded to include the surrounding area and called Greater Damascus. The adjustment was achieved by the addition of the Damascus Mohafaza Center, consisting of East Ghotia, West Ghotia, and Kisweh Manatik. Since this Mantika surrounds the Damascus city Mantika-Mohafaza, it does not constitute a realistic traffic zone and was more appropriately included as part of the "Greater Damascus" city area. Second, Aleppo was adjusted in an analogous manner. The Aleppo city and surrounding Sama'n Manatik were combined to form the more realistic (for transport analysis) "Greater Aleppo" area. In this case, the Mohafaza data were not affected.

2.5 CALIBRATION OF THE MODEL

The model uses 1970 as the base year. This is the most recent year that offers accurate population data at the Mantika level.

Calibration was achieved by executing the model for a six-year period and comparing the results with the 1976 Census by Sample. Refinements were made to the coefficients until the results were consistent.

The net natural growth rates were presented earlier in Table 2.4. The coefficients of attraction for urban areas in each Mohafaza, and their assumed changes, are presented in Table 2.5.

The coefficients indicate disproportionately high attractiveness for Al Raqqa, Hama, and Homs and low attractiveness for Quneitra, Deir Ez Zor, and Al Hassakeh.

The calibration process produced an annual migration rate of 1.0 percent for the 1970-1976 period. This rate is applied throughout the country to calculate the number of migrants and is assumed to remain constant to the year 2000. The coefficients of attraction were also calculated by calibration for the 1970-1976 period. As shown in Table 2.5, they are assumed to stabilize at 1.00 by the year 1990. This implicitly assumes that development and employment opportunities will be balanced throughout the country by 1990.

Four mohafazat required adjustments because the standard annual migration formula created an excess population shift from rural to urban areas. The mohafazat and annual adjustments are:

<u>Mohafaza</u>	<u>Percent Adjustment</u>
Hama	0.5
Tartous	0.2
Lattakia	0.2
Idleb	0.5

Four other Mohafazat required annual adjustments because the standard formula failed to provide enough rural to urban migration:

<u>Mohafaza</u>	<u>Percent Adjustment</u>
Aleppo	0.6
Al Raqqa	0.2
Deir Ez Zor	0.2
Al Hassakeh	0.2

The results of the calibration process are presented in Table 2.6 as a comparison of the modelled population for 1976 with estimates made by the 1976 Census by Sample.

Table 2.5

COEFFICIENTS OF ATTRACTION

<u>Mohafaza</u>	<u>1971- 1975</u>	<u>1975- 1980</u>	<u>1981- 1985</u>	<u>1986 - 1990</u>	<u>1991 - 1995</u>	<u>1996 - 2000</u>
Greater Damasus	1.00	1.00	1.00	1.00	1.00	1.00
Damasus Governorate	1.00	1.00	1.00	1.00	1.00	1.00
Quneitra	0.00	1.00	1.00	1.00	1.00	1.00
Dera'a	1.10	1.00	1.00	1.00	1.00	1.00
Al 'Suweida	0.10	0.50	0.80	1.00	1.00	1.00
Homs	2.50	2.00	1.50	1.20	1.00	1.00
Hama	3.50	2.50	1.50	1.20	1.00	1.00
Tartous	3.00	2.00	1.50	1.20	1.00	1.00
Lattakia	0.80	0.80	0.90	1.00	1.00	1.00
Idleb	1.00	1.00	1.00	1.00	1.00	1.00
Aleppo	0.90	0.90	1.00	1.00	1.00	1.00
Al Raqqa	1.50	1.20	1.20	1.00	1.00	1.00
Deir Ez Zor	0.10	0.50	0.80	1.00	1.00	1.00
Al Hassakeh	0.10	0.50	0.80	1.00	1.00	1.00

Source: Consultants' estimates.

Table 2.6

COMPARISON OF MODELLED POPULATION AND 1976 CENSUS BY SAMPLE
(000)

<u>Mohafaza</u>	<u>1976 Census</u>	<u>Consultants' Model</u>	<u>Difference (%)</u>
Damascus City			
Urban	1,082	1,078	-0.3
Rural	-	-	-
Total	1,082	1,078	-0.3
Damascus Govenorate			
Urban	233	232	-0.5
Rural	532	526	-1.1
Total	765	758	-0.9
Quneitra			
Urban	-	-	-
Rural	18	18	0.6
Total	18	18	0.6
Dera'a			
Urban	43	43	-1.5
Rural	232	233	0.4
Total	275	276	0.1
Al Suweida			
Urban	41	42	.1
Rural	113	112	-1.2
Total	154	154	-0.3
Homs			
Urban	319	328	3.0
Rural	338	339	0.4
Total	656	667	1.7
Hama			
Urban	214	221	3.0
Rural	413	411	-0.3
Total	627	632	0.9
Tartous			
Urban	73	72	-1.6
Rural	311	311	0.1
Total	384	383	-0.3
Lattakia			
Urban	193	194	0.1
Rural	300	301	0.4
Total	494	495	0.3
Idleb			
Urban	105	104	-1.1
Rural	379	377	-0.4
Total	483	481	-0.6

Table 2.6 (Continued)

COMPARISON OF MODELLED POPULATION AND 1976 CENSUS BY SAMPLE
(000)

<u>Mohafaza</u>	<u>1976 Census¹</u>	<u>Consultants' Model</u>	<u>Difference (%)</u>
Aleppo			
Urban	938	932	-0.6
Rural	666	668	0.4
Total	1,604	1,600	-0.2
Al Raqqa			
Urban	85	86	0.1
Rural	209	209	-0.1
Total	295	295	0.0
Deir Ez Zor			
Urban	106	108	1.5
Rural	231	232	0.8
Total	337	340	1.0
Al Hassakeh			
Urban	120	122	1.9
Rural	420	420	-0.1
Total	540	542	0.4
Syria			
Urban	3,552	3,560	0.2
Rural	4,161	4,159	-0.1
Total	7,713	7,719	0.1

Sources: Estimates by the Central Bureau of Statistics [SP] — [SP] from the 1976 Census by Sample, and Consultants' estimates.

2.6 FORECASTS

The model has been executed for the period 1970-2000. Projections have been made for the following years (including the model's base year): 1970, 1975, 1976, 1977, 1978, 1979, 1980, 1985, 1990, 1995, and 2000. Data for the three critical years of comprehensive traffic forecasting--1979, 1985, and 2000--are presented in Tables 2.7, 2.8, and 2.9. Also, the national population growth projections are shown graphically in Figure 2.2. Figure 2.3 shows the corresponding growth in seven major cities.

Since the model is based on regional natural growth rates and migration impacts, it neither assumes nor utilizes net growth rates either directly or indirectly. Rather, the net growth rates are the results of several factors, some of which are external to any specified Mohafaza. For example, the net growth rate for Damascus is the result of the natural growth rate of its population, the rate of migration throughout the country, and the relative attractiveness of other urban areas to migrants.

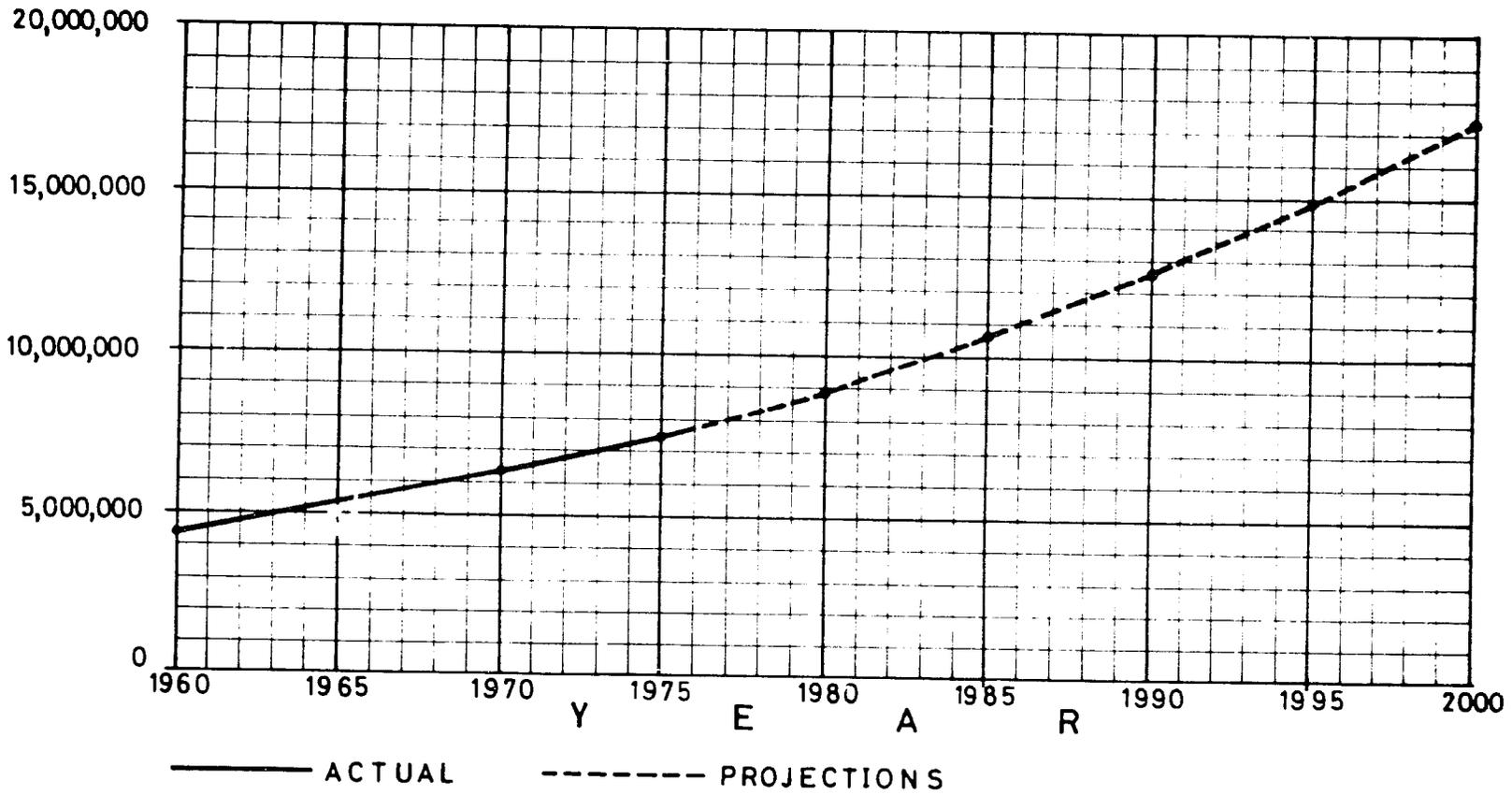
The implied net growth rates are calculated as the required equivalent compound annual growth rates to be applied to the populations at the beginning of the period to produce the ending populations. They are presented for all Mohafazat in Table 2.10 along with the actual net growth rates for 1970-1976. Table 2.11 presents the net growth rates for selected cities and their actual rates for 1960-1970.

2.7 COMPARISON WITH PREVIOUS FORECASTS

Table 2.12 presents a comparison of the Consultants' projections for the year 2000 with those of the Central Bureau of Statistics. The forecasted national population levels are relatively consistent. Some differences at the Mohafaza levels, however, should be noted. The model's projections for Deir Ez Zor and Al Hassakeh are significantly lower than those of the Central Bureau of Statistics, and the projection for Damascus is significantly higher. This is the result of the modelled migration effects.

Table 2.13 presents a comparison of national population projections as modelled by the Consultants with those of Williams presented earlier. The projections are relatively close throughout the period. Williams has projected more rapid growth in the early years and less rapid growth in the later years. This is further exhibited in Table 2.14, which compares the annual growth rates.

POPULATION PROJECTIONS FOR SYRIA
1960-2000



2-17

Figure 2.2

POPULATION PROJECTIONS FOR MAJOR CITIES*

1960 - 2000

* all cities with projected year 2000 populations exceeding 200,000

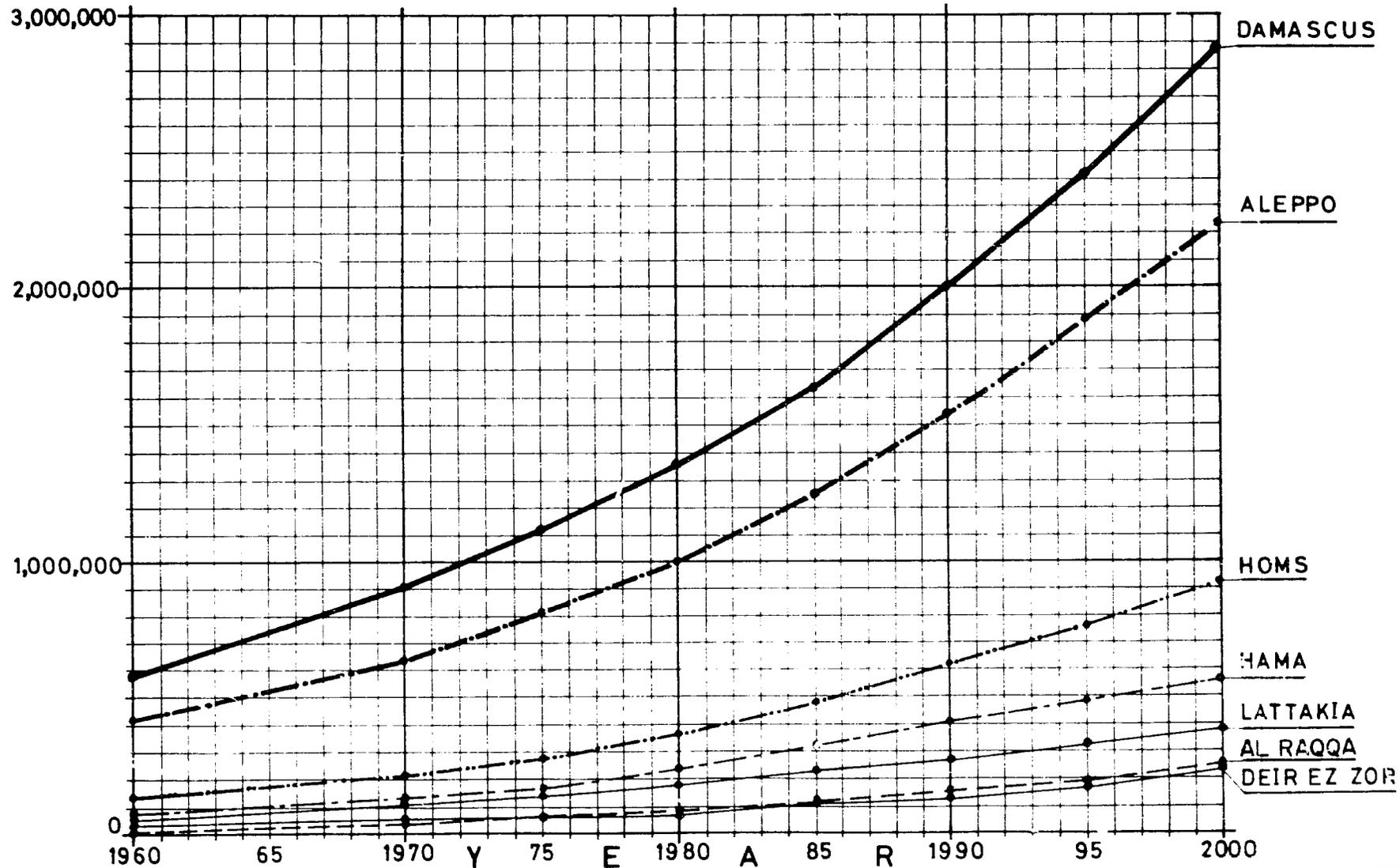


Table 2.7

POPULATION FOR 1979
(000)

<u>Mohafaza</u>	<u>Mantika</u>	<u>Urban</u>			<u>Rural</u>			<u>Total</u>
		<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>	
Greater Damascus	Greater Damascus	<u>671.1</u>	<u>629.4</u>	<u>1300.4</u>	<u>112.1</u>	<u>102.8</u>	<u>214.9</u>	<u>1515.3</u>
Total		671.1	629.4	1300.4	112.1	102.8	214.9	1515.3
Damascus Gov.	Douma	23.6	21.4	45.0	59.8	55.3	115.1	160.1
	Al Tal	10.9	11.0	22.0	16.5	16.1	32.6	54.6
	Zabadani	7.3	7.0	14.3	21.9	20.7	42.5	56.9
	Qatana	10.7	9.9	20.6	27.0	25.4	52.4	73.0
	Quoteifeh	5.1	4.8	9.9	19.8	19.6	39.5	49.4
	Nabek	10.9	10.9	21.8	13.2	13.1	26.3	48.0
	Darayya	15.2	14.0	29.2	11.2	10.2	21.4	50.7
	Yabroud	<u>0</u>	<u>0</u>	<u>0</u>	<u>15.3</u>	<u>14.7</u>	<u>30.0</u>	<u>30.0</u>
Total		83.7	79.1	162.8	184.8	175.1	359.9	522.6
Quneitra	Quneitra	0	0	0	11.5	10.6	22.1	22.1
	Fiq	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total		0	0	0	11.5	10.6	22.1	22.1
Dera'a	Izra'	3.6	3.6	7.2	72.0	72.4	144.4	151.6
	Dera'a	<u>22.8</u>	<u>21.0</u>	<u>43.8</u>	<u>61.7</u>	<u>64.1</u>	<u>125.9</u>	<u>169.6</u>
Total		26.4	24.6	50.9	133.7	136.6	270.3	321.2

Table 2.7 (continued)

POPULATION FOR 1979
(000)

<u>Mohafaza</u>	<u>Mantika</u>	<u>Urban</u>			<u>Rural</u>			<u>Total</u>
		<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>	
Al Suweida	Shahba	2.8	2.6	5.4	16.7	16.5	33.2	38.6
	Salkhad	3.0	3.1	6.1	19.8	20.1	39.9	46.0
	Al Suweida	<u>20.4</u>	<u>19.3</u>	<u>39.7</u>	<u>31.8</u>	<u>30.9</u>	<u>62.7</u>	<u>102.4</u>
Total		26.2	25.0	51.2	68.2	67.5	135.7	187.0
Homs	Tadmur	8.4	8.1	16.5	6.4	6.0	12.4	29.0
	Tal Kalakh	4.0	3.8	7.9	42.8	42.9	85.7	93.6
	Al Rastan	4.6	4.4	9.0	19.5	19.0	38.5	47.5
	Al Qussein	5.6	5.5	11.0	20.1	19.6	39.7	50.8
	Al Mouharram	1.3	1.3	2.6	13.5	12.9	26.3	28.9
	Homs	<u>178.0</u>	<u>165.0</u>	<u>343.0</u>	<u>82.0</u>	<u>80.6</u>	<u>162.6</u>	<u>505.6</u>
Total		202.0	188.0	390.0	184.4	181.0	365.4	755.4
Hama	Al Salamieh	17.9	17.2	35.1	35.7	34.9	70.6	105.7
	Al Ghab	4.1	3.9	7.9	57.8	54.3	112.1	120.0
	Missiaf	5.1	4.8	9.9	44.0	43.7	87.7	97.7
	Mhardeh	0	0	0	31.3	30.4	61.7	61.7
	Hama	<u>116.0</u>	<u>106.8</u>	<u>222.8</u>	<u>57.9</u>	<u>57.0</u>	<u>114.9</u>	<u>337.7</u>
Total		143.1	132.7	275.8	226.6	220.4	447.0	722.7

Table 2.7 (continued)

POPULATION FOR 1979
(000)

<u>Mohafaza</u>	<u>Mantika</u>	<u>Urban</u>			<u>Rural</u>			<u>Total</u>
		<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>	
Aleppo	Greater Aleppo	494.4	460.0	954.5	76.2	74.1	150.3	1104.8
	Isas	7.5	7.2	14.8	49.8	49.2	99.0	113.7
	Al Bab	16.5	15.4	31.9	39.3	37.8	77.1	109.0
	Jarablus	2.4	2.4	4.7	18.2	17.9	36.1	40.8
	Ifrin	6.4	6.0	12.5	65.9	62.7	128.6	141.0
	Ain Al Arab	4.6	4.4	9.0	43.6	41.2	84.8	93.8
	Manbedj	11.4	10.5	21.8	53.4	51.2	104.6	126.4
	Al Sira	0	0	0	20.5	21.0	41.5	41.5
	Total	543.2	505.9	1049.1	367.0	355.1	722.1	1771.2
Al Raqqa	Tal Abiad	2.2	1.9	4.1	25.5	23.9	49.4	53.5
	Al Raqqa	48.9	44.1	93.0	93.3	83.7	177.0	270.0
	Total	51.1	46.0	97.1	118.8	107.6	226.4	323.6
Deir Ez Zor	Albu Kamal	8.9	8.5	17.4	35.7	37.5	73.2	90.7
	Al Mayadin	6.4	6.2	12.6	30.2	30.5	60.7	73.3
	Deir Ez Zor	47.7	43.4	91.0	60.4	57.5	117.9	208.9
	Total	63.0	58.1	121.1	126.3	125.5	251.8	372.8

Table 2.7 (continued)

POPULATION FOR 1979
(000)

<u>Mohafaza</u>	<u>Mantika</u>	<u>Urban</u>			<u>Rural</u>			<u>Total</u>
		<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>	
Tartous								
	Banias	9.4	9.0	18.5	44.6	43.1	87.7	106.2
	Tartous	25.7	23.7	49.4	50.1	48.3	98.4	147.8
	Safita	4.3	4.1	8.4	38.8	36.5	75.3	83.7
	Sheikh Badr	0.3	0.2	0.5	18.3	17.0	35.3	35.8
	Dreikish	<u>1.9</u>	<u>1.7</u>	<u>3.6</u>	<u>22.5</u>	<u>20.7</u>	<u>43.2</u>	<u>46.8</u>
Total		41.6	38.8	80.4	174.2	165.8	399.9	420.3
Lattakia								
	Lattakia	94.7	87.5	182.1	58.7	55.6	114.3	296.5
	Djableh	12.4	11.8	24.1	53.5	50.0	103.4	127.5
	Al Hiffeh	1.9	1.8	3.7	36.3	33.3	69.6	73.2
	Qirdaha	<u>2.0</u>	<u>1.8</u>	<u>3.7</u>	<u>22.0</u>	<u>20.1</u>	<u>42.1</u>	<u>45.9</u>
Total		110.8	102.8	213.7	170.5	158.9	329.4	543.1
Idleb								
	Idleb	26.1	23.7	49.8	55.8	54.2	110.0	159.8
	Ariha	6.7	6.3	13.0	30.1	29.1	59.2	72.2
	Jisr Al							
	Shughour	11.5	10.4	21.9	33.4	31.8	65.3	87.1
	Harem	2.8	2.6	5.4	43.1	40.6	83.7	89.1
	Ma'arrat Al							
	Nuo'man	<u>12.4</u>	<u>12.0</u>	<u>24.4</u>	<u>47.0</u>	<u>46.9</u>	<u>93.9</u>	<u>118.4</u>
Total		59.5	55.0	114.6	209.5	202.6	412.1	526.6

Table 2.7 (continued)

POPULATION FOR 1979
(000)

<u>Mohafaza</u>	<u>Mantika</u>	<u>Urban</u>			<u>Rural</u>			<u>Total</u>
		<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>	
Al Hassakeh								
	Al Hassakeh	25.0	22.5	47.6	74.2	72.0	146.2	193.8
	Ras Al Ain	5.3	4.9	10.2	33.1	32.2	65.4	75.5
	Al Kamishli	35.6	33.7	69.3	76.1	74.4	150.5	219.8
	Al Malkieh	5.2	5.0	10.2	47.2	45.2	92.5	102.7
Total		71.1	66.2	137.3	230.7	223.9	454.5	591.8
Grand Total for Syria		2092.7	1951.6	4044.3	2318.2	2233.3	4551.5	8595.8

Source: Consultants' projections.

Table 2.8

POPULATION FOR 1985
(000)

<u>Mohafaza</u>	<u>Mantika</u>	<u>Urban</u>			<u>Rural</u>			<u>Total</u>
		<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>	
Greater Damascus	Greater Damascus	847.9	795.2	1643.1	135.0	123.9	258.9	1902.1
Total		847.9	795.2	1643.1	135.0	123.9	258.9	1902.1
Damascus Gov.								
	Douma	30.0	27.2	57.2	72.0	66.7	138.7	195.9
	Al Tal	13.9	14.0	27.9	19.9	19.4	39.3	67.3
	Zabadani	9.1	8.8	17.9	26.4	24.9	51.3	69.2
	Qatana	13.5	12.6	26.2	32.6	30.6	63.2	89.3
	Qouteifeh	5.9	5.5	11.3	23.9	23.7	47.6	58.9
	Nabek	13.8	13.8	27.7	15.9	15.7	31.6	59.3
	Darayya	19.3	17.8	37.1	13.5	12.3	25.8	63.0
	Yabroud	0	0	0	18.5	17.7	36.2	36.2
Total		105.6	99.7	205.3	222.7	211.0	433.7	639.0
Quneitra								
	Quneitra	0	0	0	13.8	12.8	26.6	26.6
	Fiq	0	0	0	0	0	0	0
Total		0	0	0	13.8	12.8	26.6	26.6
Dera'a								
	Izra'	4.2	4.2	8.4	86.7	87.3	174.0	182.5
	Dera'a	29.6	27.3	56.9	74.4	77.3	151.7	208.6
Total		33.8	31.5	65.3	161.2	164.6	325.7	391.1

Table 2.8 (continued)

POPULATION FOR 1985
(000)

<u>Mohafaza</u>	<u>Mantika</u>	<u>Urban</u>			<u>Rural</u>			<u>Total</u>
		<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>	
Al Suweida	Shahba	3.2	3.0	6.2	20.1	19.9	40.0	46.2
	Salkhad	3.5	3.5	7.0	23.8	24.2	48.0	55.1
	Al Suweida	<u>26.0</u>	<u>24.7</u>	<u>50.7</u>	<u>38.3</u>	<u>37.2</u>	<u>75.5</u>	<u>126.3</u>
Total		32.7	31.3	64.0	82.2	81.4	163.6	227.5
Homs	Tadmur	11.9	11.4	23.3	7.5	7.0	14.6	37.9
	Tal Kalakh	4.6	4.4	8.9	50.2	50.2	100.4	109.3
	Al Rastan	5.3	5.0	10.2	22.8	22.3	45.1	55.3
	Al Qussein	6.3	6.2	12.6	23.6	23.0	46.5	59.1
	Al Mouharram	1.5	1.5	3.0	15.8	15.1	30.8	33.8
	Homs	<u>251.4</u>	<u>233.0</u>	<u>484.5</u>	<u>96.1</u>	<u>94.3</u>	<u>190.4</u>	<u>674.9</u>
Total		281.0	261.4	542.5	215.9	211.9	427.8	970.2
Hama	Al Salamieh	26.1	25.0	51.1	43.4	42.5	85.8	136.9
	Al Ghab	4.5	4.3	8.7	70.3	66.0	136.3	145.1
	Missiaf	5.6	5.3	11.0	53.5	53.2	106.7	117.6
	Mhardeh	0	0	0	38.0	37.0	75.0	75.0
	Hama	<u>168.6</u>	<u>155.3</u>	<u>323.9</u>	<u>70.4</u>	<u>69.3</u>	<u>139.7</u>	<u>463.6</u>
Total		204.8	189.9	394.7	275.6	268.0	543.6	938.2

Table 2.8 (continued)

POPULATION FOR 1985
(000)

<u>Mohafaza</u>	<u>Mantika</u>	<u>Urban</u>			<u>Rural</u>			<u>Total</u>
		<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>	
Tartous								
	Banias	12.1	11.6	23.7	53.9	52.1	106.0	129.7
	Tartous	32.9	30.4	63.3	60.5	58.4	118.9	182.3
	Safita	4.8	4.7	9.5	46.9	44.1	91.0	100.5
	Sheikh Badr	0.3	0.3	0.6	22.1	20.6	42.7	43.2
	Dreikish	<u>2.2</u>	<u>1.9</u>	<u>4.1</u>	<u>27.2</u>	<u>25.1</u>	<u>52.2</u>	<u>56.3</u>
Total		52.3	48.9	101.2	210.5	200.4	410.9	512.0
Lattakia								
	Lattakia	115.7	107.0	222.7	71.3	67.5	138.9	361.6
	Djableh	15.1	14.4	29.5	64.9	60.6	125.6	155.1
	Al Hiffeh	2.1	2.0	4.1	44.1	40.4	84.5	88.6
	Qirdaha	<u>2.2</u>	<u>2.0</u>	<u>4.2</u>	<u>26.8</u>	<u>24.4</u>	<u>51.2</u>	<u>55.4</u>
Total		135.1	125.4	260.5	207.1	193.0	400.1	660.6
Idleb								
	Idleb	31.9	28.9	60.8	67.8	65.9	133.7	194.5
	Ariha	7.4	7.0	14.4	36.6	35.3	71.9	86.3
	Jisr							
	Al Shughour	14.0	12.7	26.7	40.6		79.3	106.0
	Harem	3.1	2.9	6.0	52.4	49.3	101.7	107.7
	Ma'arrat							
	Al Nuo'man	<u>15.2</u>	<u>14.7</u>	<u>29.8</u>	<u>57.2</u>	<u>57.0</u>	<u>114.1</u>	<u>144.0</u>
Total		71.6	66.2	137.8	254.6	246.2	500.8	638.5

Table 2.8 (continued)

POPULATION FOR 1985
(000)

<u>Mohafaza</u>	<u>Mantika</u>	<u>Urban</u>			<u>Rural</u>			<u>Total</u>
		<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>	
Aleppo								
	Greater Aleppo	647.0	602.0	1249.1	86.6	84.2	170.8	1419.8
	Isas	9.8	9.5	19.3	56.6	55.8	112.4	131.7
	Al Bab	21.6	20.1	41.7	44.7	42.9	87.6	129.4
	Jarablus	2.7	2.7	5.5	20.6	20.4	41.0	46.5
	Ifrin	7.5	7.0	14.5	74.8	71.2	146.0	160.6
	Ain Al Arab	5.4	5.1	10.4	49.6	46.8	96.4	106.8
	Manbedj	14.9	13.7	28.6	60.6	58.1	118.8	147.4
	Al Sira	0	0	0	23.3	23.9	47.2	47.2
	Total	708.9	660.2	1369.2	416.8	403.3	820.2	2189.3
Al Raqqa								
	Tal Abiad	2.7	2.3	4.9	29.8	28.0	57.8	62.7
	Al Raqqa	65.9	59.4	125.3	109.2	97.9	207.2	332.5
	Total	68.5	61.7	130.2	139.1	125.9	265.0	395.2
Deir Ez Zor								
	Albu Kamal	11.7	11.1	22.7	41.8	43.9	85.7	108.4
	Al Mayadin	7.5	7.3	14.8	35.3	35.6	71.0	85.8
	Deir Ez Zor	62.2	56.6	118.9	70.6	67.3	137.9	256.8
	Total	81.4	75.0	156.4	147.8	146.9	294.6	451.0

Table 2.8 (continued)

POPULATION FOR 1985
(000)

<u>Mohafaza</u>	<u>Mantika</u>	<u>Urban</u>			<u>Rural</u>			<u>Total</u>
		<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>	
Al Hassakeh								
	Al Hassakeh	33.1	29.8	63.0	86.8	84.3	171.1	234.1
	Ras Al Ain	6.3	5.8	12.1	38.8	37.7	76.5	88.6
	Al Kamisali	47.1	44.6	91.7	89.0	87.1	176.1	267.8
	Al Malkieh	6.2	5.9	12.2	55.3	52.9	108.2	120.3
Total		92.7	86.2	178.9	269.9	262.0	531.9	710.8
Grand Total for Syria		2716.4	2532.6	5249.0	2752.2	2651.1	5403.3	10652.3

Source: Consultants' projections.

Table 2.9

POPULATION FOR 2000
(000)

<u>Mohafaza</u>	<u>Mantika</u>	<u>Urban</u>			<u>Rural</u>			<u>Total</u>
		<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>	
Greater Damascus	Greater Damascus	<u>1488.6</u>	<u>1395.9</u>	<u>2884.5</u>	<u>200.8</u>	<u>184.3</u>	<u>385.1</u>	<u>3269.6</u>
Total		1488.6	1395.9	2884.5	200.8	184.3	385.1	3269.6
Damascus Gov.								
	Douma	53.5	48.4	101.9	107.1	99.2	206.3	308.2
	Al Tal	24.7	25.0	49.7	29.6	28.9	58.5	108.2
	Zabadani	16.3	15.7	31.9	39.2	37.0	76.2	108.2
	Qatana	24.1	22.5	46.6	48.4	45.5	94.0	140.6
	Qouteifeh	8.1	7.6	15.7	35.5	35.2	70.7	86.5
	Nabek	24.7	24.6	49.3	23.7	23.4	47.1	96.3
	Darayya	34.4	31.8	66.1	20.1	18.4	38.4	104.6
	Yabroud	0	0	0	27.5	26.3	53.8	53.8
Total		185.8	175.5	361.3	331.2	313.9	645.1	1006.3
Quneitra								
	Quneitra	14.7	14.5	29.2	44.8	42.0	86.9	116.1
	Fiq	0	0	0	24.2	22.7	46.9	46.9
Total		14.7	14.5	29.2	69.0	64.8	133.8	163.0
Dera'a								
	Izra'	5.9	5.8	11.8	129.0	129.9	258.9	270.6
	Dera'a	<u>55.1</u>	<u>50.8</u>	<u>105.9</u>	<u>110.7</u>	<u>115.0</u>	<u>225.6</u>	<u>331.5</u>
Total		61.0	56.6	117.6	239.7	244.8	484.5	602.1

Table 2.9 (continued)

POPULATION FOR 2000
(000)

<u>Mohafaza</u>	<u>Mantika</u>	<u>Urban</u>			<u>Rural</u>			<u>Total</u>
		<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>	
Al Suweida	Shahba	4.3	4.1	8.4	29.9	29.6	59.5	67.9
	Salkhad	4.7	4.8	9.5	35.5	36.0	71.4	81.0
	Al Suweida	<u>47.1</u>	<u>44.6</u>	<u>91.6</u>	<u>57.0</u>	<u>55.4</u>	<u>112.4</u>	<u>204.0</u>
Total		56.1	53.5	109.6	122.3	121.0	243.3	352.9
Homs	Tadmur	22.3	21.4	43.7	10.7	10.0	20.8	64.5
	Tal Kalakh	6.0	5.7	11.8	71.4	71.5	142.9	154.7
	Al Rastan	6.9	6.5	13.4	32.5	31.8	64.3	77.7
	Al Qussein	9.6	9.4	19.1	33.6	32.7	66.3	85.3
	Al Mouharram	2.0	1.9	3.9	22.4	21.4	43.9	47.8
	Homs	<u>471.7</u>	<u>437.0</u>	<u>908.7</u>	<u>136.8</u>	<u>134.4</u>	<u>271.2</u>	<u>1179.9</u>
Total		518.5	482.1	1000.6	307.5	301.8	609.3	1609.8
Hama	Al Salamieh	45.4	43.5	88.9	67.4	66.1	133.5	222.4
	Al Ghab	5.5	5.2	10.7	109.3	102.6	212.0	222.7
	Missiaf	6.9	6.5	13.4	83.2	82.7	165.9	179.3
	Mhardeh	0	0	0	59.1	57.5	116.6	116.6
	Hama	<u>293.3</u>	<u>270.1</u>	<u>563.4</u>	<u>109.4</u>	<u>107.8</u>	<u>217.2</u>	<u>780.7</u>
Total		351.0	325.4	676.4	428.5	416.7	845.2	1521.6

Table 2.9 (continued)

<u>Mohafaza</u>	<u>Mantika</u>	<u>POPULATION FOR 2000</u>			<u>POPULATION FOR 2000</u>			<u>Total</u>
		<u>(000)</u>			<u>(000)</u>			
		<u>Urban</u>			<u>Rural</u>			
		<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>	
Tartous	Banias	21.1	20.2	41.3	80.8	78.2	159.0	200.3
	Tartous	57.5	53.0	110.5	90.7	87.6	178.3	288.8
	Safita	6.2	6.1	12.3	70.3	66.2	136.5	148.7
	Sheikh Badr	0.4	0.4	0.7	33.1	30.9	64.0	64.7
	Dreikish	2.8	2.5	5.3	40.7	37.6	78.3	83.6
Total		88.0	82.2	170.2	315.5	300.4	616.0	786.2
Lattakia	Lattakia	195.3	180.5	375.8	108.3	102.5	210.8	586.6
	Djableh	25.5	24.3	49.8	98.6	92.1	190.7	240.5
	Al Hiffeh	2.7	2.6	5.3	66.9	61.4	128.3	133.6
	Qirdaha	2.8	2.6	5.4	40.6	37.1	77.7	83.1
Total		226.3	209.9	436.2	314.4	293.1	607.5	1043.7
Idleb	Idleb	52.2	47.3	99.5	103.1	100.1	203.2	302.7
	Ariha	11.9	11.3	23.2	55.6	53.7	109.3	132.5
	Jisr							
	Al Shughour	22.9	20.8	43.7	61.7	58.8	120.5	164.2
	Harem	3.9	3.6	7.5	79.6	74.9	154.5	162.0
	Ma'arrat Al							
	Nuo'man	24.8	24.0	48.8	86.8	86.6	173.5	222.3
Total		115.7	107.0	222.7	386.9	374.1	761.0	983.7

Table 2.9 (continued)

POPULATION FOR 2000

(000)

<u>Mohafaza</u>	<u>Mantika</u>	<u>Urban</u>			<u>Rural</u>			<u>Total</u>
		<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>	
Aleppo								
	Greater Aleppo	1188.5	1105.7	2294.3	112.7	109.5	222.2	2516.5
	Isas	18.1	17.4	35.5	73.6	72.7	146.3	181.8
	Al Bab	39.7	37.0	76.7	58.1	55.9	114.0	190.7
	Jarablus	3.8	3.8	7.6	26.9	26.5	53.4	60.9
	Ifrin	13.5	12.7	26.1	97.4	92.7	190.0	216.2
	Ain Al Arab	7.4	7.0	14.4	64.5	60.9	125.4	139.8
	Manbedj	27.4	25.2	52.5	78.9	75.7	154.5	207.1
	Al Sira	0	0	0	30.3	31.1	61.4	61.4
	Total	1298.3	1208.7	2507.0	542.4	524.9	1067.3	3574.3
Al Raqqa								
	Tal Abiad	3.8	3.3	7.1	41.8	39.2	81.1	88.2
	Al Raqqa	127.2	114.7	242.0	153.2	137.4	290.5	532.5
	Total	131.1	118.0	249.1	195.0	176.6	371.6	620.7
Deir Ez Zor								
	Albu Kamal	21.8	20.7	42.5	58.6	61.6	120.2	162.7
	Al Mayadin	14.0	13.7	27.7	49.6	50.0	99.5	127.2
	Deir Ez Zor	116.4	105.8	222.2	99.0	94.4	193.4	415.7
	Total	152.2	140.3	292.4	207.2	206.0	413.1	705.6

Table 2.9 (continued)

<u>POPULATION FOR 2000</u>								
(000)								
<u>Mohafaza</u>	<u>Mantika</u>	<u>Urban</u>			<u>Rural</u>			<u>Total</u>
		<u>Male</u>	<u>Female</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>	
Al Hassakeh								
	Al Hassakeh	63.7	57.4	121.1	121.8	118.2	240.0	361.1
	Ras Al Ain	10.3	9.6	19.9	54.4	52.9	107.3	127.2
	Al Kamishli	90.6	85.8	176.4	124.8	122.1	246.9	423.3
	Al Malkieh	<u>10.4</u>	<u>10.0</u>	<u>20.4</u>	<u>77.5</u>	<u>74.2</u>	<u>151.7</u>	<u>172.1</u>
Total		175.1	162.8	337.8	378.5	367.4	745.9	1083.7
Grand Total for Syria		4862.3	4532.3	9394.6	4038.7	3889.9	7928.6	17323.2

Source: Consultants' projections.

Table 2.10

AVERAGE ANNUAL GROWTH RATES

<u>Mohafaza</u>	Actual	Consultants' Projections		
	<u>1970-1976</u> (%)	<u>1970-1980</u> (%)	<u>1980-1990</u> (%)	<u>1990-2000</u> (%)
Greater Damascus	4.32	3.95	3.85	3.61
Damascus Governorate	3.34	3.29	3.28	3.05
Quneitra	1.93	3.29	18.30 ¹	2.91
Dera'a	2.89	3.62	3.15	2.90
Al Suweida	1.60	3.29	3.18	2.94
Homs	3.39	3.74	4.00	3.26
Hama	3.49	3.94	3.97	3.13
Tartous	4.03	3.70	3.16	2.86
Lattakia	4.07	3.71	3.22	3.08
Idleb	3.83	3.55	3.11	2.91
Aleppo	3.30	3.37	3.50	3.28
Al Raqqa	3.21	3.21	3.25	3.04
Deir Ez Zor	2.53	2.78	3.15	3.00
Al Hassakeh	2.46	2.68	2.98	2.85
Syria	3.43	3.52	3.57	3.19

Source: 1970 and 1976 Census and Consultants' projections.

¹Abnormal because of assumed repopulation of Quneitra in 1987.

Table 2.11

AVERAGE ANNUAL GROWTH RATES OF MAJOR CITIES

<u>City</u>	Actual	Consultants' Projections		
	<u>1960-1970</u>	<u>1970-1980</u>	<u>1980-1990</u>	<u>1990-2000</u>
	(%)	(%)	(%)	(%)
Damascus	4.67	4.11	3.99	3.74
Aleppo	4.16	4.56	4.45	4.04
Homs	4.61	5.41	5.40	3.94
Hama	3.50	5.72	5.32	3.42
Lattakia	6.40	4.12	3.50	3.54
Deir Ez Zor	4.64	3.72	4.48	4.17
Al Raqqa	9.82	10.14	4.90	4.39
Idleb	3.83	4.07	3.38	3.33
Al Hassakeh	5.67	4.31	4.71	4.35
Tartous	6.87	5.59	4.16	3.64
Al Suweida	4.98	3.41	4.19	3.95
Dera'a	4.81	5.14	4.44	4.15

Sources: 1960 and 1970 Census and Consultants' projections.

Table 2.12

COMPARISONS OF THE CONSULTANTS' PROJECTIONS
FOR THE YEAR 2000 WITH THOSE OF THE CBS

(000)

<u>Mohafaza</u>	<u>CBS^a</u>	<u>Consultants</u>	<u>Difference</u> (%)
Damascus City	2,177	2,452	+ 12.6
Damascus Governorate	1,704	1,824	+ 7.1
Quneitra	44	163	b
Dera'a	655	602	- 8.1
Al Suweida	345	353	+ 2.3
Homs	1,545	1,610	+ 4.2
Hama	1,504	1,522	+ 1.2
Tartous	836	786	- 5.9
Lattakia	1,069	1,044	- 2.4
Idleb	1,018	984	- 3.4
Aleppo	3,463	3,574	+ 3.2
Al Raqqa	636	621	- 2.5
Deir Ez Zor	836	706	- 15.6
Al Hassakeh	1,251	1,084	- 13.4
All Syria	17,085	17,323	+ 1.4

Sources: Central Bureau of Statistics, Consultants' Projections,

^a Central Bureau of Statistics.

^b Abnormal because of assumed repopulation of Quneitra.

Table 2.13

COMPARISON OF CONSULTANTS' PROJECTIONS FOR POPULATION WITH THOSE OF WILLIAMS

<u>Year</u>	<u>Williams' Projections</u> (000)	<u>Consultants' Projections</u> (000)	<u>Difference</u> (%)
1980	8,979	8,909	-0.8
1985	10,781	10,652	-1.2
1990	12,774	12,656	-0.9
1995	14,922	14,883	-0.3
2000	17,085	17,323	+1.4

Table 2.14

COMPARISON OF CONSULTANTS' PROJECTIONS FOR POPULATION GROWTH RATES WITH THOSE OF WILLIAMS

<u>Year</u>	<u>Williams' Projections</u> (%)	<u>Consultants' Projections</u> (%)	<u>Difference</u> (%)
1975	3.52	3.52	-
1980	3.84	3.63	-0.21
1985	3.73	3.58	-0.15
1990	3.45	3.40	-0.05
1995	3.16	3.19	+0.03
2000	2.74	2.92	+0.18

Sources: Williams Brothers Report and Consultants' projections.

CHAPTER 3

THE NATIONAL ECONOMY

THE NATIONAL ECONOMY

3.1 GENERAL

The Syrian economy is diversified in nature with mining, industry, and commerce making important contributions alongside the traditionally important agricultural sector. Considerable potential exists for further development, but the economy is experiencing a period of relatively slow growth following rapid expansion up until 1975. Major problem areas exist in commissioning large investment projects and in developing export markets to replace petroleum products, the exploitable reserves of which at current production rates are estimated to last only thirty years.

The rapid growth in the population projected in Chapter 2 and the high educational level of the labor force facilitates industrial development. This is currently being concentrated into three areas: use of indigenous raw materials in oil refineries, fertilizer factories, and textile and sugar mills; import substitution through vehicle assembly and the manufacture of consumer durables; and the production of a variety of light, mainly consumer articles.

The economy is guided by Five-Year Plans (FYP), the fourth of which covers the 1976 to 1980 period. Planning is facilitated by Government ownership of most large and medium size industry as well as a substantial proportion of wholesale trade. The private sector is subject to tight price control. Government purchases and public investment in 1979 accounted for 42 percent of gross domestic product (GDP). In 1978 Government agencies handled 71 percent of imports and 89 percent of exports. Despite this degree of Government control, performance in the 4th FYP is well below target, except in the construction sector. The 5th FYP is expected to emphasize the utilization of developments in progress with little investment on completely new projects.

Future development will re-emphasize agricultural resources with a doubling of the irrigated area likely before the associated works on the Euphrates Dam are complete. Crop yields on existing hectarage should also rise sharply following higher fertilizer usage. Syria's asset of strategic location as the Arab gateway to and from Europe is capable of further exploitation. The substantial tourist potential of the country is as yet little developed. The economy will also continue to benefit in terms of remittance income from the nearby oil-exporting states. Syria is thus relatively well placed to regain a high rate of economic growth.

3.2 NATIONAL ACCOUNTS

The national accounts for 1970, and for years 1974 to 1979, are presented in Table 3.1. Figures are shown both in constant 1975 prices and at outturn (current) prices. In Table 3.2 are shown the contributions of major sectors to GDP and in Table 3.3 gross fixed capital formation by sector and by type of asset.

In 1979 GDP at market prices totalled SP 35.9 billion, a per capita level of SP 4,175, or \$1,064. Between 1970 and 1975 real GDP growth averaged 13.7 percent per annum, but between 1975 and 1979, it averaged only 4.3 percent per annum. The growth rates of the components of GDP other than exports have been higher than these figures would suggest, a very poor international trade performance severely reducing the GDP growth. Exports at constant 1975 prices were identical in 1970 and 1979, whereas imports grew by SP 6.0 billion over the period. Private consumption, both private and public investment, and Government purchases of goods and services all expanded rapidly in real terms from 1970 to 1975 and grew much more modestly over the 1975 to 1979 period. Private consumption accounted for 51 percent of GDP plus imports in 1979 (at outturn prices), private and public investment for 21 percent, Government purchases for 14 percent, and exports for 14 percent. The relative shares in 1970 were 60 percent, 11 percent, 14 percent, and 14 percent, respectively, and this change represents a very sharp diversion of resources from consumption into investment.

Comparison of the GDP series at outturn with that at constant prices shows an inflation rate averaging 9.8 percent per annum between 1970 and 1975 and 10.0 percent between 1975 and 1979.

Table 3.2 shows that in both 1970 and 1979 the agriculture, forestry and fishing, and the mining and manufacturing sectors were of approximately equal size in terms of contributions to GDP. The most important sector in 1979, wholesale and retail trade, was also of a similar size accounting for 22 percent of GDP compared with 21 percent and 18 percent, respectively, for mining and manufacturing, and agriculture. The fastest growing production sector in the 1970s was building and construction with an average real annual growth rate of 15.1 percent from 1970 to 1979. However, Government services grew at a rate of 17.5 percent and wholesale and retail trade by 11.7 percent, and the three production sectors contributed the same share of 46 percent of GDP in 1979 as in 1970 in outturn prices, although at constant prices their share declined somewhat, the difference being due to the real increase in petroleum prices over the period.

Gross fixed capital formation (Table 3.3) reached a peak in real terms in 1977 after very rapid growth averaging 22.6 percent per annum from 1970. In 1978 and 1979 real

Table 3.1
NATIONAL ACCOUNTS
(in SP billions)

	<u>Constant 1975 Prices</u>						
	<u>1970</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979¹</u>
Private Consumption	5.96	10.95	13.04	13.25	13.43	14.69	16.75
Private Investment	0.62	1.00	1.44	1.85	3.18	2.61	1.96
Public Investment	1.29	2.74	3.71	4.95	4.77	4.30	5.25
Government Purchases	1.52	3.06	4.34	4.34	4.38	4.93	5.29
Exports	3.94	3.95	4.41	4.34	4.33	4.24	3.94
Imports	- 2.44	- 5.94	- 7.00	- 7.14	- 7.99	- 7.76	- 8.45
Increase in Stocks	0.05	0.96	0.76	0.80	- 0.26	0.72	- 0.05
G.D.P. at Market Prices	10.92	16.71	20.71	22.39	21.91	23.73	24.53
Indirect Taxes (Net)	- 0.22	- 0.11	- 0.50	- 0.33	- 0.39	- 0.51	- 0.51
G.D.P. at Factor Cost	10.70	16.61	20.21	22.06	21.44	23.22	24.01
Fixed Capital Consumption	- 0.66	- 0.58	- 0.58	- 0.66	- 0.73	- 0.81	- 0.88
Net D.P. at Factor Cost	10.04	16.03	19.63	21.40	20.71	22.41	23.13
Intermediate Consumption at Market Prices	6.28	8.08	9.78	11.36	11.85	12.89	13.81
	<u>Outturn Prices</u>						
	<u>1970</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979¹</u>
Private Consumption	4.97	10.70	13.04	14.94	18.77	21.63	25.38
Private Investment	0.26	0.72	1.44	2.07	3.61	2.95	2.38
Public Investment	0.64	2.35	3.71	5.69	5.99	5.94	7.81
Government Purchases	1.19	2.82	4.34	4.97	5.30	6.50	6.82
Exports	1.19	3.82	4.41	4.83	4.91	4.81	7.10
Imports	- 1.43	- 5.35	- 7.00	- 8.48	-10.98	-10.11	-13.53
Increase in Stocks	- 0.04	0.90	0.76	0.90	- 0.33	0.99	- 0.08
G.D.P. at Market Prices	6.85	15.95	20.71	24.92	27.26	32.70	35.89
Indirect Taxes (Net)	- 0.43	- 0.30	- 0.50	- 0.52	- 0.56	- 1.85	- 0.53
G.D.P. at Factor Cost	6.41	15.65	20.21	24.39	26.71	30.85	35.36
Fixed Capital Consumption	- 0.31	- 0.48	- 0.58	- 0.75	- 0.88	- 1.03	- 1.15
Net D.P. at Factor Cost	6.11	15.17	19.63	23.64	25.83	29.82	34.21
Intermediate Consumption at Market Prices	3.43	7.31	9.78	12.35	14.12	16.02	17.75

Source: Central Bureau of Statistics.

¹ Provisional figures.

Table 3.2

GDP AT MARKET PRICES

(in SP billions)

<u>Sector</u>	<u>Constant 1975 Prices</u>						
	<u>1970</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u> ¹
Agriculture, Forestry and Fisheries	2.20	3.57	3.71	4.36	3.71	4.42	3.99
Mining & Manufacturing ²	2.13	3.27	4.17	4.46	4.18	4.47	4.45
Building & Construction	0.50	0.96	0.96	1.50	1.53	1.59	1.77
Transport and Communications	1.64	1.92	2.41	1.77	1.58	1.74	1.81
Wholesale & Retail Trade	2.29	3.34	4.60	5.20	5.46	5.63	6.20
Finance & Insurance	1.11	1.14	1.48	1.65	1.74	1.90	2.03
Government Services	0.86	2.24	3.08	3.04	3.13	3.42	3.67
Other Services	<u>0.19</u>	<u>0.27</u>	<u>0.30</u>	<u>0.43</u>	<u>0.50</u>	<u>0.57</u>	<u>0.61</u>
Total	10.92	16.71	20.71	22.39	21.83	23.73	24.53

<u>Sector</u>	<u>Outturn Prices</u>						
	<u>1970</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u> ¹
Agriculture, Forestry and Fisheries	1.38	3.22	3.71	4.82	5.00	6.85	6.54
Mining & Manufacturing ²	1.56	3.49	4.17	4.95	5.31	6.74	7.52
Building & Construction	0.20	0.68	0.96	1.52	1.61	1.78	2.45
Transport and Communications	0.73	1.71	2.41	1.92	1.73	1.93	1.82
Wholesale & Retail Trade	1.40	3.46	4.60	5.94	7.27	7.89	7.83
Finance & Insurance	0.73	1.10	1.48	1.77	1.97	2.21	2.32
Government Services	0.71	2.03	3.08	3.53	3.76	4.56	6.62
Other Services	<u>0.13</u>	<u>0.26</u>	<u>0.29</u>	<u>0.48</u>	<u>0.61</u>	<u>0.74</u>	<u>0.78</u>
Total	6.85	15.95	20.71	24.92	27.26	32.70	35.89

Source: Central Bureau of Statistics.

¹ Provisional figures.² Including electricity, gas, and water.

Table 3.3

GROSS FIXED CAPITAL FORMATION
(in SP billions)

<u>By Sector</u>	<u>Constant 1975 Prices</u>					<u>1978</u>	<u>1979¹</u>
	<u>1970</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>		
Agriculture, Forestry and Fisheries	0.29	0.46	0.35	0.47	0.38	0.42	0.48
Mining & Manufacturing ²	0.51	1.67	2.35	2.98	3.84	2.97	3.09
Transport & Communications	0.33	0.28	0.96	1.19	1.30	0.88	0.81
Housing	0.53	0.79	0.85	1.07	1.40	1.57	1.34
Others	0.25	0.55	0.64	1.10	1.02	1.08	1.30
<u>By Type of Asset</u>							
Machinery and Non- Transport Equipment	0.59	1.41	2.37	3.02	4.12	3.07	2.66
Construction	0.51	1.09	1.33	1.85	1.69	1.66	2.07
Industrial and Commercial Buildings	0.12	0.37	0.34	0.57	0.60	0.49	0.84
Dwellings	0.53	0.79	0.85	1.07	1.40	1.57	1.34
Transport Equipment	<u>0.16</u>	<u>0.09</u>	<u>0.28</u>	<u>0.29</u>	<u>0.14</u>	<u>0.12</u>	<u>0.11</u>
Total	1.91	3.74	5.16	6.81	7.95	6.91	7.01
<u>Outturn Prices</u>							
<u>By Sector</u>	<u>1970</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979¹</u>
Agriculture, Forestry and Fisheries	0.14	0.39	0.35	0.54	0.47	0.59	0.81
Mining & Manufacturing ²	0.23	1.44	2.35	3.44	4.80	3.95	4.39
Transport & Communications	0.19	0.24	0.96	1.36	1.64	1.21	1.34
Housing	0.22	0.52	0.85	1.17	1.42	1.63	1.54
Others	0.12	0.48	0.65	1.25	1.27	1.51	2.12
<u>By Type of Asset</u>							
Machinery and Non- Transport Equipment	0.26	1.22	2.37	3.51	5.15	3.99	3.59
Construction	0.26	0.92	1.33	2.14	2.13	2.46	3.95
Industrial and Commercial Buildings	0.06	0.33	0.34	0.63	0.73	0.64	0.97
Dwellings	0.22	0.52	0.85	1.17	1.42	1.63	1.54
Transport Equipment	<u>0.11</u>	<u>0.08</u>	<u>0.28</u>	<u>0.32</u>	<u>0.18</u>	<u>0.17</u>	<u>0.15</u>
Total	0.90	3.07	5.16	7.76	9.60	8.89	10.19

Source: Central Bureau of Statistics.

¹ Provisional Figures.

² Including, electricity, gas and water.

spending was about 12 percent below the peak level. Mining and manufacturing, which includes electricity, gas, and water, is the major component of investment. It accounted for 43 percent of expenditures in 1979, compared with only 26 percent in 1970. Investment in the agricultural sector by contrast declined sharply from 16 percent of total investment in 1970 to only 8 percent in 1979. Transport and communications investment, after growing rapidly until 1977, fell 38 percent in volume over the next two years, accounting for 13 percent of total capital formation in 1979, well below its share in 1970 of 21 percent at outturn prices.

In Table 3.4 projected sectoral growths for the 4th FYP are compared with actual performance up until 1979. The planned growth rates have not been attained except in the building and construction sector. Growth in the key agricultural and mining and manufacturing sectors has been minimal, under 2 percent per annum over the 1975 to 1979 period in each case, compared with plan rates of 8 percent and 15 percent, respectively, to 1980. The trade and finance and services sectors were closer to target, but still falling short. Transport and communications performance cannot be judged from the figures given because of the effect of lost oil transit dues over the period. For GDP as a whole, growth of 4.3 percent per annum was achieved from 1975 to 1979, little more than one-third of the planned rate of 12.0 percent to 1980.

3.3 PRODUCTION

The index of industrial production is given in Table 3.5 with years 1970 and 1974 linked to the 1975 base series from the old 1970 based series. As with GDP, a rapid rise in industrial production of 11.5 percent per annum occurred from 1970 to 1975, with a much slower growth of 4.7 percent per annum from 1975 to 1979. This change in rate of growth was almost entirely accounted for by the peaking of crude oil production in 1976 after more than doubling in the previous six years. By 1979 oil output had fallen by 13 percent. Manufacturing output, which accounted for 60 percent of gross value added in 1975, grew at very similar rates of around 7 percent per annum for both the 1970-1975 and 1975-1979 periods. Within the manufacturing sector, the paper and printing and chemical and nonmetal products industries have experienced particularly rapid growth since 1975. The important textiles sector has been relatively stagnant since 1975. Food, beverages, and tobacco production, one-quarter of value added in 1975, grew by 7.4 percent per annum on average from 1975 to 1979.

Gross value added by industry in 1975 was SP 7.1 billion, representing 37 percent of GDP, and this share had not changed significantly by 1979. The extractive industries represented

Table 3.4

4th FYP TARGETS AND PERFORMANCE

Sector	1975 Plan Assumed Base	1975 Actual	1979 Actual	1980 Plan	Growth Rates	
					1975-79 Actual % p.a.	1975-80 Plan % p.a.
	(in SP billions ¹)					
Agriculture, Forestry and Fisheries	3.09	3.71	3.99	4.54	1.8	8.0
Mining & Manufacturing	4.27	4.17	4.45	8.73	1.6	15.4
Building and Construction	1.20	0.96	1.77	2.53	16.5	16.0
Transport and Communications	1.12	2.41	1.81	2.40	- 6.9	16.4
Wholesale and Retail Trade	4.85	4.60	6.20	7.88	7.7	10.2
Finance and Services	<u>4.49</u>	<u>4.86</u>	<u>6.31</u>	<u>7.43</u>	<u>6.7</u>	<u>10.7</u>
GDP	19.02	20.71	24.53	33.51	4.3	12.0

Sources: 4th FYP and Central Bureau of Statistics.

¹ At 1975 prices.

Table 3.5

INDEX OF INDUSTRIAL PRODUCTION
(1975 = 100)

Industry	Weight ¹ %	1970	1974	1975	1976	1977	1978	1979
Extractive Industries	35.9	24	71	100	103	94	95	95
Manufacturing	59.5	70	92	100	112	113	120	130
Food, Beverages and Tobacco	26.6	69	92	100	117	114	116	133
Textiles & Leather etc.	18.6	78	96	100	106	100	107	104
Wood & Furniture	0.3	77	95	100	107	143	131	109
Paper & Printing	0.2	60	86	100	129	173	191	180
Chemicals	5.5	69	86	100	110	131	157	180
Non-metal Products	1.8	85	95	100	108	133	140	174
Basic Metal Industries	1.5	35	59	100	115	114	127	109
Metal Products and Equipment	4.8	-	-	100	110	121	128	149
Electricity and Water	4.6	59	82	100	107	126	158	184
Electric Power	3.5	56	81	100	106	129	161	200
Water	1.1	74	85	100	108	119	130	131
Total	100	58	86	100	109	106	113	120

Source: Central Bureau of Statistics.

Note: 1970 and 1974 figures are linked from 1970 = 100 index without rebasing.

¹ By gross value added in 1975. Total for all industries SP 7141 million.

the largest single sector with a 36 percent share of value added by industry in 1975. By 1979, with the decline in petroleum production, their share had fallen to about 28 percent, being just overtaken by that of the food, beverages, and tobacco sector.

In Table 3.6 the output volumes of major industrial products are given. Crude oil represents by far the most important item with production of 8.7 million tons in 1979. The exploitation of phosphate deposits commenced in 1971 and by 1979 production had reached 1.2 million tons. Cement is the only other product manufactured in large volume. Output stabilized at 1 million tons between 1970 and 1975, increasing rapidly thereafter to reach 1.8 million tons in 1979. Of other products, outputs of round iron bars, sugar, and of cotton-cake were all close to 0.1 million tons in 1979, with production of natural asphalt and of salt both being 0.08 million tons. Electric power production increased strongly throughout the 1970s, exactly doubling between 1975 and 1979 to reach 3.4 billion kilowatt-hours.

Production of building materials expanded very rapidly in the 1970s along with the growth in investment in the construction industry. Sand and gravel production in 1979 was 7.9 million cubic meters, approaching six times the 1970 volume, and the production of stone more than tripled in the period to reach 2.0 million cubic meters in 1979.

In Table 3.7 are shown the production figures for the 10 most important agricultural crops and for milk. Output is heavily dependent upon the weather, and large annual variations in yield occur. The combined output of the 10 crops and milk is a good indicator of overall production. It shows 1976 and 1978 to have been peak production years, with tonnages 20 to 25 percent above those of 1974, 1975, 1977, and 1979. Following abundant winter and spring rainfall, 1980 is expected to see record production levels. It is difficult to fit a trend to output because of the large weather-induced variations, but an underlying growth rate of about 5 percent per annum in tonnage terms appears to have occurred in the 1970s.

Wheat is by far the largest crop with its production of 1.3 million tons in 1979, 26 percent below the 1976 peak level. Barley production in 1979 was only 0.40 million tons, compared to 1.1 million tons in the 1976 peak. Cotton production (unginned) remained almost stable throughout the 1970s at 0.4 million tons. Milk production increased steadily to reach 0.84 million tons in 1979, 86 percent above the 1970 level. Output of the major vegetable crops - potatoes, tomatoes, and onions - also grew rapidly with a combined production of 0.86 million tons in 1978. Sugar beet output in 1979 of 0.26 million tons was only 12 percent higher than in 1970. Production of olives

Table 3.6

VOLUME OF PRODUCTION

(in 000 tons)

<u>Product</u>	<u>1970</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
Crude Oil	4,240	6,430	9,570	10,040	9,120	8,932	8,701
Phosphate	-	650	857	511	425	747	1,170
Cement	964	965	994	1,110	1,395	1,497	1,847
Iron Bars (round)	-	-	85	98	98	109	93
Sugar	124	148	117	126	104	105	118
Cotton-cake	109	113	103	147	108	107	-
Natural Asphalt	24	35	31	106	99	95	83
Salt	46	40	34	54	48	62	75
Olive Oil	16	44	33	56	38	70	-
Electric Power (million Kwh)	947	1,366	1,673	1,776	2,152	2,702	3,356
Sand and Gravel 000M ³	1,365	-	-	4,341	4,567	6,495	7,870
Gypsum 000M ³	14	-	-	27	37	138	177
Stone 000M ³	619	-	-	748	985	1,585	2,013
Semi-marble Stones 000M ³	30	-	-	55	57	80	72

Source: Central Bureau of Statistics.

Table 3.7

AGRICULTURAL PRODUCTION

(in 000 tons)

<u>Crop</u>	<u>1970</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
wheat	624	1,630	1,550	1,790	1,217	1,651	1,320
Barley	235	656	597	1,059	337	729	395
Lentils	58	83	67	136	117	92	43
Potatoes	65	105	125	126	164	199	235
Tomatoes	192	396	375	516	454	502	457
Onions	65	133	133	100	162	160	161
Cotton (unginned)	383	386	414	409	395	377	330
Sugar Beet	228	139	187	242	273	272	255
Olives	85	215	157	233	175	305	196
Grapes	206	250	281	319	353	346	287
Milk	<u>451</u>	<u>500</u>	<u>567</u>	<u>665</u>	<u>647</u>	<u>781</u>	<u>839</u>
Total	2,592	4,493	4,453	5,595	4,294	5,414	4,568

Source: Central Bureau of Statistics.

fluctuates on a two-year cycle; 1979 was one of the lower years, with an output of 0.20 million tons, 36 percent below that of 1978. The grape harvest in 1979 was 0.29 million tons, 19 percent below the peak output of 1977.

3.4 EMPLOYMENT AND PRODUCTIVITY

The distribution of the labor force by sector is shown in Table 3.8. The figures include about 5 percent of workers classified as unemployed. The labor force grew by 38 percent between 1970 and 1979 (3.7 percent per annum) to 2.2 million, and significant changes in the distribution pattern took place. The number employed in the largest sector - agriculture, forestry, and fishing - tended to decline over the period, and in 1979 employment was 25 percent below the peak reached in 1971 of 0.93 million, although large annual fluctuations occur in this sector. In 1979 agriculture still employed 32 percent of the labor force. All other sectors added employees in the 1970s, the fastest growth being shown by building and construction with an increase of 159 percent between 1970 and 1979. Transport and communications, which includes the storage industry, employed 0.10 million in 1979, 20 percent less than in 1977 following a period of rapid growth. The sectoral shares of employment in 1979 with those of 1970 for comparison were: agriculture 32 percent (48 percent); mining and manufacturing 16 percent (13 percent); building and construction 14 percent (7 percent); and services, trade, and others 39 percent (32 percent).

The average rate of increase in the labor force from 1970 to 1979 was only 0.3 percent per annum above the population growth rate, and the participation rate in employment was thus little changed. The labor force comprises 25 percent of the population but 56 percent of those aged from 15 to 59. For the 15 to 64 age bracket, 95 percent of men and 11 percent of women were employed in 1979.

In Table 3.9 output per worker by sector has been calculated for 1970 and 1979. The table shows each sector's employment, output (gross value added at market prices), output per worker, and the sectoral output per worker expressed as a percentage of average output per worker. Average output per worker increased from SP 4,360 in 1970 to SP 16,510 in 1979. There are major differences between sectors; agriculture and building and construction are well below average, and wholesale and retail trade (including restaurants and hotels) are more than double the overall average. Between 1970 and 1979 the variation in productivity between the sectors narrowed considerably. The decline in the relative productivity of mining and manufacturing over the period from 180 percent of average to 134 percent is surprising in view of the major investment made in that sector over the period.

Table 3.8

LABOR FORCE BY SECTOR

(in 000 persons)

<u>Sector</u>	<u>1970</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
Agriculture, Forestry and Fishing	752	874	916	578	754	681	693
Manufacturing, Extractive Industry	199	190	211	276	265	284	339
Building & Construction	115	110	130	204	178	243	298
Trade, Restaurants and Hotels	145	164	189	186	203	209	221
Transport & Communications	64	68	78	114	119	105	98
Services	224	228	238	355	381	409	422
Electricity, Gas & Water	8	7	10	17	17	14	32
Others	<u>64</u>	<u>78</u>	<u>67</u>	<u>98</u>	<u>82</u>	<u>79</u>	<u>71</u>
Total	1,571	1,719	1,839	1,828	1,995	2,024	2,174

Source: Central Bureau of Statistics.

Note: Includes approximately 5% of workers classified as unemployed.

Table 3.9

EMPLOYMENT, OUTPUT, AND PRODUCTIVITY

Sector	1970				1979			
	Employment (000)	Output (SP billion)	Output Per Worker (SP 000)	% of Average Output Per Worker	Employment (000)	Output (SP billion)	Output Per Worker (SP 000)	% of Average Output Per Worker
Agriculture etc.	752	1.38	1.84	42	693	6.54	9.44	57
Mining and Manufacturing	199	1.56	7.84	180	339	7.52	22.18	134
Building and Construction	115	0.20	1.74	40	298	2.45	8.22	50
Wholesale and Retail Trade	145	1.40	9.66	222	221	7.83	35.43	215
Transport and Communications	64	0.73	11.41	262	98	1.82	18.57	112
Others	296	1.57	5.30	122	525	9.72	18.51	112
Total	1,571	6.85	4.36	100	2,174	35.89	16.51	100

3-14

Source: Central Bureau of Statistics.

3.5 PRICES AND WAGES

Prices are subject to Government control, and essential items of consumption such as basic foodstuffs, certain fuels, cement, fertilizer, and rents are subsidized. A two-tier pricing system applies for basic foodstuffs with a subsidized price for a fixed quantity and a higher price for any additional purchases. The retail prices of goods produced by the public sector are fixed and private sector goods are controlled through the setting of profit margins at each stage of sale. Price indices therefore do not necessarily fully reflect underlying cost movements.

The wholesale price index (1962 based) and the retail price index for Damascus (1970 based) are presented in Table 3.10. The wholesale index is shown adjusted to 1970=100 for comparison with the retail. Between 1970 and 1974 the indices increased by similar amounts. From 1974 to 1977 retail prices rose rather faster, while in 1978 and 1979 wholesale price inflation considerably exceeded retail. The average annual inflation rate from 1970 to 1975 was 11.2 percent for wholesale prices and 11.8 percent for retail. From 1975 to 1979 the rates were 10.7 percent and 8.1 percent respectively.

Foodstuffs is by far the most important item in each index, accounting for about half of expenditures. Wholesale prices of foodstuffs rose by 10.3 percent per annum from 1970 to 1979. Transport prices increased by 7.5 percent a year on average between 1970 and 1979, but by only 2.7 percent in 1979 itself.

Wage rates in the public sector were increased substantially in February 1980 following rises in February 1978 and in November 1975. All three increases narrowed differentials with much higher percentage increases at the lower end of the salary scales. The last two changes were as follows:

<u>Salary Component</u> (SP per month)	<u>Increases</u>
	<u>February 1978</u>
0 - 800	SP 140
800 +	10%
	<u>February 1980</u>
0 - 400	75%
401 - 900	50%
901 - 1500	25%
1500+	10%

Table 3.10

PRICE INDICES

(1970 = 100)

	<u>Weight %</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
<u>Wholesale Prices</u> ¹	<u>1962 base</u>						
Foodstuffs	56	147	157	183	202	224	242
Raw Materials	23	169	182	192	207	219	233
Manufactured Products	5	186	209	218	223	231	239
Building Materials	8	185	183	212	223	282	324
Fuels	8	<u>101</u>	<u>107</u>	<u>128</u>	<u>143</u>	<u>213</u>	<u>215</u>
Total	100	159	170	191	208	235	255
<u>Retail Prices</u> (Damascus)	<u>1970 base</u>						
Foodstuffs	48.8	157	186	207	234	246	260
Rent	17.7	176	186	185	196	198	208
Clothing	9.1	155	167	194	249	255	256
Fuel and Light	4.6	107	109	124	130	141	150
Transport	3.8	122	105	157	176	186	191
Medicine and Treatment	3.5	104	124	125	125	125	125
Others	12.5	<u>173</u>	<u>218</u>	<u>223</u>	<u>244</u>	<u>255</u>	<u>265</u>
Total	100	157	175	195	218	229	239

Source: Central Bureau of Statistics.

¹ Converted by the Consultants to 1970 base from 1962 = 100 series.

As of 1 January 1977, 64 percent of Government and public sector employees had monthly salaries of between SP 305 and SP 490, and the average percentage rises were thus high. For Syrian Railways, as an example, the changes increased the total salary costs by a little over 30 percent in February 1978 and by 70 percent in February 1980.

A system of allowances and fringe benefits adds considerably to basic wages for certain employees and such benefits were improved at the time of the salary increases. Private sector wages are set at virtually free market rates and in areas of skill in demand considerably outbid the public sector. There are, however, administrative controls on movement out of the public sector into the private sector or abroad. Many public sector employees do, however, work in the private sector in the afternoons or evenings.

3.6 MONEY SUPPLY

The growth of the money supply and its sources are presented in Table 3.11. The total supply including quasi-money (term, savings, and restricted bank deposits) at the end of 1979 was SP 17.8 billion, or SP 2,070 per capita. The average annual growth rate between 1970 and 1975 was 24.6 percent, with a 23.8 percent per annum rise from 1975 to 1979. The increase in 1979 itself was 16 percent. The expansion occurred mainly as a result of an increase in claims on Government and the public sector. The growth in claims on public enterprises was a reflection of the impact of price controls on them during a period of rising import prices and other costs. Import deposits and other items partially offset the inflationary impact of public sector enterprises' cash requirements, together taking SP 2.6 billion out of the system between 1970 and 1978.

3.7 INTERNATIONAL TRADE

Import and export volumes from 1974 to 1979 for each major class of trade are shown in Table 3.12. The equivalent value figures are given in Table 3.13. Table 3.14 presents both the volumes and values of the major commodities involved in trade. The distribution of imports and exports by trading area of the world is given in Table 3.15.

The volume of imports increased by 56 percent from 1974 to 1977 to a total of 8.2 million tons, then declined sharply to 6.5 million tons in 1978, before recovering to a record 10.4 million tons in 1979. Primary fuels were the largest item in imports, 32 percent of the total in 1979, with processed fuels accounting for a further 21 percent. Processed industrial supplies also accounted for 32 percent, with food and beverages (primary and processed) amounting to 10 percent.

Table 3.11

MONEY SUPPLY
(in SP billions)

	End of Year						
	<u>1970</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
<u>Assets</u>							
Notes and Coin in Circulation	1.79	3.41	3.94	5.26	6.80	8.46	9.91
Demand Deposits	<u>0.55</u>	<u>2.13</u>	<u>3.01</u>	<u>3.30</u>	<u>4.13</u>	<u>5.41</u>	<u>6.10</u>
Money Supply	2.34	5.54	6.96	8.56	10.92	13.87	16.01
Quasi-Money	<u>0.18</u>	<u>0.46</u>	<u>0.62</u>	<u>0.83</u>	<u>1.11</u>	<u>1.43</u>	<u>1.78</u>
Total Assets	2.52	6.00	7.58	9.39	12.03	15.30	17.79
<u>Liabilities</u>							
Claims on Government	1.82	2.45	2.00	4.35	5.09	8.65 ²	-
Claims on Public Sector	0.97	3.07	4.67	6.77	8.16	8.08	-
Claims on Private Sector	0.55	0.69	0.89	1.15	1.34	1.65	-
Less Import Deposits	-0.15	-0.54	-0.44	-1.09	- 1.26	- 1.11	-
Other Items (Net)	<u>-0.56</u>	<u>-1.30</u>	<u>-1.45</u>	<u>-1.69</u>	<u>- 1.90</u>	<u>- 2.15²</u>	<u>-</u>
Domestic Credit	2.63	4.37	5.66	9.49	11.47	15.12	-
Claims on Foreigners ¹	<u>-0.11</u>	<u>1.63</u>	<u>1.92</u>	<u>-0.10</u>	<u>0.56</u>	<u>0.18</u>	<u>-</u>
Total Liabilities	2.52	6.00	7.58	9.39	12.03	15.30	-

Source: Central Bank.

¹ Foreign assets.

² Estimated.

Table 3.12

IMPORTS AND EXPORTS BY VOLUME

(000 tons)

	<u>Imports</u>					
	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
Food and Beverages - Primary	377	384	278	532	481	388
Food and Beverages - Processed	402	337	449	431	538	620
Industrial Supplies - Primary	72	125	160	193	238	357
Industrial Supplies - Processed	1,557	1,738	2,344	2,384	2,027	3,315
Fuels and Lubricants - Primary	1,734	2,434	2,772	2,916	2,238	3,323
Fuels and Lubricants - Processed	975	163	40	1,437	789	2,144
Transport Equipment & Accessories	49	101	102	91	58	77
Other Equipment and Accessories	57	87	106	154	126	110
Consumer Goods	18	30	30	42	38	48
Total	5,245	5,402	6,282	8,179	6,532	10,382

	<u>Exports</u>					
	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
Food and Beverages - Primary	61	65	111	195	171	143
Food and Beverages - Processed	13	12	32	31	32	35
Industrial Supplies - Primary	709	498	613	880	1,168	1,566
Industrial Supplies - Processed	36	34	120	152	112	103
Fuels and Lubricants - Primary	6,160	9,530	9,662	7,949	8,106	7,697
Fuels and Lubricants - Processed	1	215	379	371	179	373
Transport Equipment & Accessories	3	6	5	17	8	8
Other Equipment and Accessories	1	2	14	4	5	4
Consumer Goods	10	9	14	13	16	16
Total	6,993	10,371	10,949	9,612	9,795	9,945

Source: Central Bureau of Statistics.

Table 3.13

IMPORTS AND EXPORTS BY VALUE

(in SP millions)

	<u>1974</u>	<u>1975</u>	<u>Imports</u>		<u>1978</u>	<u>1979</u>
			<u>1976</u>	<u>1977</u>		
Food and Beverages - Primary	369	322	301	491	695	593
Food and Beverages - Processed	801	789	754	618	846	952
Industrial Supplies - Primary	104	191	223	195	186	250
Industrial Supplies - Processed	1,782	2,078	2,363	3,050	3,026	4,035
Fuels and Lubricants - Primary	110	181	721	1,086	872	1,926
Fuels and Lubricants - Processed	160	214	28	663	395	1,298
Transport Equipment & Accessories	351	911	1,133	993	668	971
Other Equipment and Accessories	532	886	1,477	2,642	2,152	2,005
Consumer Goods	<u>351</u>	<u>601</u>	<u>699</u>	<u>759</u>	<u>810</u>	<u>1,036</u>
Total	4,571	6,173	7,695	10,497	9,650	13,066

	<u>1974</u>	<u>1975</u>	<u>Exports</u>		<u>1978</u>	<u>1979</u>
			<u>1976</u>	<u>1977</u>		
Food and Beverages - Primary	71	67	108	165	201	198
Food and Beverages - Processed	25	26	48	54	58	71
Industrial Supplies - Primary	915	611	825	1,039	902	1,037
Industrial Supplies - Processed	102	106	170	142	132	191
Fuels and Lubricants - Primary	1,608	2,377	2,586	2,436	2,553	4,449
Fuels and Lubricants - Processed	0	42	93	108	58	208
Transport Equipment & Accessories	15	27	24	86	62	58
Other Equipment and Accessories	6	10	56	22	26	24
Consumer Goods	<u>174</u>	<u>174</u>	<u>232</u>	<u>146</u>	<u>166</u>	<u>217</u>
Total	2,914	3,441	4,141	4,199	4,160	6,453

Source: Central Bureau of Statistics.

Table 3.14
MAJOR TRADED COMMODITIES

	Volume 000 tons						
	1970	1974	1975	1976	1977	1978	1979
<u>Imports</u>							
Fuels	1,483	2,740	2,616	2,828	4,365	3,033	5,473
Metals & Metal Products	298	528	385	813	727	676	971
Cement	78	549	855	1,125	961	584	1,517
Other Foodstuffs	650	369	376	308	584	507	592
Fruits & Vegetables	181	237	215	266	266	299	340
Chemicals & Chemical Products	196	183	250	107	253	301	366
Sugar, Raw and Refined	120	162	144	184	131	264	210
Wood & Wood Products	112	131	90	103	193	187	215
Machinery and Equipment	33	58	84	98	142	125	118
Transport Equipment	15	37	94	97	81	65	67
<u>Exports</u>							
Crude Oil	3,521	6,160	9,530	9,662	7,949	8,106	7,697
Phosphate	0	496	308	422	620	920	1,253
Raw Cotton (Fiber)	136	110	102	118	121	127	113
Value in SP millions							
	1970	1974	1975	1976	1977	1978	1979
<u>Imports</u>							
Fuels	107	275	397	753	1,757	1,268	3,228
Metals & Metal Products	208	858	889	1,256	1,459	1,283	1,841
Cement	5	87	121	166	158	112	310
Other Foodstuffs	236	581	520	560	760	1,094	1,338
Fruits & Vegetables	60	123	124	197	221	277	343
Chemicals & Chemical Products	134	333	644	405	562	724	956
Sugar, Raw and Refined	40	361	427	315	142	243	194
Wood & Wood Products	41	150	93	112	257	263	296
Machinery and Equipment	174	602	930	1,562	2,676	2,178	2,119
Transport Equipment	64	263	826	1,011	865	616	826
<u>Exports</u>							
Crude Oil	129	1,608	2,377	2,586	2,436	2,553	4,449
Phosphate	0	82	56	42	59	90	126
Raw Cotton (Fiber)	310	715	439	638	836	674	758

Source: Central Bureau of Statistics/General Directorate of Customs.

Table 3.15
DIRECTION OF TRADE

	<u>1970</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
<u>By Value</u>							
				<u>Imports %</u>			
E.E.C.	26.6	39.2	39.1	33.4	38.2	35.2	36.1
Eastern Europe and China	24.2	20.6	16.6	10.2	19.4	19.9	18.0
Arab Countries	17.6	13.8	10.1	12.7	14.9	15.6	20.2
Rest of Europe	7.3	10.9	9.9	24.3	10.5	9.9	9.3
USA and Canada	10.5	4.3	6.6	6.0	5.5	5.1	4.8
Rest of World	<u>13.8</u>	<u>11.2</u>	<u>17.7</u>	<u>13.4</u>	<u>11.5</u>	<u>14.3</u>	<u>11.6</u>
Total	100	100	100	100	100	100	100
				<u>Exports %</u>			
E.E.C.	30.6	30.9	47.5	48.7	46.8	44.6	51.5
Eastern Europe	26.6	31.7	22.4	25.3	25.5	22.4	16.1
Arab Countries	25.0	13.8	9.5	10.9	12.9	13.5	11.8
Rest of Europe	8.8	19.2	6.3	9.9	9.3	7.9	8.7
USA and Canada	0.4	0.3	0.6	1.0	3.8	9.0	9.6
Rest of World	<u>8.8</u>	<u>4.1</u>	<u>13.7</u>	<u>4.2</u>	<u>1.7</u>	<u>2.6</u>	<u>2.3</u>
Total	100	100	100	100	100	100	100
<u>By Volume</u>							
				<u>Imports %</u>			
E.E.C.	-	-	-	-	-	13.8	17.2
Eastern Europe and China	-	-	-	-	-	19.9	20.5
Arab Countries	-	-	-	-	-	44.4	40.3
Rest of Europe	-	-	-	-	-	5.8	3.9
USA and Canada	-	-	-	-	-	3.8	2.1
Rest of World	-	-	-	-	-	<u>12.3</u>	<u>16.0</u>
Total	-	-	-	-	-	100	100
				<u>Exports %</u>			
E.E.C.	-	-	-	-	-	49.9	56.8
Eastern Europe and China	-	-	-	-	-	23.0	14.5
Arab Countries	-	-	-	-	-	5.1	7.2
Rest of Europe	-	-	-	-	-	8.8	8.9
USA and Canada	-	-	-	-	-	11.4	9.3
Rest of World	-	-	-	-	-	<u>1.8</u>	<u>3.3</u>
Total	-	-	-	-	-	100	100

Source: Central Bureau of Statistics / General Directorate of Customs.

Imports of fuels in 1979 reached a record 5.5 million tons. Cement imports were also at a record level of 1.5 million tons. Foodstuff imports, including fruit and vegetables, totalled 0.93 million tons and metals and metal products 0.97 million tons. Other major commodity groups were chemicals and chemical products, 0.37 million tons, sugar 0.21 million tons, and wood 0.22 million tons. There are considerable fluctuations from year to year in imports, and growth rates by commodity are not very meaningful. Transport equipment imports totalled 0.10 million tons in 1976 but had declined to 0.07 million tons in 1979.

Exports reached a peak of 10.9 million tons in 1976. In 1979 they totalled 9.9 million tons. Crude oil is the major export item. This single commodity accounted for 92 percent of the export volume in 1975. In 1979 crude oil exports were 7.7 million tons, 77 percent of the total. Phosphates are the only other volume export of importance. Production commenced in late 1971 and exports increased quickly, reaching 1.3 million tons in 1979. Raw cotton exports in 1979 were 0.11 million tons compared with 0.14 million in 1970.

The average value per ton of imports rose from SP 871 in 1974 to SP 1,259 in 1979. The equivalent figures for exports were SP 417 and SP 649 respectively. Phosphates are a particularly low value commodity with an average receipt of SP 101 per ton in 1979, compared to the SP 578 per ton received for crude oil.

The value of visible imports in 1979 on a trade accounts basis was SP 13.1 billion, nearly triple the 1974 value. Processed industrial supplies, and equipment and accessories accounted for 46 percent of the value in 1979. Food and beverages amounted to 12 percent and fuels and lubricants 25 percent. Transport equipment and accessories imports reached a peak of SP 1.5 billion in 1976, 19 percent of all imports in that year, but totalled SP 1.0 billion in 1979, 7 percent of imports.

In 1979 exports totalled SP 6.5 billion, 55 percent higher than in 1978, following the increase in petroleum prices. Crude oil accounted for 69 percent of receipts in 1979 and primary industrial supplies a further 16 percent. Nonprimary products were 12 percent of exports in 1979, a similar share to that of 1974.

The chief trading partner is the European Economic Community (EEC), which in 1979 took 52 percent of all exports and supplied 36 percent of imports, as measured by value. The second most important area was made up of the communist countries of Eastern Europe and China, with 16 percent of exports and 18 percent of imports, followed by the Arab countries, with 12 percent of exports and 20 percent of imports. In volume terms the position was rather different, with Arab countries supplying 40 percent of imports but taking only 7 percent of

exports and the EEC receiving 57 percent of exports but providing only 17 percent of imports. The communist countries were responsible for 20 percent of imports and 14 percent of exports.

3.8 BALANCE OF PAYMENTS

A summary of the balance of payments on current account is given in Table 3.16. The position on visible trade deteriorated from 1970 to 1977 and after some recovery in 1978 worsened again in 1979. The visible trade deficit in 1970 was equivalent to 76 percent of that year's exports. In 1979 it was 104 percent of exports, a total of SP 6.7 billion.

The invisible trade account was in balance in 1978, having fluctuated between small surpluses and deficits since 1970. The value of services imports and exports changed little from 1974 to 1978, falling sharply as a proportion of total trade.

The growth in the trade deficit from 1970 to 1978 was largely offset by increased official transfer payments from abroad. These reached a peak of SP 4.5 billion in 1977, exceeding that year's receipts from visible trade. The Central Bank's balance of payments statistics include private transfers only if these are made through the banking system. Such transfers totalled SP 0.37 billion in 1978. The total volume of private transfers considerably exceeds this and may have been as high as SP 3 billion in 1978.

Overall, the balance of payments on current account was close to equilibrium between 1970 and 1972. In 1973 a surplus of SP 1.3 billion was achieved. In 1974 and 1975 smaller surpluses occurred. A fall in public transfer payments and sharply higher imports produced a deficit of SP 3.0 billion in 1976. This was largely eliminated in the following year as transfer payments recovered, but in 1978 the deficit rose again, to a total of SP 1.8 billion.

3.9 ECONOMIC FORECAST

The outline of the development of the economy in the 1970s given in the previous sections of the chapter illustrates the problem of making a medium- and long-term economic projection. With actual GDP growth having fluctuated between 14 percent annually from 1970 to 1975 and 4 percent from 1975 to 1979, the possible range of outcomes is very wide. Political factors such as union within the Arab world or a solution to the problems in Lebanon could be of major importance for the economy but cannot be explicitly incorporated in the forecast.

Table 3.16

BALANCE OF PAYMENTS SUMMARY

(in SP billions)

	<u>1970</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
Exports fob	0.84	2.91	3.44	4.14	4.20	4.16	6.47
Imports cif	<u>-1.49</u>	<u>-4.18</u>	<u>-5.70</u>	<u>-8.83</u>	<u>-10.24</u>	<u>-9.42</u>	<u>-13.20</u> ¹
Visible Trade Balance	-0.64	-1.26	-2.26	-4.69	- 6.04	-5.26	- 6.73
Services Receipts	0.68	1.34	1.42	1.22	1.50	1.40	-
Services Payments	<u>-0.20</u>	<u>-1.17</u>	<u>-1.43</u>	<u>-1.31</u>	<u>- 0.97</u>	<u>-1.42</u>	<u>-</u>
Invisible Trade Balance	0.48	0.17	-0.01	-0.08	0.54	-0.02	-
Public Transfer Payments	0.01	1.55	2.42	1.56	4.49	3.07	-
Private Transfer Payments	<u>0.02</u>	<u>0.17</u>	<u>0.19</u>	<u>0.21</u>	<u>0.36</u>	<u>0.37</u>	<u>-</u>
Balance on Current Account	-0.13	0.62	0.34	-3.00	- 0.65	-1.83	-

Source: Central Bank.

Consultants' estimate, based on fob total of SP 11.99 billion.

Thus, although the Consultants have used a model to predict GDP growth, any one chosen growth rate has a high probability of being significantly in error.

Economic growth results from a complex interplay of demand and supply factors, but in the long run it is dependent on the increase in the labor force, the extent of technological progress, and the net investment in the economy. The latter is limited by international trading performance and the availability of foreign exchange to import capital equipment essential for development. Although growth so far does not seem to have been seriously affected by shortage of funds, favorable factors have applied. Domestic oil production expanded at a time of rising real prices, and the growth of public and private transfer payments from oil-rich Arab countries covered the balance of payments deficits. The position in the future may be less favorable with near-stagnant oil production. A foreign exchange shortage is likely to act as a restraint on the growth rate even if the development of export industries is given a high priority.

The basic assumptions in the Consultants' GDP forecasting model, which is described in detail in Appendix 3.1, are that 25 percent of the population will be employed (the current participation rate) and that 25 percent of GDP and international transfer payments will be invested. The model determines GDP growth on the basis of the past relationship between the growth of output and the inputs of additional capital and labor. The variables in the system of model equations are the rate of technological progress, the proportion of international transfer payments to GDP, and the proportion of investment devoted to the development of exports. The results of a number of alternative assumptions for these factors are given in Appendix 3.1. A balance of payments constraint is implicit in the model, with imports limited to the total of exports plus transfer payments generated by the variables.

The central GDP forecast adopted for the study from the model is for an average annual growth rate of 7.2 percent from 1979 to 1985 and of 6.4 percent from 1985 to 2000. The growth in income per capita is 3.4 percent per annum from 1979 to 1985 and 3.0 percent from 1985 to 2000.

The growth rates of the sectors of the economy consistent with the overall GDP forecast were determined by a two-step iterative process. Firstly, a notional set of sectoral growth rates based on international development patterns was derived, taking account of the Consultants' preliminary output forecasts for agriculture and industry, and secondly, a projection of the

labor force distribution and of the relative average output per worker by sector was made on the basis of the 1970 to 1979 pattern shown in Table 3.9. Differences between the two forecasts were reconciled by minimizing the necessary adjustments.

Sector outputs for 1985 and 2000 in 1975 prices are given in Table 3.17, with the implicit labor force distribution and outputs and relative outputs per worker. With such a large increase expected in the labor force and emphasis in Government planning on agricultural development, it is to be expected that the present decline in agricultural employment will be halted, and a moderate increase in such employment is forecast. A major change in relative agricultural worker productivity is not anticipated because of the need to absorb manpower in rural areas. For the other sectors, a further narrowing of the productivity differentials is projected on the basis of 1970 to 1979 experience, to achieve a more equal distribution of income in the economy, which is an important Government policy objective.

The growth rates by sector are given in Table 3.18 and are compared with 1970 to 1975 and 1975 to 1979 performance. The variation in growth rates between sectors in the forecast is much less than in the previous periods, when unusually rapid structural adjustments were in progress. Mining and manufacturing is forecast to grow fastest at about 2 percent per annum above the GDP rate. The finance, insurance, and non-Government service sectors are projected to grow by 0.8 percent above the GDP rate to 1985 and thereafter by 0.6 percent faster. Building and construction, which witnessed extremely rapid growth in the 1970s, is expected to expand closely in line with GDP, as is the output of the Government services sector. Retail and wholesale trade is unlikely to grow any further as a proportion of GDP and the forecast rate is 0.6 percent lower than the GDP, rate to 1985 and 0.9 percent lower to 2000. Agriculture, forestry, and fishing shows the slowest rate of growth, being limited by physical factors to increases of 5.7 percent annually to 1985 and 4.3 percent to 2000.

The development of the transport sector is the subject of the Consultants' study. The projected transport and communications sector growth rate of 6.3 percent per annum from 1979 to 2000 in Table 3.18 is compatible with the GDP growth forecast by sector. Due to the small share of the transport sector in GDP, the GDP projection and the shares of the other sectors are insensitive to a moderate change to this growth rate.

3.10 REGIONAL INCOME DISTRIBUTION

The GDP forecast by sector has to be split for transport demand purposes into a regional income distribution. There are

Table 3.17
EMPLOYMENT, OUTPUT, AND PRODUCTIVITY FORECAST
 (at 1975 prices)

Sector	1985				2000			
	Employment (000)	Output (SP billion)	Output Per Worker (SP 000)	% of Average Output Per Worker	Employment (000)	Output (SP billion)	Output Per Worker (SP 000)	% of Average Output Per Worker
Agriculture etc.	840	5.57	6.63	48	950	10.42	10.97	51
Mining and Manufacturing	460	7.47	16.24	118	1,000	25.10	25.10	117
Building and Construction	350	2.79	7.97	58	500	7.12	14.24	66
Wholesale and Retail Trade	320	9.13	28.53	206	600	20.16	33.60	156
Transport and Communications	125	2.65	21.20	154	265	6.59	24.87	116
Others	600	9.62	16.03	116	1,055	24.50	23.22	108
Total	2,695	37.23	13.81	100	4,370	93.90	21.49	100

Source: Consultants' forecasts.

Table 3.18

GDP GROWTH RATES BY SECTOR, 1970-2000

(at 1975 prices)

<u>Sector</u>	Weight ¹ in 1979 %	Growth Rate per Annum			
		<u>1970-75</u>	<u>1975-79</u>	<u>1979-85</u>	<u>1985-2000</u>
Agriculture, Forestry and Fishing	18.2	11.0	1.8	5.7	4.3
Mining and Manufacturing	21.0	14.4	1.6	9.0	8.4
Building and Construction	6.8	13.9	16.5	7.6	6.4
Transport and Communications	5.1	8.0	- 6.9	6.3	6.3
Trade	21.8	15.0	7.7	6.6	5.5
Finance and Insurance	6.5	5.9	8.2	8.0	7.0
Government Services	18.4	29.1	4.5	7.2	6.2
Other Services	<u>2.2</u>	<u>9.6</u>	<u>19.4</u>	<u>8.0</u>	<u>7.0</u>
Total	100.0	13.7	4.3	7.2	6.4

Source: 1970-79 Central Bureau of Statistics, 1979-2000 Consultants' forecasts.

At current prices.

significant differences in per capita incomes between regions, but no recent data are available on their extent. In order to determine order-of-magnitude income levels, the Consultants have made the broad assumption that productivity and income per worker in each sector is uniform across the country. The latest published employment statistics by sector by Mohafaza (those for 1970) were used with the rural and urban population figures by Mohafaza to derive regression equations for each sector, expressing employment as a function of the rural and urban populations. The coefficients in the equations for 1970 were adjusted by the Consultants' population data by Mohafaza for 1979 and the total employment in each sector for that year. The refined equations were used to estimate employment by Mantika by sector in 1979, using the rural and urban populations given in Chapter 2. Regional incomes were determined by applying the average 1979 outputs per worker by sector to these employment figures. In Table 3.19 are shown the Mohafaza incomes for 1979 (at 1975 prices) as estimated, and the GDP per capita by Mohafaza. Greater Damascus had the highest per capita income level, 38 percent above the national average, with Aleppo second 12 percent above average. The poorest Mohafaza was Dera'a, which was 29 percent below average.

The forecast Mohafaza incomes for 1985 and 2000 are also shown in Table 3.19. The forecasts were prepared on the basis of the Consultants' rural and urban population forecasts presented in Chapter 2 and the regression equations and the outputs per worker given in Table 3.17. A significant narrowing of the differences between regions occurs by 2000, with Damascus then being only 21 percent above the average per capita income level and Dera'a 21 percent below average.

The resulting economic projections, together with the population projections presented in Chapter 2 above, form the basis for the Consultants' nontransit commodity and passenger projections. The methodology by which the projections were derived from the base economic and population projections is described in Section 4.1 of Chapter 4 and in Chapter 6 below. The single central economic forecast that is described above is somewhat more conservative than the growth rates the Consultants understood the Government was likely to adopt for the 5th Plan and more optimistic than some analysts might predict. Since the level of growth for the 5th Plan and beyond will be determined by factors outside the transport sector, this single alternative was chosen as the best basis for transport planning purposes, and the other alternatives described in Appendix 3.1 were not carried through the modelling process. The Government can use the described methodology and the SYRTRANS model to predict the effect of an alternate overall growth rate on transport if it desires to do so.

Table 3.19

GDP BY MOHAFAZA, 1979, 1985, and 2000
(billion SP at 1975 prices)

Mohafaza	1979			1985			2000		
	Total GDP	Population (000)	GDP Per Capita (SP 000)	Total GDP	Population (000)	GDP Per Capita (SP 000)	Total GDP	Population (000)	GDP Per Capita (SP 000)
Greater Damascus	5.94	1,515	3.92	8.27	1,902	4.35	21.44	3,270	6.56
Damascus Governorate	1.25	522	2.39	1.98	632	3.10	4.83	1,006	4.80
Quneitra	0.05	22	2.27	0.07	27	2.59	0.68	163	4.18
Dera'a	0.65	321	2.02	1.07	391	2.74	2.57	602	4.27
Al Suweida	0.42	187	2.25	0.68	228	3.00	1.64	353	4.63
Homs	2.24	755	2.97	3.54	970	3.65	9.15	1,610	5.68
Hama	1.88	723	2.60	3.12	938	3.33	7.75	1,522	5.09
Tartous	0.87	420	2.07	1.44	512	2.82	3.40	786	4.33
Lattakia	1.44	543	2.65	2.16	661	3.26	5.23	1,044	5.01
Idleb	1.15	527	2.18	1.82	639	2.85	4.30	984	4.36
Aleppo	5.65	1,771	3.19	8.32	2,189	3.80	21.27	3,574	5.95
Al Raqqa	0.78	324	2.41	1.23	395	3.12	3.08	621	4.95
Deir Ez Zor	0.91	373	2.44	1.42	451	3.16	3.52	706	4.99
Al Hassakeh	<u>1.32</u>	<u>592</u>	<u>2.23</u>	<u>2.09</u>	<u>711</u>	<u>2.94</u>	<u>5.04</u>	<u>1,084</u>	<u>4.65</u>
Total	24.53	8,596	2.85	37.23	10,652	3.49	93.90	17,323	5.42

Source: Consultants' estimates.

APPENDIX 3.1

GDP FORECASTING MODEL

Appendix 3.1

GDP FORECASTING MODEL

The GDP forecasts for 1985 and 2000 have been made using a capacity model which expresses GDP growth as a function of capital accumulation, the growth in the labor force, and the rate of technological progress. Capital accumulation, that is, gross investment less depreciation of the existing capital stock, depends on both the end-use pattern of domestically available resources and the ability to import investment goods. The latter is determined by the propensity to import non-investment goods and by the availability of foreign exchange, which itself depends on export performance and the volume of public and private transfer payments received from abroad. In the long run, export volume, to the extent that it is under domestic control, depends on the proportion of investment devoted to the production of export goods. The import of consumer goods can be reduced in favor of investment goods as a proportion of imports by substituting domestic goods and by curtailing the import of luxury items.

The forecasting model was calibrated by determining separately coefficients for the production and investment functions on the basis of the past performance of the economy. For the former function, 1966 to 1978 data were used; for the latter function, 1963 to 1978 data were used. The 1963-based constant price GDP series was used for calibration as the complete 1975-based series was not available at the time. The model was run for forecasting purposes at 1975 prices by adjusting the constants in the 1963-base equations.

The base capital stock (K) was determined by the Consultants for the years 1966 to 1978 by calculating residual asset values for each component of fixed capital (dwellings, nonresidential buildings, construction, transport equipment, and machinery) from assumed asset lines and the annual gross investments over an appropriate period. At 1963 prices the capital stock thus calculated increased from SP 4.47 billion in 1966 to SP 13.6 billion in 1978, a growth rate averaging 9.7 percent per annum. With a labor force up from 1.45 million to 2.02 million over the period, the capital stock per worker rose from SP 3,085 to SP 6,715, that is, by 6.7 percent annually.

The rate of investment was maintained throughout the forecasting period at the base level of 25 per cent of GDP plus transfers from abroad. This is a high rate, but given the development priorities and the Government's commitment to obtaining a high rate of growth, it can be achieved. The depreciation rate of the capital stock has been taken to be 7 per cent annually, in line with the calculated average rate for the 1966 to 1978 period.

The three variables in the model are E, a, and b. Alternative forecasts were made for a range of values of the efficiency and technological progress factor, the proportion of transfers to GDP, and investment in the export sector. The central assumptions used for the chosen forecast were:

- that technological progress will increase output by 1.5 percent annually

- that transfers will be 10 percent of GDP

- that 10 percent of investment will be in investment for exports.

These appear to be the most reasonable values based on past experience and anticipated future changes. With a 21 year forecasting period from 1979 to 2000, clearly any change in the basic assumption will produce a significant alteration to the end-year result, as the sensitivity analysis results below show:

E	Variable Value		GDP 1985 (in SP 1975 billions)	GDP 2000 (in SP 1975 billions)	GDP Growth Rate	
	a % of GDP	b % of I			1979-85 % per annum	1985-2000 % per annum
1.0	8	8	34.9	74.0	6.1	5.1
1.0	8	10	35.1	76.5	6.2	5.3
1.0	8	12	35.3	79.0	6.2	5.5
1.0	12	8	36.1	82.4	6.7	5.7
1.0	12	10	36.1	84.8	6.7	5.9
1.0	12	12	36.1	86.8	6.7	6.0
1.5	10	10	37.2	93.9	7.2	6.4
2.0	8	8	37.8	100.3	7.5	6.7
2.0	8	10	38.0	104.0	7.6	6.9
2.0	8	12	38.3	107.5	7.7	7.1
2.0	12	8	39.2	112.2	8.1	7.3
2.0	12	10	39.2	115.6	8.1	7.5
2.0	12	12	39.2	118.8	8.1	7.7

The specifications of the model equations and the equations as calibrated are as follows:

Production Function

$$GDP = A(t)^b K^a L^{1-a}$$

where:

K = fixed reproducible capital stock (in SP millions)

L = labor force (in 000)

t = time, with t(0) = 1965

A, a, and b = coefficients to be determined

In logarithmic form the calculated equation is:

$$\log \frac{n(GDP)}{L} = 0.514 + 0.134 \log n(t) + 0.467 \log \frac{n(K)}{L}$$

standard error of regression coefficient	0.046	0.134
t values	2.92	3.49

R2 = 0.97 F value= 71.1

Investment Equation

$$I = s(GDP + T) + c$$

where:

I = investment (SP millions)

T = public and private transfers from abroad (SP millions)

s, c = coefficients to be determined

The equation as calculated is:

$$I = -632 + 0.252 (GDP + T)$$

standard error of
regression coefficient 0.0018

t value 14.08

R2 = 0.97 F value =198.2

The model used for forecasting incorporates two major changes in the above equations. An explicit efficiency factor replaces the time trend term 't' and a foreign exchange constraint is added into the model. The full set of equations in computer running order is given below:

$$L \text{ exp.}t = 0.14L_t$$

$$K \text{ exp.}t = 0.14K_t$$

$$T_{t-1} = a \text{ GDP}_{t-1}$$

$$\text{IMP}_{t-1} = \text{EXP}_{t-1} + T_{t-1}$$

$$I_{t-1} = 1734 + 0.252 (\text{GDP}_{t-1} + T_{t-1})$$

$$I \text{ exp.}t = bI_{t-1}$$

$$I_{t-1} \leq \text{IMP}_{t-1}$$

$$K_t = K_{t-1} + I_{t-1} - 0.07 K_{t-1}$$

$$K \text{ exp.}t = K \text{ exp.}t-1 + I \text{ exp.}t-1 - 0.07 K \text{ exp.}t-1$$

$$L \text{ exp.}t = L \text{ exp.}t-1 + b(L_t - L_{t-1})$$

$$\text{GDP}_t = K_t^{0.467} L_t^{0.533} E$$

$$\frac{\text{GDP}_t}{\text{GDP}_{t-1}} = \frac{K_t^{0.467} L_t^{0.533} E}{K_{t-1}^{0.467} L_{t-1}^{0.533} E}$$

$$\frac{\text{EXP}_t}{\text{EXP}_{t-1}} = \frac{K \text{ exp.}t^{0.467} L \text{ exp.}t^{0.533} E}{K \text{ exp.}t-1^{0.467} L \text{ exp.}t-1^{0.533} E}$$

$$\frac{\text{EXP}_{t-1}}{\text{EXP}_{t-1}} = \frac{K \text{ exp.}t-1^{0.467} L \text{ exp.}t-1^{0.533} E}{K \text{ exp.}t-1^{0.467} L \text{ exp.}t-1^{0.533} E}$$

where:

L exp = labor force employed in export industries

K exp = capital stock employed in export industries

IMP = imports

EXP = exports

I exp = investment in export industries

E = efficiency, technological progress factor

a = proportion of transfers to GDP

b = proportion of investment in the export sector

The future labor force was determined from the consultants' population forecasts presented in Chapter 2 by assuming a continued participation rate of 25 percent. This is consistent with the constant dependency ratio in the population projection. International experience suggests that the current high male participation rate will decline somewhat in the future and that this will be offset by a greater participation of women.

CHAPTER 4

DOMESTIC FREIGHT TRAFFIC

DOMESTIC FREIGHT TRAFFIC

Introduction

The objective of commodity studies is to estimate the total tonnage of goods requiring transportation in the future, so that plans and policies can be undertaken to meet this demand in full or to adjust demand parameters to levels which can be accommodated within the resources a nation is able or willing to devote to the transport sector.

To accomplish this objective, the Consultants have made estimates of production and consumption and have derived estimates of imports and exports for 1985 and 2000. As many of these estimates are either derived growth rates from the base year, or are tested for validity by analysis of implied growth rates once trial projections have been made, it is also necessary to estimate base year values.

For this study, the latest year for which statistics are available is 1979, and many of these are incomplete or preliminary. Moreover, 1979 is not necessarily a typical year. This is particularly true for agriculture, where production fluctuates substantially according to rainfall.

For other products, changes in inventory can account for substantial yearly variations. Therefore, the Consultants' base statistics do not necessarily correspond to reported 1979 actual statistics, but may be adjusted based on historical trends or averages.

Analytical Procedures

The following steps were followed in determining total future commodity transport demand and in generating estimated commodity flows for transport planning purposes:

1. Estimate demand on a national level.
2. Distribute the national totals to geographical zones - in this study to each Mantika - and to each significant border import/export or entry/exit point, including the ports.
3. Calculate zonal commodity tonnage surpluses and deficits; the surpluses being the excess of production over consumption (demand), and the deficits being the excess of consumption over production.

4. Prepare a matrix of inter-zonal commodity flows, balancing zonal surpluses and deficits.
5. Calculate modal split (in this study the estimated share which will be carried by railroad, trucks, and pipelines) and then assign flows to specific transportation corridors or routes.

Both the methodology and the values adopted in step one are described in detail in this chapter.

The methods for accomplishing step two are then described. It is not, however, possible to detail for each commodity and each zone how each set of surplus and deficit values were obtained or their actual values. These are documented in hundreds of pages of computer printouts.

Step three is simply the mathematical procedure of summing production and consumption tonnage values and obtaining the difference.

Step four is summarized by origin and destination in tables and by corridor flows in maps included in this chapter. For facility of graphic presentation, Mantika flows have been grouped by Mohafaza and commodities have been grouped into the three main groups most useful for transport planning.

Step five is described in detail in Volume VII.

4.1 ESTIMATED NATIONAL DEMAND

Major Commodity Flows

A total of 51 commodity categories were studied. Zonal surpluses and deficits were computed for each. These were then grouped into 15 for purposes of determining commodity flows (origin/ destination matrices). Surpluses and deficits were added separately since a particular zone may have a surplus in one item of a commodity group and a deficit in another. These groupings were based on similarity of product characteristics in terms of production and consumption parameters.

For purposes of projecting commodity movements in 1985 and 2000, these 15 groups were further combined to 3 groups with similar per ton-kilometer transportation cost characteristics, plus phosphates and crude oil. Modal split was constructed for these 3 groups. Commodity traffic was then assigned on this basis. These groups are shown in Table 4.1.

This section briefly describes the methods used to estimate production and consumption once the national projections had been made. It is followed by maps (Figures 4.1 to 4.3) showing flows on the major corridors for 1979, 1985, and 2000 divided

Table 4.1

COMMODITY GROUPS AND CODES

	<u>Bulk</u>	<u>Inter- mediate</u>	<u>High Value</u>	<u>Phosphate</u>	<u>Crude Oil</u>
01 <u>Wheat and Barley</u>	X				
Wheat					
Barley					
Wheat (flour mill input)					
02 <u>Sugar Beets</u>		X			
Sugar Beets					
03 <u>Cotton + Products</u>		X			
Raw Cotton					
Ginned Cotton					
Cotton Seed					
04 <u>Vegetables and other Farm Products</u>		X			
Lentils					
Tomatoes					
Watermelons					
Muskmelons					
Grapes					
Dry Onions					
Cucumbers					
Potatoes					
Egg Plants					
Olives (Table)					
Fodder					
Rice					
Cheese, Butter, Chee					
Olives for Pressing					
Eggs					
Milk					
Other Agricultural Products					
05 <u>Animal and Meat</u>			X		
Beef Meat					
Mutton Meat					
Poultry Meat					
Livestock					

Table 4.1 (Continued)

COMMODITY GROUPS AND CODES

	<u>Bulk</u>	<u>Inter- mediate</u>	<u>High Value</u>	<u>Phosphate</u>	<u>Crude Oil</u>
06 <u>Flour, Sugar, Vegetable Oil, and Other Manufactured Food</u>		X			
Flour Domestic					
Raw Sugar					
Refined Sugar					
Cotton Seed Oil					
Olive Oil					
Salt					
Flour (imported)					
Other Processed Food and Beverages					
07 <u>Cement</u>	X				
Cement					
08 <u>Manufactured Construction Materials</u>		X			
Manufactured Construction Materials					
09 <u>Phosphate</u>				X	
Phosphate					
10 <u>Fertilizer</u>		X			
Fertilizer					
11 <u>Refined Petroleum</u>	X				
Gasoline					
Kerosine					
Diesel					
Fuel Oil					
Butane					
Other Petroleum					
Jet Fuel					
Pipeline Movements					

Table 4.1 (Continued)

COMMODITY GROUPS AND CODES

	<u>Bulk</u>	<u>Inter- mediate</u>	<u>High Value</u>	<u>Phosphate</u>	<u>Crude Oil</u>
12 <u>Consumer Goods and Other Manufactured Goods</u>			X		
Consumer Goods					
13 <u>Producers Goods</u>			X		
Producers Goods					
14 <u>Sand, Gravel, Cement Block, and Other Raw Construction Materials</u>	X				
Sand, Gravel, Stone					
15 <u>Crude Oil</u>					
Crude Oil					X

Source: Consultants' classification.

into three major commodity groups - bulk, intermediate, and high value. Transit corridor flows are shown in Chapter 5, Figure 5.1 and passenger flows are shown in Chapter 6, Figure 6.8.

Estimated inter-regional flows by origin and destination for commodity groups are presented in Tables 4.12 to 4.20 at the end of this chapter. Table 4.11, also at the end of this section, explains the zone codes used in the origin and destination tables.

Table 4.2 summarizes the Consultants' estimates on a national level for consumption, production, imports, and exports in 1979, 1985, and 2000. The analytical process for estimating the values are described in the sub-sections that follow. The headings for these explanations are somewhat different from those in the table, because the rationale for the groups necessary to project transport flows is not identical with the analytical process by which values were determined. For example, although wheat and barley are grouped in the table, the computational process required studying of wheat and flour together and barley with animal feeds, and meat. Flour, animal feeds and meat are all components of manufactured food in the table.

In computing commodity tonnages, considerable reliance was placed on the macrosocial and economic parameters documented and projected in Chapters 2 and 3. The most significant are population, total GDP, per capita income, growth of GDP by productive sector, GDP investment/consumption relationships, and balance of payments or trade account.

To determine consumption for foods and other final consumption goods, demand income elasticities were usually adopted. FAO estimates for Syria, historical relationships, and the Consultants' experience in other countries were used. For other non-food manufactured products, relationships to sectoral GDP projections were most frequently used.

To determine production estimates, investments planned or in progress to expand productive capacity were explicitly considered. Where those were not sufficient to satisfy demand projections for food, growth rates were adopted to try to achieve as great a level of self-sufficiency in food as possible, within constraints of reasonable production capabilities. For manufactured products, where the raw materials were projected as being available internally, most were assumed to be transferred into intermediate or final goods in Syria by the year 2000.

The process of estimating production and consumption was an iterative one. Trial assumptions frequently gave unreasonable

growth rates or absolute values, in terms of production, consumption, or macro-economic parameters. Assumptions were varied and tested until internally consistent values were obtained.

For cotton, sugar beets, and wheat, planned investments to expand production in specific zones were determined, particularly for the northeast. The differences between the increases in total projected production and these values were distributed by equal scaling upward of all existing producing zones. For many other agricultural raw materials, production estimates were made by zone based on acreage and productivity potentials. For products for which information was not adequate, production projections were governed by the projected rural population of each existing producing zone. Present production of wheat, cotton, and melons by zone was included in Phase I.

Also in Phase I, assumptions were made pertaining to the location of future agricultural processing capacity. Where our Phase II total volume estimates have changed, production by factory was scaled up or down accordingly.

Distribution of consumption of raw and manufactured foods was governed by zonal increases in per capita GDP, population forecasts, and the elasticities of demand specified in forecasting national consumption.

For manufactured construction materials, cement, and sand/gravel, consumption was governed by its projected share in the GDP for the construction sector. Production of cement was scaled up from base year values but adjusted by the specific plant capacity increase specified in Phase I. Other construction materials production was allocated by zonal growth of GDP for the manufacturing sector.

Manufactured consumer goods consumption was distributed on the basis of the elasticity of demand, per capita GDP, and population; producer goods were governed by growth in GDP weighted for construction, agriculture, and manufacturing. For both consumer and producer goods, production was assumed to be coincident with projections of GDP manufacturing.

Fertilizer production was assumed to expand at its present location, Homs. Fertilizer consumption was distributed according to projected zonal shares of the GDP for agriculture.

Refined petroleum production is assumed to continue at the present refineries in Homs and Baniyas. Consumption of refined products was scaled up in direct relationship to the existing consumption patterns. Movements through the zones representing import/export gates were scaled up from the existing distribution of flows.

Table 4.2

COMMODITY PROJECTIONS

Commodity	Base Year		(1979 Adjusted)*	
	Production	Consumption	Import	Export
Wheat and Barley	2,170	2,200	30	-
Sugar Beet	270	270	-	-
Cotton and By-Products	380	267	-	113
Other Farm Products	4,283	4,616	340	7
Animal Meat	101	100	-	1
Manufactured Food	1,944	2,487	578	35
Cement	1,847	2,535	688	-
Manufactured Construction Materials	137	665	528	-
Phosphates	1,169	-	-	1,169
Fertilizer	76	324	248	-
Refined Petroleum	3,406	4,598	1,460	308
Manufactured Consumer Goods	325	700	400	25
Producer Goods	1	967	966	-
Sand, Gravel + Non Manufactured Construction Materials	11,800	11,800	-	-
Crude Oil	8,918	3,827	2,826	7,917

* Adjustments to 1979 data were based on eliminating seasonality and other nonrecurring factors that distorted 1979 from the norm.

Table 4.2 (Continued)

COMMODITY PROJECTIONS

Commodity	Projection (1985)			
	Production and Growth Rate	Consumption and Growth Rate	Imports and Growth Rate	Exports and Growth Rate
Wheat and Barley Percent	2,680 3.6	2,780 4.0	100 22.2	-
Sugar Beet Percent	1,652 35.2	1,652 35.2	-	-
Cotton and By- Products Percent	423 1.8	308 1.3	-	115 0.3
Other Farm Products Percent	5,940 5.6	6,070 4.7	189 -7.8	51 39.2
Animal Meat Percent	150 6.8	152 7.2	5 -	3 20.1
Manufactured Food Percent	2,726 5.8	3,079 3.6	625 1.3	192 32.8
Cement Percent	3,282 10.1	3,282 4.4	164 -21.3	164 -
Manufactured Con- struction Materials Percent	312 14.7	945 6.0	642 3.3	9 -
Phosphates Percent	1,530 4.6	600 -	-	930 -3.7
Fertilizer Percent	502 37.0	518 8.1	26 -31.3	10 -
Refined Petroleum Percent	4,840 6.0	6,054 4.7	1,664 2.2	450 6.5
Manufactured Consumer Goods Percent	551 9.2	1,103 7.9	590 6.7	38 7.2
Producer Goods Percent	74 104.9	1,470 7.21	1,396 6.3	0 -
Sand, Gravel + Non Manufactured Materials Percent	16,280 5.5	16,280 5.5	-	-
Crude Oil Percent	8,100 -1.6	5,438 6.0	4,024 6.1	6,686 -2.8

Table 4.2 (Continued)

COMMODITY PROJECTIONS

Commodity	Projection (2000)			
	Production and Growth Rate	Consumption and Growth Rate	Imports and Growth Rate	Exports and Growth Rate
Wheat and Barley	4,650	4,950	300	-
Percent	3.7	3.9	7.6	
Sugar Beet	3,540	3,540	-	-
Percent	5.2	5.2		
Cotton and By-Products	950	711	-	239
Percent	5.5	5.6	-	5.0
Other Farm Products	12,097	13,156	870	335
Percent	4.9	5.3	10.0	13.4
Animal Meat	390	391	22	21
Percent	6.6	6.5	10.4	13.9
Manufactured Food	5,715	5,733	966	948
Percent	5.1	4.2	2.9	11.2
Cement	5,743	5,743	287	287
Percent	3.8	3.8	3.8	3.8
Manufactured Construction Materials	1,285	1,835	678	128
Percent	9.9	4.5	0.4	19.4
Phosphates	3,000	2,400	-	600
Percent	4.6	9.7		-2.9
Fertilizer	2,009	1,260	113	862
Percent	9.7	6.1	10.3	34.6
Refined Petroleum	11,651	12,336	1,850	1,165
Percent	6.0	4.9	0.7	6.5
Manufactured Consumer Goods	1,990	3,049	1,107	48
Percent	8.9	7.0	4.3	1.6
Producer Goods	550	3,661	3,136	25
Percent	14.3	6.3	5.5	-
Sand, Gravel + Non Manufactured Construction Materials	28,500	28,500	-	-
Percent	3.8	3.8		
Crude Oil	10,000	13,091	9,687	6,596
Percent	1.4	6.0	6.0	-0.1

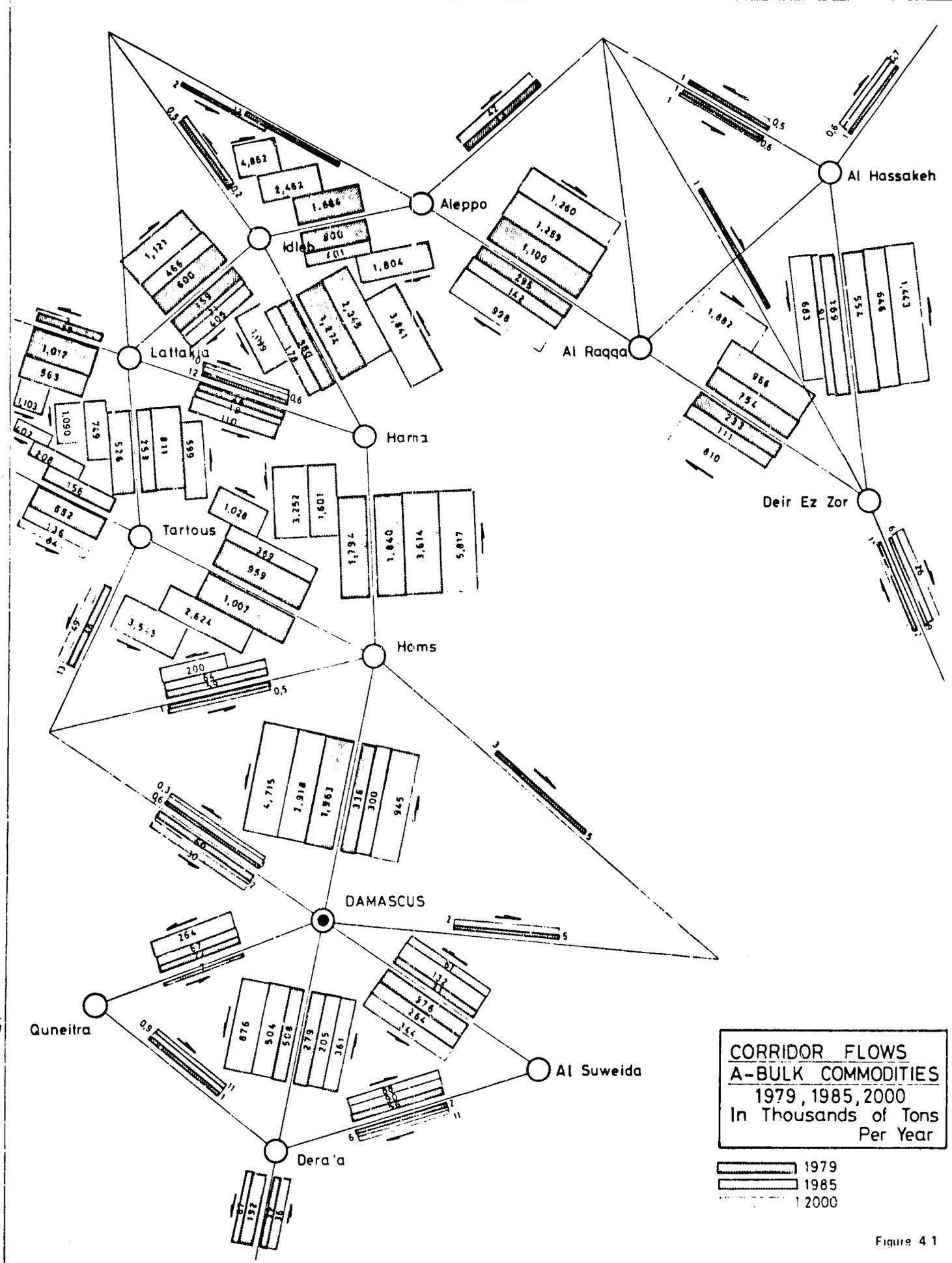


Figure 4 1

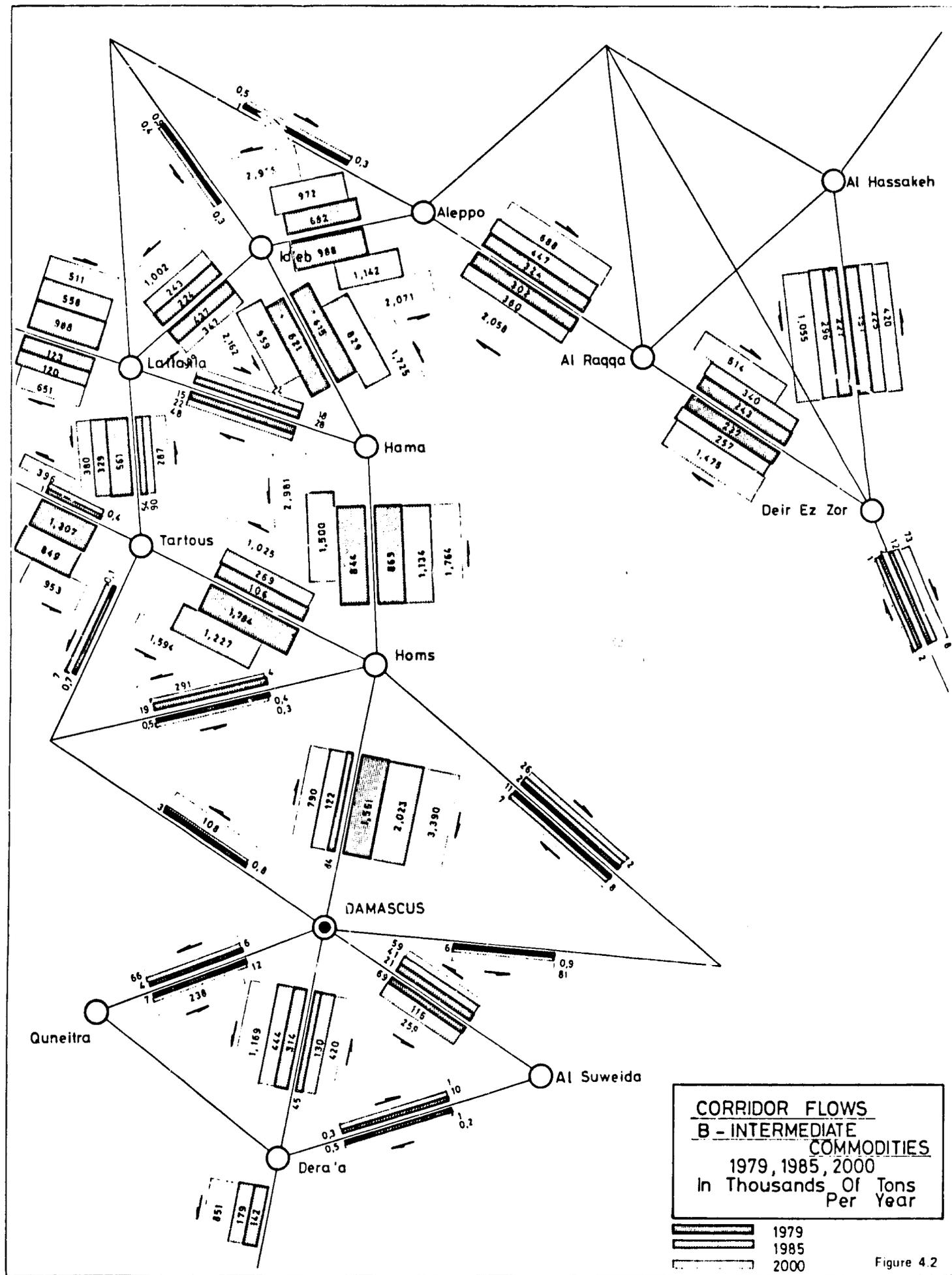


Figure 4.2

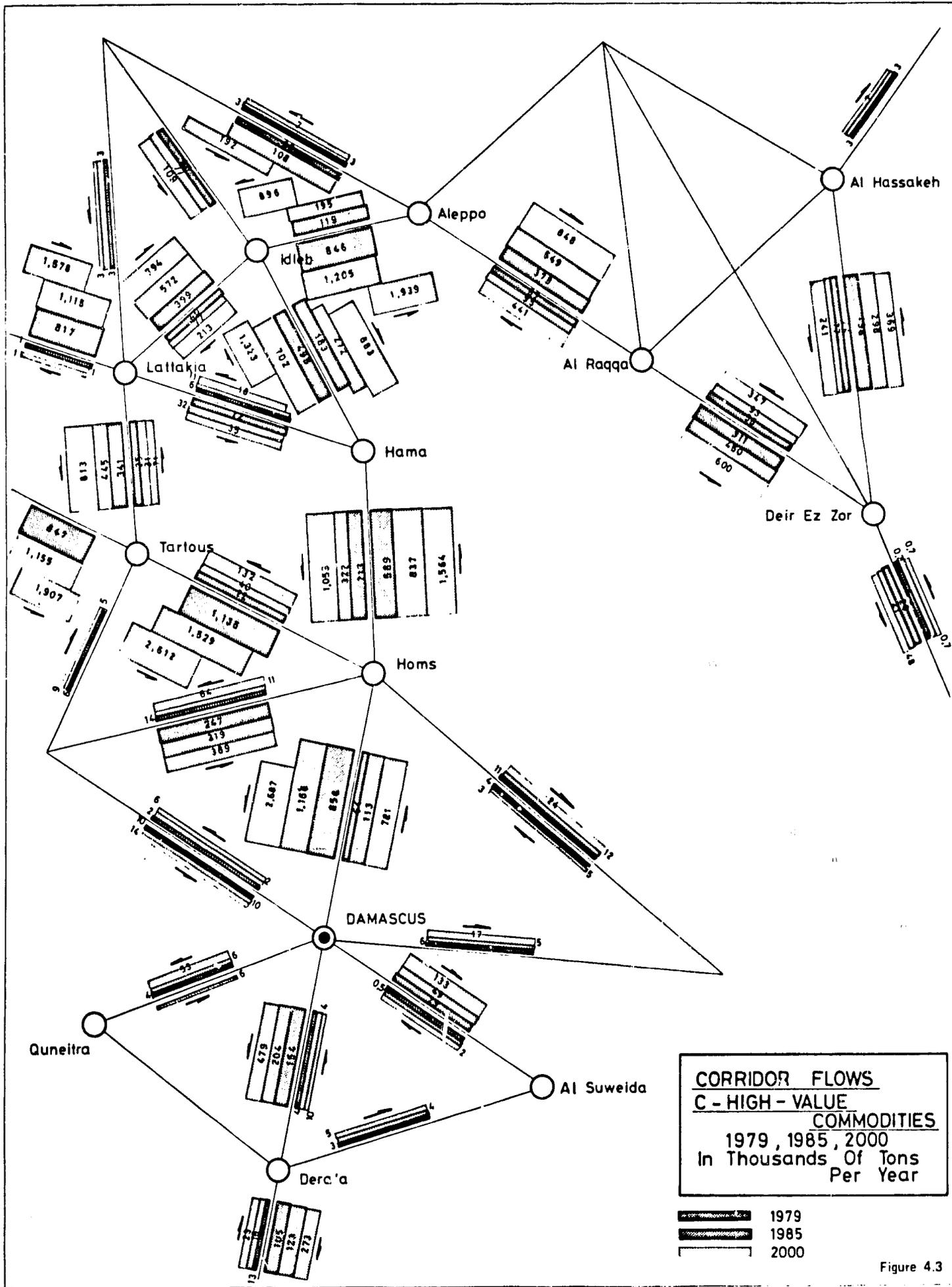


Figure 4.3

Fruits and Vegetables and Other Farm Products

This product group includes farm products which are produced for domestic consumption. Most of the products are consumed as fresh or dried produce. Wheat and sugar beets, which are transformed into manufactured foods, are discussed under separate commodity headings. Imports of fresh produce, principally fruit from Lebanon, supplies about 4 percent of total consumption. Rice, which is consumed at a rate of about 100,000 tons per year, is almost entirely imported. Elasticity of demand for several products was obtained from FAO estimates. Elasticity growth factors for 1979-1985 and 1985-2000 were calculated and multiplied by projected increases in per capita income and population to obtain consumption growth factors for the above-year intervals. Where these calculations produced per capita consumption exceeding reasonable levels either in terms of diet or production increase probabilities, the elasticities were reduced. The elasticities adopted are shown in Table 4.3. In parenthesis are elasticities initially tested and rejected on grounds of unreasonableness. Also shown are the base 1979 production levels adopted for projections and the per capita consumption implied by consumption growth rates assumed.

Wheat and Flour

Cereals, principally wheat, are the main staple of the Syrian diet. Government policy is to assure adequate total supply for consumption primarily from domestic production. About 35 to 45 percent of production is purchased by the General Organization for Cereals for conversion into flour in large commercial mills. The remainder is transformed to flour on a small scale in areas where wheat is produced. Presently about 10 percent of flour consumption is imported, but it is Government policy that wheat imports will replace flour imports, to be milled in country, until such time as the nation is self-sufficient in wheat.

Projections of wheat production and flour consumption assume continuation of the present Government subsidy policy. The farm price for wheat has been greater than the retail price for inexpensive bread since 1973. In real terms, retail prices have been declining while producer prices have risen to a point where they significantly exceed world prices.

Year-to-year production levels vary considerably with weather conditions. As a 1979 projection basis for wheat production, 1.6 million tons has been adopted. This is about 23 percent higher than 1979 but is approximately at levels achieved in 1974, 1975, and 1978. The highest production, 1.8 million tons, was recorded in 1976.

Table 4.3

FRUITS AND VEGETABLES AND OTHER FARM PRODUCTS

<u>Commodity</u>	<u>Elasticity</u>	<u>1979 Production (000 tons)</u>	<u>Per Capita Consumption 2000</u>
Lentils	0.4	120	18
Tomatoes	0.3(0.5)	500	74
Melons	0.1(0.42)	1,020	126
Grapes	0.42	350	53
Onions	0.3(0.5)	186	26
Cucumbers	0.3(0.5)	225	32
Potatoes	0.3	212	31
Eggplant	0.5	135	22
Table Olives	0.5	30	5
Olives for Oil	0.4	167	25 ³
Milk	0.7(0.9)	820	144 ¹
Rice	0.4	5	15
Total		3,770 ²	

Source: FAO, and Consultant's estimates. Projections for 2000 are for a total consumption of the above products of 10 million tons of which about 14 percent may have to be met by imports².

¹ Of which about 100 kilograms consumed in processed form such as butter, cheese, and yogurt.

² This total does not match the total for other farm products shown in the summary table because fodder is excluded.

³ At a ratio of 10:1 for conversion of olives to oil, a consumption of 2.5 kilograms of olive oil.

Consumption is estimated at 90 percent of production, the difference being wasted or used as seed. Assuming that 1.45 million tons are available for consumption and using a conversion factor to flour of 0.75, the total flour produced is about 1.1 million tons, or 122 kilograms per capita. Imported flour provides about 13 kilograms per capita for a total of 135 kilograms per capita consumption. The elasticity for consumption for cereals based on FAO guidelines is 0.2. When multiplied by the forecast increase in GNP per capita, this yields a forecast per capita consumption of 131 kilograms of flour in 1985 and 190 kilograms in 2000. Assuming the same conversion rate of wheat to flour, and percent of wheat wasted and held for seed, consumption of wheat will be 2.06 million tons in 1985 and 3.67 million tons in 2000.

Wheat production has been projected to rise at a rate nearly sufficient to meet demand by 1985. Imports of about 5 percent of demand would be required for cereals not produced in Syria. For 1985 to 2000, increases in cereal production will diminish somewhat, and by 2000 imports will represent 7 to 8 percent of total demand.

Sugar Beet and Sugar

While these two commodities cannot be grouped for transportation studies because their origin and destinations and resulting flows are very different, for analysis of national production, consumption, imports, and exports, they must be considered together.

Syria produces sugar from sugar beet, but production falls significantly short of demand. Sugar consumption is on the order of 210,000 tons, or 25 kilograms per capita. Although official trade statistics show 1979 imports of 210,000 tons of refined and raw sugar, the 1974 to 1979 average is 180,000 tons, which is a better base for estimating.

To determine future consumption, an elasticity of demand of 0.46 is assumed (based on FAO estimates). Projections of production of sugar beets are derived from the increases in production from newly cultivated lands specified in the Highway Development Study for the Northeast Region of Syria. These projections show very high growth rates but from a relatively small base. Even with the assumed increases in planting, Syria would still have to import sugar in 1985 and 2000. Presently, prices paid to sugar beet producers are subsidized and imported sugar costs appear to be significantly less than that domestically produced. Wholesale and retail prices are controlled at prices set to cover the cost of locally produced subsidized sugar. Therefore, the Consultants' projections assume a continued Government policy of trying to meet domestic consumption

through domestic production with continued subsidies at levels necessary to achieve this production goal, even though this may not be most economically advantageous. It also assumes that wholesale and consumer prices will remain at levels higher than international prices, as a means of restraining consumer demand.

Refineries now have the capacity to produce about 134,000 tons of refined sugar, whereas production from domestic beets is on the order of 30,000 to 35,000 tons. Therefore, about half of imports are received as raw sugar and refined locally. With no increases in capacity, but with a nominal increase in production efficiencies of 0.5 percent per year, the existing capacity will meet domestic beet processing requirements through about 1984. From 1985 capacity should be increased to enable processing of the rapidly increasing sugar beet production.

Projections are therefore as shown in Table 4.4 below:

Table 4.4

PROJECTIONS OF SUGAR BEETS AND SUGAR
(000 tons)

<u>Year</u>	<u>Sugar Beet Production</u>	<u>Raw Sugar Imports</u>	<u>Refined Sugar Production</u>	<u>Refined Sugar Consumption</u>	<u>Refined Sugar Imports</u>
1979	270*	79**	134	210	102
1985	1,652		198	283	85
2000	3,540		425	563	138

*Yields approximately 32,000 tons of refined sugar.

**Yields 76,000 tons of refined sugar.

Cotton and Cotton By-products

Cotton is the major industrial crop in Syria. Cotton production has been relatively stable since 1968. Although there have been important productivity gains - approximately 40 percent from 1967 to 1977 - they have been offset by reduced acreage. Government policy has been to expand acreage of food crops, particularly sugar beets and wheat, in order to achieve self-sufficiency in basic foods. This has caused a decrease in acreage devoted to cotton, although quality is high.

For 1979, raw cotton production was approximately 380,000 tons. This was processed into 145,000 tons of ginned cotton. The 235,000 tons of seed were processed into about 205,000 tons of cake and 30,000 of oil. Of the ginned cotton, about 32,000 tons were consumed by the textile industry, and the remainder, 113,000 tons, was exported.

A very modest 1.8 percent per year increase in cotton production is projected, rising to 423,000 tons in 1985. In the period 1985-2000 a growth rate of production of 5.5 percent in cotton and cotton by-products per year is projected based on Government plans to expand acreage and thereby increase production in the northeast alone to 860,000 tons by 2000.

The growth in domestic consumption of ginned cotton is closely related to domestic demand for clothing, reflected in expansion of demand by the textile industry. The elasticity of demand for clothing has been assumed to be 0.9. When computed against estimated growth of population and per capita GDP, this indicates a yearly growth rate of domestic demand of 6.6 percent to 1985 and 6.2 percent thereafter. Exports of cotton and cotton by-products in 1985 would therefore remain at 1979 levels but would rise to about 240,000 tons by 2000, concurrent with the major increase in production. All production of cotton cake and cotton oil, approximately 515,000 tons and 80,000 tons, respectively, in 2000, would be consumed internally.

Animal Feeds and Meat

The consumption of commercial animal feeds is linked to the consumption of meat through the size of livestock slaughter. The principal animal feeds are barley, fodder, cotton cake, corn, and various feeds which may be imported.

Barley is produced largely as animal feed. Production from 1974 to 1979 fluctuated widely from a high of 1.06 million tons in 1976 to a low of 377,000 tons in 1977. In 1979 production was about 400,000 tons. However, 600,000 tons is adopted as a projection base, a level attained or exceeded in four of the past six years. Variations in rainfall are probably most responsible for production changes, rises and declines following the same cyclical pattern as wheat but with greater extremes. Barley is priced lower than wheat, so that wheat is generally preferred where either may be planted. Syrian barley prices have remained below world levels.

Cotton seed cake is the second most important animal feed produced. As this is the residue from cotton seeds, after extraction of oil, its production is limited by and directly related to production of raw cotton (approximately 55 percent

by weight). Based on cotton production (discussed elsewhere) an estimate of 215,000 tons of cake is used as the 1979 projection base.

Maize is the third most significant animal feed, but the most important for the poultry industry. About 50,000 tons are produced.

Therefore, total measurable production of animal feeds is, for a normal base year, between 800,000 and 900,000 tons. Although feed grain imports are restricted, there is normally some 100,000 to 150,000 tons imported. Assuming that up to 20 percent of domestic production is unrecorded, the Consultants have adopted consumption of animal feeds of 1.2 million tons in 1979 as a basis for projection.

Domestic consumption is assumed to increase in direct proportion to the production of meat (beef, mutton, and poultry), estimated in 1979 at 101,000 tons. The FAO suggested elasticity factor for meat consumption, 1.06, was adopted to project growth rates of both meat and animal feed consumption.

Meat production is assumed to increase rapidly enough to meet demand, rising to about 150,000 tons in 1985 and 390,000 tons in 2000.

Animal feed production is also anticipated to increase sufficiently rapidly to meet demand in 1985, about 1.8 million tons, without significant imports. As cotton cake production is not projected to increase sufficiently in the interval from 1979 to 1985, corn and barley production will play an increasingly important role in meeting demand.

Projection to 2000 is more problematical. Based on the future for growth of meat consumption, animal feeds totaling 4.3 million tons would be required. To achieve this target, major increases in animal feeds in addition to barley and corn will be required. Cotton production should resume its growth after 1985, yielding at least 400,000 tons of cake by 2000. In addition, major increases in acreage planted to commercial feed grasses are assumed. Due to foreign exchange constraints, it is assumed that only 5 percent of needs will be imported. Should domestic production not achieve the targets assumed, there would presumably be lower meat consumption than implied by the meat consumption elasticity adopted for this analysis. However, the proportion of animal nutrition consumed from grazing is substantially greater than the total from commercial animal feeds. An increase in the acreage devoted to grazing or an improvement in the quality of pasture land could meet an increasing proportion of animal nutrition requirements.

Manufactured Foods

This commodity category is largely composed of flour, sugar, and cotton and olive oils, which have already been discussed under other headings. One other specific product, salt, is produced and consumed at about 68,000 tons per year.

To obtain a projection base for production of the miscellaneous and other processed foods manufactured in the country, the official statistics for total processed foods production in 1979 were obtained and the specific major items above were subtracted out. The difference, about 300,000 tons, represents a production estimate of these other products. Total consumption of other products is obtained by adding to domestic production processed food imports, less flour and sugar, or about 250,000 tons. Therefore, a 1979 base of about 550,000 tons of non-specified processed food consumption is obtained.

To project consumption of other food products, an elasticity of demand of 0.53 was assumed. This was obtained by dividing the other products into three subcategories, each representing about one-third by weight of consumption and assigning FAO suggested elasticities to each group. These were beverages and canned food (1.0), various flour based products (0.4), and others (0.2). The weighted average is an elasticity of 0.53.

Production of non-specified manufactured food is assumed to increase at the same rate as the projected GDP for the manufacturing sector, 9.2 percent from 1979 to 1985 and 9.0 percent from 1985 to 2000.

Although Syria is not now a significant exporter of processed foods, it is reasonable to assume that as the manufacturing sector grows, it will produce for export, particularly to other Middle East countries. Likewise, it will have to continue to import processed foods not manufactured locally, especially as rises in per capita income increase demand for more processed foods, many of which may now be considered luxury items.

Given the deficit in the trade account that is projected through 2000, Syria should have as a target the balancing of export and import tonnages of processed foods. For 2000 it is therefore assumed that such a balance will be obtained at a level of about 950,000 tons, both imported and exported. It is not believed that a balance can be achieved for 1985, however, when there will be net imports of about 433,000 tons, with imports only slightly above 1979 levels and exports growing rapidly to nearly 200,000 tons. Sugar would represent about 14 percent of import tonnage in both 1985 and 2000, the remainder of imports being miscellaneous processed foods.

The composition of the Consultants' production and consumption estimates for the commodity category are summarized in Table 4.5.

4.2 CEMENT, SAND AND GRAVEL, MANUFACTURED CONSTRUCTION MATERIALS

The projection for these three commodity groups is based on the reasonable hypothesis that they should be internally consistent and linked to the macro projections of GDP growth for the construction sector of the economy. The most accurate historical information concerns the consumption of cement derived from summing domestic production and imports.

The first step was to derive a relationship between cement consumption and GDP for building and construction (GDP_C). For this purpose a statistical analysis of historical series from 1970 to 1978 was done. Although the relationships from one year to the following fluctuate substantially, probably because of changes in inventories, it was possible to obtain a power curve fit for the statistical series with a reasonably high coefficient of correlation. Actual 1979 data could not be included because the extraordinary level of imports reported for this year would have implied consumption of 3.36 million tons, 62 percent higher than 1978 and 43 percent higher than the peak in 1977.

The formula used to calculate the coefficient is as follows:

$$Y = bx^a$$

$$\text{Log } Y = b + a \text{ log } X$$

Where Y = cement consumption

X = GDP_C at 1975 prices

Solving this equation gives the following value, where the exponent is the elasticity function

$$27.36 \text{ } GDP_C^{0.591} \quad R = 0.946$$

This elasticity, when multiplied by the GDP_C growth rates of 7.6 percent for 1979-1985 and 6.4 percent for 1985-2000, gives values for growth of cement consumption of 4.4 percent and 3.8 percent per year respectively. This implies a rise in per capita consumption from about 294 kilograms per capita to 332 kilograms per capita in 2000, which is reasonable.

Table 4.5

COMPOSITION AND CONSUMPTION ESTIMATES FOR MANUFACTURED FOODS
(000 tons)

	1979		1985		2000	
	<u>Pro- duction</u>	<u>Consump- tion</u>	<u>Pro- duction</u>	<u>Consump- tion</u>	<u>Pro- duction</u>	<u>Consump- tion</u>
Flour	1,379	1,509	1,860	1,960	3,300	3,300
Sugar Re- fined	134	210	198	283	425	563
Sugar Raw	-	791	-	-	-	-
Cotton Oil	31	31	35	41	78	79
Olive Oil	35	37	50	49	105	95
Salt	68	68	84	84	137	137
Others	297	554	498	761	1,679	1,559
	1,944	2,487	2,726	3,079	5,724	5,733

1 Imported and transformed into refined sugar but not included under the line for refined sugar.

Note: Figures may not add due to rounding.

The 1979 consumption implied by summing production and imports, as noted above, was unreasonable. Therefore, as a basis for projection, the 1977 consumption levels were raised by 4.4 percent per year to 2,535,000 tons, a realistic base for projections.

For 1985 and 2000 it was assumed that Syria would become largely self-sufficient in cement production. However, as certain specialized cement products would probably continue to have to be imported, it was assumed that 5 percent of consumption would come from imports, balanced by 5 percent export of production. This implies a growth rate in production of about 10 percent per year to 1985 and 3.8 percent per year from 1985 to 2000. Over the past four years, production has been increasing at an average rate of 17 percent per year. Therefore, the assumption of future production equaling demand appears reasonable.

Sand, gravel, and stone represent the commodity category with the largest tonnage. Although this commodity has a significant impact on transport demand, the tonnages exaggerate its importance as much of it is transported over short distances.

For projections, the relationship between cement consumption and total production of this commodity, reported in the Statistical Abstract for the period 1975 to 1978, was examined. The average ratio of sand, gravel, and stone tonnage to cement was 4.7:1. To obtain the base for projections, the calculated base year cement production of 2,535,000 tons was multiplied by 4.7. This calculation was repeated for 1985 and 2000. No imports or exports are assumed.

Projections of growth rates for manufactured construction materials began with the following hypotheses:

a. The ratio of the sum of the value of cement and this commodity to GDP_C decreases by 1 percent per year as other inputs - labor, capital, and equipment - increase their share proportionately. This is consistent with heavy capital investment programs already committed.

b. The real prices for this commodity group relative to cement increases by 1 percent per year with cement prices assumed to remain constant.

The value of consumption for these two commodities at 1979 prices is shown in Table 4.6:

Table 4.6

VALUE OF CONSUMPTION FOR CEMENT AND MANUFACTURED
CONSTRUCTION MATERIALS, 1979

	<u>000 Tons</u>	<u>SP/Ton</u>	<u>Value (million SP)</u>
Cement	2,535	141	357
Manufactured Construction Materials (MCM)	<u>665</u>	2,270	<u>1,510</u>
	3,200		1,867

GDP_C 1979 = SP 1,770 million Ratio $\frac{1,867}{1,770} = 1.05$
(at 1975 prices)

Source: Consultants' estimates.

For 1985 and 2000 the tonnages of cement, its value, and projections of GDP_C value have been previously determined. The value of cement plus manufactured construction materials can be computed as follows:.

$$\text{For 1985: } \frac{X}{2,794} = 0.98 \quad X = 2,738$$

With this value, the known value of cement production and the estimated real price of manufactured construction materials, the tonnage can be derived (see Table 4.7).

Table 4.7

TONNAGE OF CEMENT AND MANUFACTURED CONSTRUCTION MATERIALS, 1985

	<u>Value (million SP)</u>	<u>SP/Ton</u>	<u>000 Ton</u>
Cement Consumption	463	141	3,282
Manufactured Construction Materials	<u>2,278</u>	2,411	<u>945</u>
	2,741		4,227

Following this methodology, the value of tonnage consumption of cement and manufactured construction materials in 2000, where GDP at 1975 prices is SP 7,117 million is as follows:

Total Value Cement and Manufactured Construction Materials = 7,117 X 0.835 = 5,943 million. Tonnage of cement consumption is shown in Table 4.8.

Table 4.8
FORECAST CEMENT CONSUMPTION, 2000

	Value (million SP)	SP/ton	<u>000 Tons</u>
Cement Consumption	1,390	242	5,743
Manufactured Construction Materials Consumption	<u>5,136</u>	2,799	<u>1,835</u>
	6,526		7,578

The bases for the calculations of the consumption of manufactured construction materials projections are summarized below:

	<u>1979</u>	<u>Growth</u>	<u>1985</u>	<u>Growth</u>	<u>2000</u>
Consumption of Manufactured Construction Materials (000 tons)	665	6 percent per year	945	4.5 percent per year	1,835
Ratio Manufactured Construction Materials tons/ cement tons	0.26		0.29		0.32

Source: Consultants' estimates.

For purposes of estimating production, imports, and exports, the following assumptions were made:

a. Manufactured construction materials production would develop more rapidly than demand, increasing the percentage of demand supplied by local industry. Presently, iron bars represent about 70 percent, by weight, of locally manufactured construction materials. In terms of tonnage, the ratio of total manufactured construction materials production to consumption is 20.6 percent; it is assumed that this will rise to 33 percent by 1985 and 70 percent in 2000.

b. Production of manufactured construction materials for export would rise from negligible at present to 3 percent of tonnage in 1985 and 10 percent in 2000.

These assumptions yield a production growth rate of about 15 percent per year from 1979 to 1985 (from a small base) and 10 percent per year from 1985 to 2000. Imports would increase at a rate of about 3 percent per year through 1985 and grow less than 1 percent per year thereafter.

4.3 PHOSPHATES AND FERTILIZERS

Syria has sufficient phosphate reserves to become self-sufficient in phosphate-based fertilizers and to become an exporter of such fertilizers. Fertilizer production began on a relatively small scale in 1974 at 58,000 tons, rising to 76,000 tons in 1978. Phosphate production, however, has risen to about 1.2 million tons, most of which is exported.

It is assumed that by 1985 Syria will produce sufficient phosphate fertilizers to meet the growing demand of agriculture. The planned expansion of the Homs plant to 600,000 tons per year capacity will make this possible. Syria will thereafter only have to import a small amount of non-phosphate based fertilizers, principally potash.

For the period of 1985 to 2000 the capacity to produce fertilizer should expand faster than the estimated 6 percent per year domestic demand growth, so that fertilizer may become a significant export. The value of one ton of fertilizer exported is more than 10 times the value of phosphate, so the value added potential is significant.

It is estimated that phosphate production will grow at a constant 4.6 percent per year from 1979 to 2000. The quantities exported will diminish as greater quantities are processed into fertilizer. For the year 2000, with the production and consumption growth rates assumed, Syria will still export about 600,000 tons of phosphate.

In the event that phosphate mining grows faster, exports could be greater. However, given the low export value of phosphate,

it does not appear desirable for Syria to invest in production capability greatly exceeding the industry's capacity to transform this product into fertilizer. Faster growth of the fertilizer industry would clearly help generate badly needed foreign exchange.

To estimate fertilizer demand, a statistical relationship between the GDP for agriculture, fertilizer consumption, and rainfall for 1970-1978 was calculated. Rainfall data for Damascus, Palmyra, Lattakia, Al Kamishli, and Deir Ez Zor were averaged. The resulting statistical series are shown in Table 4.9.

Table 4.9

HISTORICAL FERTILIZER CONSUMPTION RELATIONSHIPS

<u>Year</u>	<u>Rainfall (mm)</u>	<u>Fertilizer Consumption (000 tons)</u>	<u>GDP ag 1975 prices (SP billion)</u>
1970	1,402	112	2,203
1971	2,132	126	2,351
1972	1,771	166	3,499
1973	1,251	154	2,098
1974	2,846	133	3,571
1975	2,135	165	3,705
1976	2,113	211	4,359
1977	1,767	260	3,710
1978	1,806	261	4,421

Multiple regression analysis gives the following results with a high coefficient of correlation.

$$\text{GDP}_{\text{ag}} = e^{-0.487} \times \text{rainfall}^{0.658} \times \text{fertilizer}^{0.70}$$

$$R = 0.922$$

$$\therefore \text{GDP}_{\text{ag}} = 0.615 \times 145.44 \times \text{Fert}^{0.701} = 89.4 \text{ Fert}^{0.701}$$

$$\therefore \text{Fert} = \left(\frac{\text{GDP}_{\text{ag}}}{89.4} \right)^{1/0.701} = 0.00164 \text{ GDP}^{1.427}$$

Therefore, the estimated elasticity relationship between growth of fertilizer consumption and growth of GDP_{ag} is on the order of 1.43. The annual growth rates in fertilizer use implied are 8.2 percent for 1979-1985 (5.7 x 1.43) and for 1985-2000, 6.1 percent (4.3 x 1.43). Consumption in 1985 is therefore 518,000 tons and in 2000 is 1,260,000 tons.

To obtain estimates of imports and exports of fertilizer, the consumption estimates above were reduced by 5 percent in 1985 and 9 percent in 2000 to reflect the portion of non-phosphate based fertilizers in total consumption which will continue to be imported. The phosphate fertilizer available for export is then the total estimated production less domestic consumption.

4.4 PETROLEUM PRODUCTS

Syria is both an exporter and importer of crude oil and refined products. This occurs because Syrian heavy crude must be mixed with lighter, lower-sulfur-content crudes for refinery operation and the refinery product output does not match the internal demand, some products being in excess of demand and others inadequate to meet demand. At present the value of net crude exports and refined exports is substantially greater than net refined product imports, producing very significant foreign exchange earnings.

The projections for 1985, based on Government estimates, assume a reduction in crude oil production of 1.6 percent per year as limited reserves are depleted and recovery becomes technically more difficult and expensive. Driven by increases in demand for refined products on the order of 6 percent per year, crude available for export will decline at about 3 percent per year, and crude imports will rise about 6 percent per year. For refined products it is assumed that Syria will try to achieve as much self-sufficiency as possible. Importing these products would otherwise place a great strain on the balance of payments.

Therefore, only modest growth in net refined product imports is projected.

From 1985 to 2000, refinery consumption of crude is forecast to grow at 6 percent per year, with a rise in crude oil production of 1.4 percent per year generated by the use of more efficient methods of extraction of crude. Refined production is forecast to rise at 6 percent and product imports to rise to 4.7 percent; limited growth is expected in imports and substantial growth is anticipated in exports.

Although product exports rise faster than imports, import tonnage will still exceed exports by about 0.7 million tons. Coupled with the shift from net exporter to net importer of

crude, Syria's petroleum product needs in 2000 will cause a net deficit on the trade account for this product group.

The forecast national balance in petroleum products for 1985 and 2000 is shown in Figures 4.4 and 4.5.

The underlying assumption and calculations are as follows. The projection base for crude oil production, imports, and exports is the average of 1977-1979.

These quantities (Tables 3.6 and 3.14) were converted to refined products at an average conversion function of 0.89. Actual tonnage consumption (sales) of various refined products for 1978 and 1979 were obtained from SADCOP and averaged. Gas oil accounted for 54 to 55 percent of all sales. SADCOP estimates that about 80 percent of gas oil is used for transport, not unreasonable since less than 10 percent of electric energy production is generated from gas oil. Gasoline sales are about 14 percent of total product sales. Therefore, we can infer that about 58 percent of all refined product sales are for transport use (aviation fuels excluded).

To estimate growth rates of product consumption, elasticity assumptions were made. The historical elasticity (1970-1979) of motor fuels to GDP is 0.622. The projected growth rate of passenger- and ton-kilometer exceeds GDP growth, but it was decided to hold this elasticity relationship for projections for the following reasons:

a. Modal split analysis indicates that railways will carry a much higher share of passenger and goods movement than in the past and railroads are much more fuel efficient.

b. The average fuel consumption of passenger cars will decrease as the fleet mix changes in favor of smaller, more fuel efficient vehicles.

c. It is assumed that the level of subsidies of gas oil will be reduced and produce an incentive to use the vehicle fleet more efficiently.

d. The effect on the balance of payments, if a higher elasticity were assumed, would be so serious that conservation policies would have to be involved to reduce consumption.

For petroleum products other than transportation fuels, it was not possible to obtain data on end use by sector or with which to calculate elasticity. It has therefore been assumed that the elasticity to GDP is 1.0.

It is not possible to use the elasticity of growth of the mining and manufacturing sector to GDP (1.25 in 1979-1985 and

Figure 4.4

PETROLEUM PRODUCTS PROJECTIONS 1985

(000 Tons)

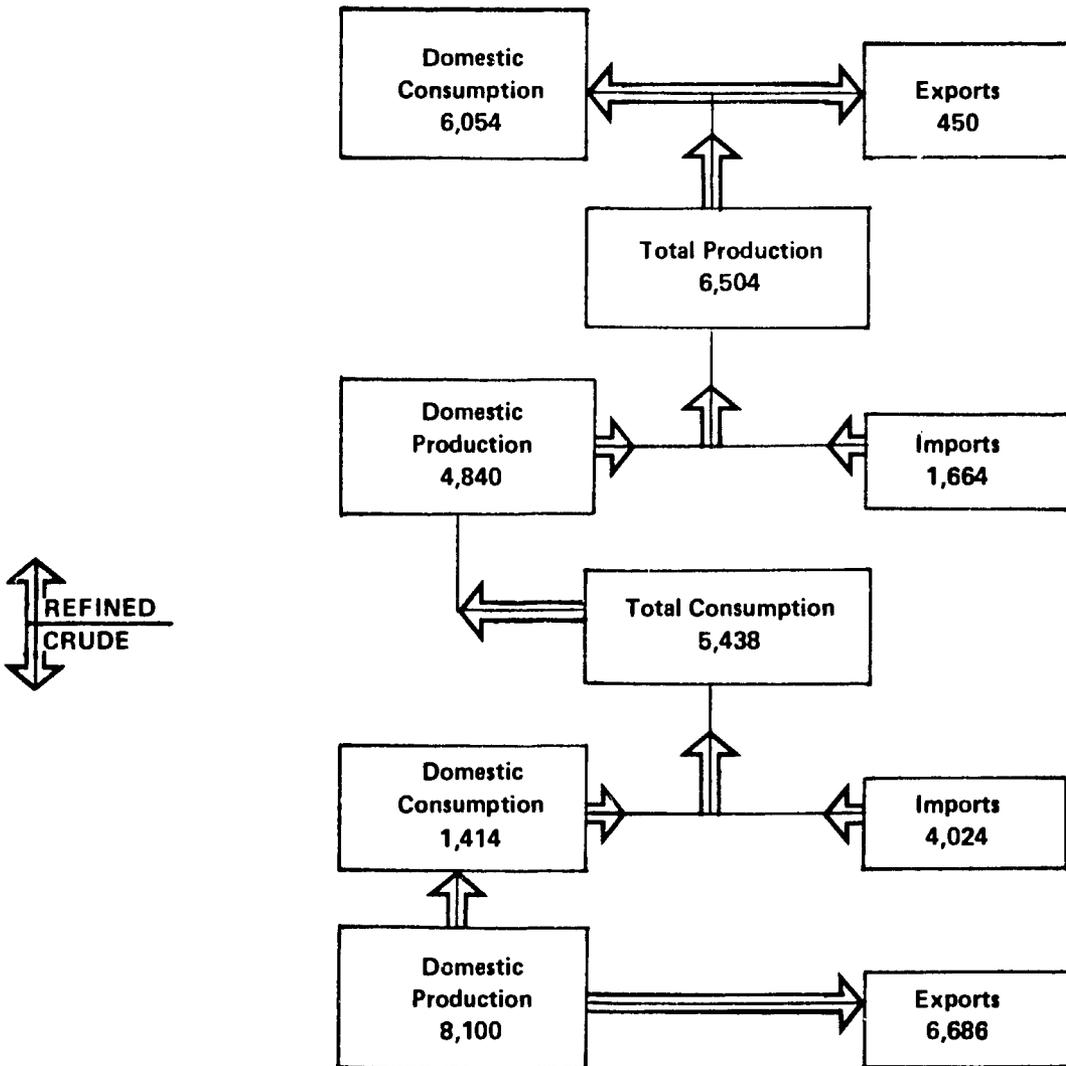
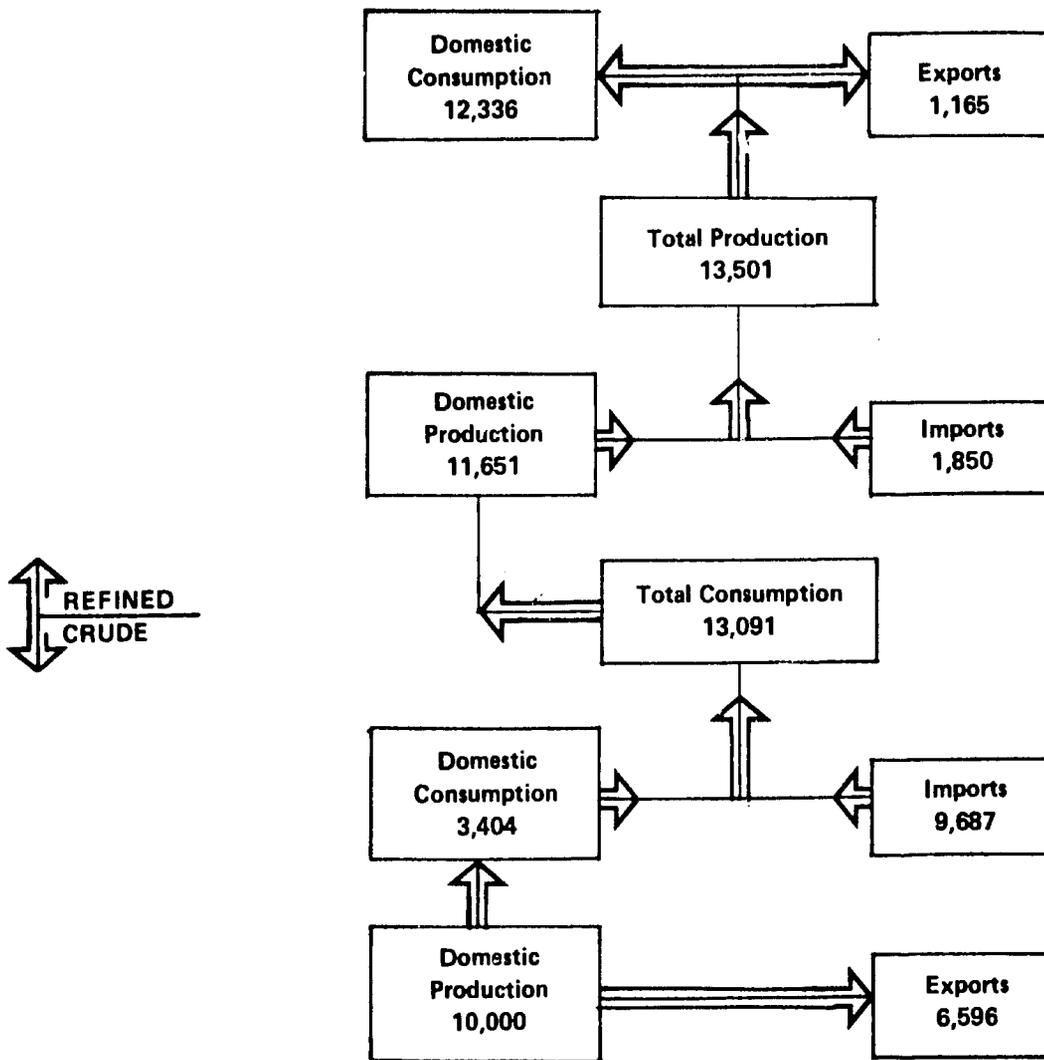


Figure 4.5

PETROLEUM PRODUCTS PROJECTIONS 2000

(000 Tons)



1.21 in 1985-2000) because most mining and manufacturing is powered by hydro-generated electricity, not petroleum products. About 78 percent of the nation's total electricity consumption is hydro-generated and, considering planned capacity expansion and its lower cost, growth of electricity from hydro should be adequate to meet future energy needs of the mining and manufacturing sector and possibly to further reduce its already low use of petroleum products.

In addition, a gas utilization plant will be completed in the northeast oil fields by 1982 with a capacity of handling 792,000 cubic meters of gas per day. This will provide an additional energy equivalent of about 200,000 tons of fuel oil. As gas reserves are thought to be ample (above 100 billion cubic meters), and Syria must try to use alternative energy resources to the maximum in view of the depletion of crude reserves, it has been assumed that production in 2000 will be equivalent to 1 million tons of fuel oil.

Forecast consumption of refined petroleum products is shown in Table 4.10.

Table 4.10

FORECAST PETROLEUM PRODUCTS CONSUMPTION
(000 tons)

	<u>1979 Projection Base</u>	<u>Annual Growth Rate</u>	<u>1985</u>	<u>Annual Growth Rate</u>	<u>2000</u>	<u>Percent of Total</u>
Motor	2,653	4.2	3,390	4.0	6,079	46
Other	<u>1,945</u>	6.7	<u>2,870</u>	6.4	<u>7,257</u>	54
	4,598		6,260		13,336	
Less Natural Gas Equivalent			<u>206</u>		<u>1,000</u>	
Net Total			6,064		12,336	

Source: Consultants' estimates.

To estimate the portion of refined products which would be supplied by domestic refining, it was assumed for 1985 that the relationship of imports to domestic consumption would remain as

in 1979, or about 32 percent, and that the percentage of product exported would remain at 9 percent. For 2000 it has been assumed that the percentage of imports would drop to 15 percent, because the percentage of total products consumed by transport will have shifted from 58 percent (1979) to 46 percent (2000) (i.e., in the form of heavier products and because refinery technology should adapt more closely to the country's own internal product mix requirements).

The projection for crude oil production is explained above. Crude consumption is derived from the estimated production of refined products. The proportions of domestic and imported crude entering the refinery have been assumed the same as for the 1979 projection base, 26 percent and 74 percent respectively, for reasons of technical processes, but they might shift to somewhat higher use of domestic crude. Such a tendency would not alter the trade balance as the reduction in crude imports would be at the expense of crude exports.

Producer Goods

The producer goods category includes basic metals, manufactured metal products not for final consumption, machinery, and non-transport equipment. Domestic production is negligible, as one can assume that imports approximated consumption in 1979 at 966,000 tons.

The Consultants' macro-economic model projects investment (capital formation) rising at the rate of 7.6 percent from 1979 to 1985 and 6.2 percent from 1985 to 2000. It is assumed that producer goods as a share of total investment will rise in value in the future, as the mix of producer goods gets more expensive and sophisticated per unit. This also implies that the value-to-weight relationship will also increase. It has been assumed that changes in these two parameters will offset each other so that one can adopt the macro-economic model investment growth rates as proxies for the growth rate in tonnage consumed.

Although Syria does not produce significant volumes of producer goods presently, one can expect this to gradually change with the growth and sophistication of the economy. It has been assumed that by 1985, 5 percent of domestic requirements will be produced internally. By 2000 this will rise to 15 percent, with 5 percent of domestic production exported.

Manufactured Consumer Goods

This product category includes a multiplicity of products, and so is difficult to estimate with accuracy. To arrive at base 1979 figures, the best provisional data available for 1979 exports and imports were obtained. These suggest that total

imports were about 400,000 tons, composed principally of textiles and clothing, plastics, paper products, wood products, and various household equipment, including automobiles.

This value is substantially higher than is shown in Table 3.12 because some of the products therein classified as "industrial processed" have not been included elsewhere in our categories and are captured here as manufactured consumer goods. Total exports are about 25,000 tons.

To estimate total domestic consumption, it was assumed that expenditures on manufactured goods would equal 25 to 30 percent of total private consumption at 1979 prices.¹ A weighted average value of the imported consumer goods was calculated at about SP 12,000 per ton and for consumer goods produced in Syria at SP 10,000 per ton.

Therefore, in 1979, the expenditures on manufactured consumer goods would be:

Imports 400,000 tons x SP 12,000/ton = 4.8 x SP 10⁹

Domes.

Prod. for
Domes.

Consump. 300,000 tons x SP 10,000/ton = 3.0 x SP 10⁹

 Total 700,000 tons 7.8 x SP 10⁹

Private

Consump-
tion:

(1979 prices)² 25.4 x SP 10⁹

Added Estimated

Unrecorded

Transfers + 3.0 x SP 10⁹

 Total 28.4 x SP 10⁹

Manufactured Consumer Goods

Total Private Consumption

$$\frac{7.8}{28.4} = .27$$

¹ The percentage in 1970, determined from 1970 consumer surveys in Damascus, was about 25 percent (see Table 3.10).

² Table 3.1.

To obtain total production, exports are added to the production for internal use (300,000 + 25,000 tons) for a total of 325,000 tons.

Production is assumed to grow at the same rate as GDP for manufacturing, namely 9.2 percent from 1979 to 1985 and 9.0 percent from 1985 to 2000. Consumption estimates are based on an elasticity of demand of 1.2. This compares with a somewhat lower elasticity for all consumer consumption of 1.06 in constant 1975 prices for the period from 1970 to 1979. In terms of market prices, the apparent historical elasticity has been 0.8, reflecting the fact that prices of food products have been controlled and subsidized.

Table 4.11

ZONE CODES

<u>Zone</u>	<u>Location</u>
1	Damascus City and Damascus Mohafaza
2	Quneitra Mohafaza
3	Dera'a Mohafza
5	Homs
6	Hama
7	Tartous
8	Lattakia
9	Idleb
10	Aleppo
11	Al Raqqa
12	Deir Ez Zor
13	Al Hassakeh
14	Tartous Port
15	Lattakia Port
16	Jordanian Crossing
17	Lebanese Crossing
18	Western Turkey Crossing
19	Eastern Turkey Crossing
20	Tal Kojak Iraqi Crossing
21	Albu Kamal Iraqi Crossing
22	Tanf Iraqi Crossing
23	Damascus International Airport

Table 4.12

BULK COMMODITIES INTER-REGION ORIGIN AND DESTINATION, 1979

ORIGIN ZONE	ZONE	VALUE	DESTINATION ZONE	VALUE	ORIGIN ZONE	VALUE	DESTINATION ZONE	VALUE	ORIGIN ZONE	VALUE	DESTINATION ZONE	VALUE	ORIGIN ZONE	VALUE	
1	1	4000268.	*	2	77000.	*	3	229987.	*	4	310378.	*	5	109836.	
	7	42000.	*	8	11204.	*	10	13061.	*	11	668.	*	12	2000.	
	14	11000.	*	16	13484.	*	17	347.	*	21	408.	*	22	4631.	
	TOTAL FOR THIS ORIGIN :		4963028.												
2	3	1000.	*												
	TOTAL FOR THIS ORIGIN :		1000.												
3	1	206000.	*	3	64000.	*	4	56367.	*	6	648.	*	8	72.	
	16	51000.	*												
	TOTAL FOR THIS ORIGIN :		378663.												
4	1	27000.	*	3	2000.	*	4	139000.	*	8	4000.	*	17	265.	
	TOTAL FOR THIS ORIGIN :		172265.												
5	1	1058118.	*	3	145635.	*	4	28687.	*	5	979501.	*	6	385389.	
	8	53874.	*	9	90871.	*	10	446444.	*	11	127593.	*	12	78298.	
	14	133329.	*	16	2448.	*	17	51539.	*	18	306.	*	19	73000.	
	21	3269.	*	22	4000.	*									
	TOTAL FOR THIS ORIGIN :		4374683.												
6	1	280180.	*	3	3880.	*	4	2900.	*	5	1152760.	*	6	605266.	
	8	12100.	*	9	77780.	*	10	24460.	*	11	1720.	*	12	2540.	
	16	18320.	*	17	900.	*	22	400.	*						
	TOTAL FOR THIS ORIGIN :		2267506.												
7	1	21000.	*	4	1000.	*	6	113243.	*	7	634456.	*	8	90855.	
	10	3115.	*	12	6000.	*	13	1000.	*	16	5000.	*	9	1000.	
	TOTAL FOR THIS ORIGIN :		896670.												
8	1	50042.	*	5	13115.	*	6	23700.	*	7	72000.	*	8	1190288.	
	10	16234.	*	11	480.	*	12	2000.	*	13	1000.	*	17	38000.	
	TOTAL FOR THIS ORIGIN :		1416784.												
9	1	1518.	*	3	561.	*	5	4224.	*	6	77495.	*	7	336.	
	9	421861.	*	10	68125.	*	12	495.	*	13	891.	*	16	40837.	
	18	198.	*	21	2145.	*									
	TOTAL FOR THIS ORIGIN :		645076.												
10	1	30208.	*	3	22968.	*	4	12484.	*	5	23767.	*	6	21737.	

Table 4.12 (Continued)

ORIGIN ZONE	ZONE	VALUE	DESIGNATION	ZONE	VALUE	ORIGIN ZONE	ZONE	VALUE	DESIGNATION	ZONE	VALUE	ORIGIN ZONE	ZONE	VALUE	DESIGNATION	ORIGIN ZONE	ZONE	VALUE
	8	89056.	*	9	384471.	*	10	2658093.	*	11	119533.	*	12	137393.	*	13	136339.	*
	14	11182.	*	15	22540.	*	17	684.	*	21	1000.	*	22	900.	*			
TOTAL FOR THIS ORIGIN :				3673615.														
11	1	50.	*	5	5850.	*	6	9130.	*	8	6126.	*	10	65000.	*	11	87217.	*
	12	13000.	*	13	1602.	*												
TOTAL FOR THIS ORIGIN :				187976.														
12	1	19002.	*	4	940.	*	5	23640.	*	8	520.	*	9	20000.	*	10	7240.	*
	11	4123.	*	12	141001.	*	13	146058.	*	17	1000.	*	21	1000.	*			
TOTAL FOR THIS ORIGIN :				364523.														
13	1	16040.	*	3	2050.	*	4	1447.	*	5	23308.	*	6	20584.	*	7	684.	*
	8	1930.	*	9	8371.	*	10	42993.	*	11	18551.	*	12	15075.	*	13	68775.	*
	15	16140.	*	16	1085.	*	17	1000.	*	19	1000.	*						
TOTAL FOR THIS ORIGIN :				239034.														
14	1	102091.	*	3	20270.	*	4	16899.	*	5	56527.	*	6	14023.	*	7	136783.	*
	8	93005.	*	9	51853.	*	10	33731.	*	11	35784.	*	12	57136.	*	13	33462.	*
TOTAL FOR THIS ORIGIN :				651565.														
15	1	53991.	*	3	1825.	*	4	1501.	*	5	292984.	*	6	21868.	*	7	2564.	*
	8	71699.	*	9	31412.	*	10	300050.	*	11	74599.	*	12	39651.	*	13	125037.	*
TOTAL FOR THIS ORIGIN :				1017181.														
16	1	68000.	*	5	1000.	*	6	3000.	*									
TOTAL FOR THIS ORIGIN :				72000.														
17	1	60000.	*	5	1000.	*	13	362.	*	Source: Consultants' estimates.								
TOTAL FOR THIS ORIGIN :				61362.														
18	10	13250.	*															
TOTAL FOR THIS ORIGIN :				13250.														
19	12	1000.	*	13	1000.	*												
TOTAL FOR THIS ORIGIN :				2000.														
21	10	1000.	*	11	1000.	*												
TOTAL FOR THIS ORIGIN :				2000.														

DESTINATION TOTALS

1	5993510.	*	2	77000.	*	3	494176.	*	4	571604.	*	5	2687512.	*	6	1452390.	*
7	1579231.	*	8	1647412.	*	9	1096543.	*	10	3693373.	*	11	471268.	*	12	495589.	*
13	622505.	*	14	155511.	*	15	38680.	*	16	132225.	*	17	97398.	*	18	504.	*
19	74000.	*	20	1000.	*	21	8822.	*	22	9931.	*						

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Table 4.13 (Continued)

ORIGIN ZONE	ZONE	VALUE	D E S T I N A T I O N ZONE	VALUE	ORIGIN ZONE	VALUE	Z O N E S ZONE	VALUE	A N D ZONE	VALUE	C E L L ZONE	VALUE	V A L U E S ZONE	VALUE				
11	1	19.	*	5	3130.	*	6	493.	*	8	277.	*	10	42878.	*	11	125605.	*
	12	7828.	*	13	1238.	*												
TOTAL FOR THIS ORIGIN :		181468.																
12	1	8408.	*	4	317.	*	5	11991.	*	8	28.	*	9	7584.	*	10	4367.	*
	11	2504.	*	12	123425.	*	13	127949.	*	17	53.	*	21	285.	*			
TOTAL FOR THIS ORIGIN :		286912.																
13	1	8388.	*	3	1238.	*	4	316.	*	5	17283.	*	6	3046.	*	7	28.	*
	8	113.	*	9	4081.	*	10	27830.	*	11	13384.	*	12	15181.	*	13	61368.	*
	17	62.	*															
TOTAL FOR THIS ORIGIN :		152319.																
14	1	26802.	*	3	6533.	*	4	2008.	*	5	21661.	*	6	1452.	*	7	2094.	*
	8	2603.	*	9	13832.	*	10	13912.	*	11	12220.	*	12	19358.	*	13	13398.	*
TOTAL FOR THIS ORIGIN :		135874.																
15	1	8854.	*	3	395.	*	4	107.	*	5	272242.	*	6	6182.	*	7	27.	*
	8	1429.	*	9	17566.	*	10	133193.	*	11	36961.	*	12	19651.	*	13	66428.	*
TOTAL FOR THIS ORIGIN :		563035.																
17	1	1952.	*															
TOTAL FOR THIS ORIGIN :		1952.																
19	13	612.	*															
TOTAL FOR THIS ORIGIN :		612.																

Source: Consultants' estimates.

DESTINATION TOTALS																	
1	7302741.	*	2	66949.	*	3	563772.	*	4	620363.	*	5	2962624.	*	6	2017342.	*
7	1739558.	*	8	2371570.	*	9	1156005.	*	10	4160547.	*	11	443298.	*	12	581083.	*
13	707094.	*	14	208073.	*	17	78294.	*	18	227.	*	20	717.	*	21	6237.	*

Table 4.14

BULK COMMODITIES INTER-REGION ORIGIN AND DESTINATION, 2000

ORIGIN ZONE	ZONE	DE VALUE	ES	STI	NA	TI	ON	ZONE	VALUE	ES	AN	D	C	EL	L	VA	L	U	ES	ZONE	VALUE
1	1	8825448.	*	2	264204.	*	3	541683.	*	4	276353.	*	5	210211.	*	6	525598.	*	13	619.	*
	7	20511.	*	8	20919.	*	10	141475.	*	11	285.	*	12	2240.	*						
	14	13207.	*	16	2908.	*	17	67.	*	21	453.	*	22	1910.	*						
	TOTAL FOR THIS ORIGIN : 10348091.																				
2	1	7074.	*	3	10611.	*															
	TOTAL FOR THIS ORIGIN : 17685.																				
3	1	321389.	*	3	204812.	*	4	87934.	*	6	2303.	*	8	501.	*	10	679.	*			
	16	43409.	*																		
	TOTAL FOR THIS ORIGIN : 661026.																				
4	1	57482.	*	3	10514.	*	4	319789.	*	8	3588.	*	17	218.	*						
	TOTAL FOR THIS ORIGIN : 390591.																				
5	1	2798050.	*	3	257430.	*	4	45939.	*	5	2010238.	*	6	1040804.	*	7	484601.	*	13	221798.	*
	8	81793.	*	9	371831.	*	10	1628763.	*	11	88323.	*	12	94758.	*	20	578.	*			
	14	355560.	*	16	589.	*	17	182257.	*	18	59.	*	19	42260.	*						
	21	10603.	*	22	3078.	*															
	TOTAL FOR THIS ORIGIN : 9919312.																				
6	1	253465.	*	3	858.	*	4	605.	*	5	2172880.	*	6	568680.	*	7	9458.	*	13	162.	*
	8	10115.	*	9	29346.	*	10	65727.	*	11	473.	*	12	1066.	*						
	16	1271.	*	17	708.	*															
	TOTAL FOR THIS ORIGIN : 3115815.																				
7	1	643467.	*	4	1347.	*	5	428241.	*	6	502409.	*	7	1706444.	*	8	478630.	*			
	9	7904.	*	10	890646.	*	12	9528.	*	13	956.	*	16	2374.	*						
	TOTAL FOR THIS ORIGIN : 4671946.																				
8	1	355037.	*	5	308836.	*	6	41981.	*	7	46730.	*	8	3173393.	*	9	8609.	*	21	1652.	*
	10	453278.	*	11	51.	*	12	3004.	*	13	2581.	*	17	48550.	*						
	TOTAL FOR THIS ORIGIN : 4443701.																				
9	1	6361.	*	3	965.	*	5	14289.	*	6	148142.	*	7	560.	*	8	79159.	*	17	15418.	*
	9	588924.	*	10	475811.	*	12	1637.	*	13	2232.	*	16	16835.	*						
	18	38.	*	21	7464.	*															
	TOTAL FOR THIS ORIGIN : 1357834.																				
10	1	136676.	*	3	44345.	*	4	16824.	*	5	187754.	*	6	74899.	*	7	2418.	*			

Table 4.14 (Continued)

DATA FILE : 0000.CCM15.IIMO

ORIGIN ZONE	ZONE	DESTINATION ZONE	VALUE	ORIGIN ZONE	ZONE	DESTINATION ZONE	VALUE	ORIGIN ZONE	ZONE	DESTINATION ZONE	VALUE	ORIGIN ZONE	ZONE	DESTINATION ZONE	VALUE			
	8	297786.	*	9	565526.	*	10	3821057.	*	11	215889.	*	12	265941.	*	13	306300.	*
	14	33648.	*	15	2574.	*	17	620.	*	21	3444.	*						
TOTAL FOR THIS ORIGIN :				5975702.														
11																		
	1	71.	*	5	13569.	*	6	8602.	*	8	13447.	*	10	191738.	*	11	367703.	*
	12	304272.	*	13	625674.	*												
TOTAL FOR THIS ORIGIN :				1525075.														
12																		
	1	31942.	*	4	349.	*	5	78167.	*	8	1157.	*	9	9290.	*	10	32255.	*
	11	3668.	*	12	249971.	*	13	272966.	*	17	349.	*	21	2684.	*			
TOTAL FOR THIS ORIGIN :				682799.														
13																		
	1	60518.	*	3	5091.	*	4	1651.	*	5	142726.	*	6	54968.	*	7	953.	*
	8	10557.	*	9	7227.	*	10	331439.	*	11	35879.	*	12	31542.	*	13	150538.	*
	17	636.	*	19	497.	*												
TOTAL FOR THIS ORIGIN :				834223.														
14																		
	1	19321.	*	3	1221.	*	4	535.	*	5	11028.	*	6	2464.	*	7	5968.	*
	8	13641.	*	9	2428.	*	10	13037.	*	11	2101.	*	12	4831.	*	13	7002.	*
TOTAL FOR THIS ORIGIN :				83578.														
15																		
	1	11542.	*	3	151.	*	4	94.	*	5	318392.	*	6	67925.	*	7	215.	*
	8	52694.	*	9	167009.	*	10	481522.	*	11	441.	*	12	523.	*	13	2566.	*
TOTAL FOR THIS ORIGIN :				1103075.														
16																		
	1	33597.	*	5	1660.	*	6	462.	*									
TOTAL FOR THIS ORIGIN :				35720.														
17																		
	1	29761.	*	5	498.	*												
TOTAL FOR THIS ORIGIN :				30259.														
18																		
	10	2185.	*															
TOTAL FOR THIS ORIGIN :				2185.														
19																		
	12	4.	*	13	1043.	*												
TOTAL FOR THIS ORIGIN :				1048.														
21																		
	10	987.	*	11	6.	*												
TOTAL FOR THIS ORIGIN :				993.														

Source: Consultants' estimates.

DESTINATION TOTALS																	
1	13591201.	*	2	264204.	*	3	1077681.	*	4	750419.	*	5	5898491.	*	6	3039239	*
7	2277858.	*	8	4237380.	*	9	1758093.	*	10	8731600.	*	11	714019.	*	12	969216.	*
13	1594439.	*	14	402416.	*	15	2574.	*	16	67386.	*	17	248822.	*	18	97	*
19	42757.	*	20	578.	*	21	26299.	*	22	4988.	*						

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Table 4.15

INTERMEDIATE COMMODITIES INTER-REGION ORIGIN AND DESTINATION, 1979

ORIGIN ZONE	ZONE	VALUE	*	DESTINATION ZONE	VALUE	*	ZONE	VALUE	*	AND ZONE	VALUE	*	CELL ZONE	VALUE	*	VALUES ZONE	VALUE	
1	1	167221.	*	2	3000.	*	3	74183.	*	4	16489.	*	5	49775.	*	6	3346.	*
	7	2774.	*	8	5365.	*	9	306.	*	10	13770.	*	11	2060.	*	12	1122.	*
	13	2937.	*	16	36119.	*	17	3264.	*	21	796.	*	22	5855.	*			
TOTAL FOR THIS ORIGIN :		368380.																
2	1	7000.	*															
TOTAL FOR THIS ORIGIN :		7000.																
3	1	43734.	*	3	9200.	*	4	306.	*	10	1180.	*	13	504.	*			
TOTAL FOR THIS ORIGIN :		54924.																
4	1	21000.	*	3	500.	*	4	4800.	*	10	301.	*						
TOTAL FOR THIS ORIGIN :		26601.																
5	1	91840.	*	2	306.	*	3	4101.	*	4	714.	*	5	197219.	*	6	96038.	*
	7	46519.	*	8	20311.	*	9	4733.	*	10	58029.	*	11	9336.	*	12	5406.	*
	13	10603.	*	14	48.	*	16	5202.	*	17	1734.	*						
TOTAL FOR THIS ORIGIN :		552139.																
6	1	96376.	*	3	13060.	*	4	9620.	*	5	145351.	*	6	230808.	*	7	5540.	*
	8	14980.	*	9	3000.	*	10	20314.	*	11	2614.	*	12	3952.	*	13	4175.	*
	14	221.	*	15	140.	*	16	3920.	*	17	80.	*	21	880.	*	22	660.	*
TOTAL FOR THIS ORIGIN :		555691.																
7	5	22000.	*	6	8200.	*	7	40400.	*	9	360.	*	16	21000.	*			
TOTAL FOR THIS ORIGIN :		91960.																
8	1	8870.	*	3	855.	*	4	185.	*	5	3557.	*	6	1478.	*	7	20115.	*
	8	77356.	*	9	12026.	*	10	17864.	*	11	162.	*	12	620.	*	13	762.	*
	16	577.	*	17	693.	*	22	346.	*									
TOTAL FOR THIS ORIGIN :		145469.																
9	1	59466.	*	3	13596.	*	4	1513.	*	5	11088.	*	6	2772.	*	7	5544.	*
	8	19359.	*	9	102460.	*	10	61768.	*	11	9372.	*	12	5577.	*	13	6501.	*
	14	429.	*	15	6000.	*	16	56635.	*	17	6270.	*	21	1353.	*			
TOTAL FOR THIS ORIGIN :		369703.																
10	1	239219.	*	3	3492.	*	4	15084.	*	5	66825.	*	6	41695.	*	7	16156.	*
	8	70452.	*	9	12740.	*	10	46500.	*	11	23105.	*	12	31328.	*	13	54548.	*
	14	520.	*	15	117189.	*	16	17424.	*	17	8028.	*	21	5976.	*			
TOTAL FOR THIS ORIGIN :		1180281.																

Table 4.15 (Continued)

ORIGIN ZONE	ZONE	VALUE	DESIGNATION	ZONE	VALUE	ORIGIN ZONE	ZONE	VALUE	AND	ZONE	VALUE	CELL	ZONE	VALUE	VALUES	ZONE	VALUE	
11	1	1004.	*	3	160.	*	5	351.	*	6	2284.	*	8	141.	*	9	1451.	*
	10	73957.	*	11	5800.	*	13	828.	*									
TOTAL FOR THIS ORIGIN :		85976.																
12	1	9560.	*	3	1720.	*	5	3780.	*	6	3460.	*	7	1740.	*	8	9760.	*
	9	4240.	*	10	59592.	*	11	5640.	*	12	36400.	*	13	8113.	*	17	1720.	*
	21	3060.	*	22	900.	*												
TOTAL FOR THIS ORIGIN :		149684.																
13	1	14171.	*	3	2935.	*	4	221.	*	5	6081.	*	6	2111.	*	7	523.	*
	8	1347.	*	9	1065.	*	10	94751.	*	11	8590.	*	12	92950.	*	13	47676.	*
	16	904.	*	17	1186.	*	22	261.	*									
TOTAL FOR THIS ORIGIN :		274771.																
14	1	400966.	*	3	44870.	*	4	15329.	*	5	101465.	*	6	181128.	*	7	76619.	*
	8	28466.	*	9	71788.	*	10	299624.	*	11	23754.	*	12	25096.	*	13	37395.	*
TOTAL FOR THIS ORIGIN :		1306703.																
15	1	373524.	*	2	647.	*	3	12936.	*	4	9402.	*	5	120097.	*	6	26444.	*
	7	8778.	*	8	31262.	*	9	55036.	*	10	301757.	*	11	10753.	*	12	17592.	*
	13	19830.	*	21	162.	*												
TOTAL FOR THIS ORIGIN :		988218.																
17	6	204.	*	13	301.	*												
TOTAL FOR THIS ORIGIN :		505.																
18	5	429.	*	9	429.	*	10	1287.	*									
TOTAL FOR THIS ORIGIN :		2145.																
21	10	640.	*	11	540.	*	12	220.	*	13	640.	*						
TOTAL FOR THIS ORIGIN :		2040.																
22	5	640.	*	9	640.	*	10	4421.	*	11	640.	*	12	640.	*	13	3840.	*
TOTAL FOR THIS ORIGIN :		10821.																

DESTINATION TOTALS																		
	1	1533951.	*	2	3953.	*	3	181608.	*	4	73663.	*	5	728659.	*	6	599968.	*
	7	224908.	*	8	278799.	*	9	270275.	*	10	1465755.	*	11	102366.	*	12	220903.	*
	13	198654.	*	14	1218.	*	15	123329.	*	16	141782.	*	17	22975.	*	21	12226.	*
	22	8022.	*															

Source: Consultnats' estimates.

Table 4.16

INTERMEDIATE COMMODITIES INTER-REGION ORIGIN AND DESTINATION, 1985

ORIGIN ZONE	ZONE	VALUE	*	DESTINATION ZONE	VALUE	*	ZONE	VALUE	*									
1	1	278526.	*	2	5353.	*	3	121991.	*	4	27113.	*	5	65782.	*	6	5552.	*
	7	4037.	*	8	8244.	*	9	809.	*	10	24369.	*	11	2695.	*	12	1825.	*
	13	4760.	*	16	37381.	*	17	792.	*	21	87.	*	22	923.	*			
	TOTAL FOR THIS ORIGIN :			590240.														
2	1	11872.	*															
	TOTAL FOR THIS ORIGIN :			11872.														
3	1	125927.	*	3	26368.	*	4	1024.	*	10	2875.	*	13	755.	*			
	TOTAL FOR THIS ORIGIN :			156948.														
4	1	40930.	*	3	970.	*	4	6992.	*	10	335.	*						
	TOTAL FOR THIS ORIGIN :			49227.														
5	1	358439.	*	2	681.	*	3	15500.	*	4	2084.	*	5	470297.	*	6	290189.	*
	7	134401.	*	8	64948.	*	9	28231.	*	10	214437.	*	11	28446.	*	12	18766.	*
	13	39330.	*	14	28.	*	16	12126.	*	17	556.	*						
	TOTAL FOR THIS ORIGIN :			1678379.														
6	1	238768.	*	3	43988.	*	4	35012.	*	5	282162.	*	6	450454.	*	7	22911.	*
	8	21240.	*	9	17373.	*	10	74947.	*	11	7665.	*	12	13226.	*	13	14827.	*
	14	120.	*	15	456.	*	16	7204.	*	17	20.	*	21	6515.	*	22	1639.	*
	TOTAL FOR THIS ORIGIN :			1238528.														
7	5	54717.	*	6	26372.	*	7	80888.	*	9	2589.	*	16	40820.	*			
	TOTAL FOR THIS ORIGIN :			205387.														
8	1	21391.	*	3	1935.	*	4	540.	*	5	6605.	*	6	3635.	*	7	14678.	*
	8	138745.	*	9	48383.	*	10	40190.	*	11	299.	*	12	11205.	*	13	1879.	*
	16	854.	*	17	130.	*	22	55.	*									
	TOTAL FOR THIS ORIGIN :			290525.														
9	1	136970.	*	3	29874.	*	4	2222.	*	5	20980.	*	6	6551.	*	7	7724.	*
	8	21197.	*	9	253303.	*	10	140243.	*	11	23650.	*	12	18414.	*	13	20499.	*
	14	86.	*	15	7556.	*	16	62654.	*	17	826.	*	21	130.	*			
	TOTAL FOR THIS ORIGIN :			752880.														
10	1	358632.	*	3	5436.	*	4	29119.	*	5	82953.	*	6	67133.	*	7	21914.	*
	8	96603.	*	9	36344.	*	10	752558.	*	11	28421.	*	12	43071.	*	13	79599.	*
	14	129.	*	15	111823.	*	16	16981.	*	17	1085.	*	21	600.	*			
	TOTAL FOR THIS ORIGIN :			1732399.														

Table 4.16 (Continued)

ORIGIN ZONE	ZONE	VALUE	DES	T I N	A T I O	N Z O N E S	A N D	C E L L	V A L U E S	VALUE	ORIGIN ZONE	ZONE	VALUE					
11	1	2528.	*	3	364.	*	5	667.	*	6	4815.	*	8	291.	*	9	6772.	*
	10	109932.	*	11	11587.	*	13	1969.	*									
TOTAL FOR THIS ORIGIN :				138923.														
12	1	28287.	*	3	5029.	*	5	8782.	*	6	8209.	*	7	3577.	*	8	3518.	*
	9	20611.	*	10	63033.	*	11	11894.	*	12	81055.	*	13	23079.	*	17	1103.	*
	21	813.	*	22	158.	*												
TOTAL FOR THIS ORIGIN :				259149.														
13	1	24136.	*	3	5168.	*	4	444.	*	5	7922.	*	6	3791.	*	7	759.	*
	8	2322.	*	9	3029.	*	10	42119.	*	11	9992.	*	12	194186.	*	13	124336.	*
	16	922.	*	17	728.	*	22	37.	*									
TOTAL FOR THIS ORIGIN :				419891.														
14	1	267083.	*	3	28639.	*	4	12188.	*	5	51603.	*	6	117570.	*	7	39972.	*
	8	16792.	*	9	75577.	*	10	188694.	*	11	12048.	*	12	15241.	*	13	24030.	*
TOTAL FOR THIS ORIGIN :				849436.														
15	1	213714.	*	2	209.	*	3	6700.	*	4	6265.	*	5	51875.	*	6	14770.	*
	7	3868.	*	8	15968.	*	9	63342.	*	10	157047.	*	11	4565.	*	12	9202.	*
	13	10821.	*	21	9.	*												
TOTAL FOR THIS ORIGIN :				558355.														
17	13	386.	*															
TOTAL FOR THIS ORIGIN :				386.														
18	5	88.	*	9	190.	*	10	330.	*									
TOTAL FOR THIS ORIGIN :				608.														
21	10	641.	*	11	308.	*	12	156.	*	13	476.	*						
TOTAL FOR THIS ORIGIN :				1581.														
22	5	391.	*	9	773.	*	10	3625.	*	11	384.	*	12	477.	*	13	2835.	*
TOTAL FOR THIS ORIGIN :				8485.														

DESTINATION TOTALS																		
	1	2107202.	*	2	6244.	*	3	291963.	*	4	123004.	*	5	1104823.	*	6	998960.	*
	7	334729.	*	8	389868.	*	9	557327.	*	10	1315375.	*	11	141954.	*	12	406823.	*
	13	349580.	*	14	363.	*	15	119835.	*	16	178942.	*	17	5241.	*	21	8154.	*
	22	2812.	*															

Source: Consultants' estimates.

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Table 4.17

INTERMEDIATE COMMODITIES INTER-REGION. ORIGIN AND DESTINATION, 2000

ORIGIN ZONE	ZONE	VALUE	*	DESTINATION ZONE	VALUE	*	ZONE	VALUE	*	ZONE	VALUE	*	ZONE	VALUE	*	ZONE	VALUE	*
1	1	1298162.	*	2	64956.	*	3	213608.	*	4	177137.	*	5	211203.	*	6	21589.	*
	7	55543.	*	8	143623.	*	9	1609.	*	10	184786.	*	11	13368.	*	12	4013.	*
	13	15674.	*	16	314412.	*	17	108120.	*	21	10762.	*	22	81141.	*			
	TOTAL FOR THIS ORIGIN :		2919706.															
2	1	237620.	*															
	TOTAL FOR THIS ORIGIN :		237620.															
3	1	292354.	*	3	15865.	*	4	1047.	*	10	93618.	*	13	34312.	*			
	TOTAL FOR THIS ORIGIN :		437196.															
4	1	58422.	*	3	234.	*	4	6843.	*	10	286.	*						
	TOTAL FOR THIS ORIGIN :		65785.															
5	1	503971.	*	2	711.	*	3	10385.	*	4	4152.	*	5	1347915.	*	6	304821.	*
	7	205416.	*	8	116945.	*	9	41705.	*	10	330122.	*	11	47435.	*	12	11665.	*
	13	46312.	*	14	384879.	*	16	35535.	*	17	166766.	*	21	10077.	*			
	TOTAL FOR THIS ORIGIN :		3568811.															
6	1	422490.	*	3	34418.	*	4	41012.	*	5	518112.	*	6	855744.	*	7	37902.	*
	8	37894.	*	9	24889.	*	10	415340.	*	11	24806.	*	12	11961.	*	13	23688.	*
	14	4045.	*	15	10332.	*	16	21208.	*	17	1399.	*	21	9498.	*	22	6656.	*
	TOTAL FOR THIS ORIGIN :		2501395.															
7	5	72478.	*	6	81592.	*	7	194372.	*	9	2476.	*	16	230787.	*			
	TOTAL FOR THIS ORIGIN :		581706.															
8	1	49469.	*	3	2246.	*	4	573.	*	5	10748.	*	6	9127.	*	7	41227.	*
	8	288544.	*	9	60075.	*	10	103659.	*	11	958.	*	12	14371.	*	13	4675.	*
	16	4653.	*	17	7386.	*	22	5103.	*									
	TOTAL FOR THIS ORIGIN :		602813.															
9	1	139488.	*	3	12620.	*	4	2659.	*	5	13010.	*	6	5051.	*	7	10576.	*
	8	51876.	*	9	427239.	*	10	128385.	*	11	15839.	*	12	4856.	*	13	9656.	*
	14	2632.	*	15	948.	*	16	167312.	*	17	29093.	*	21	7016.	*			
	TOTAL FOR THIS ORIGIN :		1028257.															
10	1	622219.	*	3	3965.	*	4	23278.	*	5	109485.	*	6	134097.	*	7	39714.	*
	8	221162.	*	9	103702.	*	10	1821668.	*	11	65201.	*	12	56587.	*	13	133365.	*
	14	4916.	*	15	639263.	*	16	71337.	*	17	37110.	*	21	35491.	*			
	TOTAL FOR THIS ORIGIN :		4122560.															

Table 4.17 (Continued)

ORIGIN ZONE	ZONE	DESTINATION ZONE	VALUE	ORIGIN ZONE	VALUE	ORIGIN ZONE	VALUE	ORIGIN ZONE	VALUE	ORIGIN ZONE	VALUE	ORIGIN ZONE	VALUE	ORIGIN ZONE	VALUE
11	1	3	26428.	5	1712.	6	49681.	8	3304.	9	33531.	*	*	*	*
	10	11	609907.	13	45720.		17220.								
TOTAL FOR THIS ORIGIN :		792028.													
12	1	3	140728.	5	7366.	6	31385.	7	45174.	8	13262.	17	57011.	*	*
	9	10	47270.	11	252405.	12	279764.	13	97306.						
	21	22	383.		61.										
TOTAL FOR THIS ORIGIN :		1094412.													
13	1	3	237504.	4	15408.	5	545.	6	43078.	7	34330.	13	6007.	*	*
	8	9	28237.	10	22314.	11	270072.	12	68681.	13	297846.		307430.	*	*
	16	17	5638.	22	11431.		14046.								
TOTAL FOR THIS ORIGIN :		1362567.													
14	1	3	309854.	4	13766.	5	6512.	6	47470.	7	141731.	13	48134.	*	*
	8	9	26496.	10	56647.	11	249272.	12	18231.		9394.		25641.	*	*
TOTAL FOR THIS ORIGIN :		953148.													
15	1	2	214559.	3	164.	4	3086.	5	2720.	6	34435.	12	14426.	*	*
	7	8	4055.	9	22076.	10	30462.	11	164353.		5743.		4933.	*	*
	13	21	9559.		243.										
TOTAL FOR THIS ORIGIN :		510814.													
17	13		286.												
TOTAL FOR THIS ORIGIN :		286.													
18	5	9	94.	10	319.	492.									
TOTAL FOR THIS ORIGIN :		905.													
21	10	11	798.	12	245.	13	55.	261.	Source: Consultants' estimates.						
TOTAL FOR THIS ORIGIN :		1359.													
22	5	9	238.	10	361.	11	3870.	12	455.	13	244.	2132.			
TOTAL FOR THIS ORIGIN :		7300.													

DESTINATION TOTALS															
	1	2	4553269.	3	65831.	4	334678.	5	266477.	6	2444176.	12	1697364.	*	*
	7	8	656208.	9	997169.	10	852598.	11	4629032.	13	383048.	17	695689.	*	*
	13	14	727518.	15	396472.	16	650543.	17	850832.	21	406435.		73470.	*	*
	22		107006.												

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Table 4.18

HIGH VALUE COMMODITIES INTER-REGION ORIGIN AND DESTINATION, 1979

ORIGIN ZONE	ZONE	DESTINATION ZONE	VALUE	ORIGIN ZONE	VALUE	DESTINATION ZONE	VALUE	ORIGIN ZONE	VALUE	DESTINATION ZONE	VALUE	ORIGIN ZONE	VALUE	DESTINATION ZONE	VALUE		
1	1	2	65464. *	3	15000. *	4	14814. *	5	11803. *	6	8422. *	7	3581. *	8	5305. *		
	7	8	3581. *	9	2487. *	10	20088. *	11	1322. *	12	3377. *	13	4541. *	16	20263. *		
	13	16	4541. *	17	1978. *	21	3178. *	22	6085. *								
	TOTAL FOR THIS ORIGIN :		191743.														
3	16	21	756. *														
	TOTAL FOR THIS ORIGIN :		972.														
4	1		265. *														
	TOTAL FOR THIS ORIGIN :		265.														
5	1	3	72496. *	4	1135. *	5	45292. *	6	3210. *	7	5306. *	8	2976. *	9	977. *	10	3645. *
	8	9	2976. *	10	3645. *	12	1030. *	13	3625. *	16	18727. *	17	3570. *	21	263. *	22	1326. *
	17	21	3570. *	22	1326. *												
	TOTAL FOR THIS ORIGIN :		163886.														
6	1	3	20480. *	5	1800. *	6	52412. *	7	3628. *	8	5910. *	10	1049. *	12	688. *	13	240. *
	10	12	1049. *	13	240. *	16	14816. *	17	4460. *	22	1040. *						
	TOTAL FOR THIS ORIGIN :		109062.														
7	6	7	1320. *	16	280. *												
	TOTAL FOR THIS ORIGIN :		24806.														
8	1	5	2818. *	7	485. *	8	21668. *	9	1109. *	10	5036. *	12	346. *	13	185. *	16	624. *
	12	13	346. *	16	624. *												
	TOTAL FOR THIS ORIGIN :		32964.														
9	1	3	19965. *	5	429. *	7	396. *	8	14916. *	9	46577. *	10	4543. *	11	1716. *	12	429. *
	10	11	4543. *	12	429. *	13	429. *	16	7722. *	17	858. *	20	1419. *				
	20		1419. *														
	TOTAL FOR THIS ORIGIN :		100357.														
10	1	5	21087. *	6	2374. *	7	542. *	8	22168. *	9	396. *	10	92334. *	11	2743. *	12	835. *
	10	11	92334. *	12	835. *	13	7694. *	14	66. *	15	400. *	16	41467. *	17	4834. *	18	2759. *
	16	17	41467. *	18	2759. *	20	1201. *	21	15587. *	22	7740. *						
	TOTAL FOR THIS ORIGIN :		226254.														
11	1	3	502. *	5	301. *	6	1506. *	9	201. *	10	4141. *	11	6496. *	12	72. *	13	936. *
	11	12	6496. *	13	936. *	16	75. *	17	276. *								
	TOTAL FOR THIS ORIGIN :		14581.														

Table 4.18 (Continued)

ORIGIN ZONE	ZONE	VALUE	*	D E S T I N A T I O N ZONE	VALUE	*	ZONE	VALUE	*	ZONE	VALUE	*	ZONE	VALUE	*	ZONE	VALUE	*	
12	1	901.	*	5	567.	*	6	700.	*	8	480.	*	9	520.	*	10	8388.	*	
	11	2703.	*	12	25190.	*	13	3618.	*	19	60.	*	21	620.	*	22	241.	*	
TOTAL FOR THIS ORIGIN :				43988.															
13	1	2306.	*	5	1924.	*	6	2263.	*	8	1608.	*	9	156.	*	10	28143.	*	
	11	1895.	*	12	5959.	*	13	33647.	*	15	560.	*	17	121.	*	19	60.	*	
	21	60.	*	22	643.	*													
TOTAL FOR THIS ORIGIN :				79345.															
14	1	303055.	*	3	30264.	*	4	7260.	*	5	107830.	*	6	80147.	*	7	38113.	*	
	8	12260.	*	9	34054.	*	10	143608.	*	11	27374.	*	12	20374.	*	13	42656.	*	
TOTAL FOR THIS ORIGIN :				846996.															
15	1	259842.	*	3	1200.	*	4	6010.	*	5	66260.	*	6	21627.	*	7	2616.	*	
	8	67120.	*	9	14590.	*	10	317033.	*	11	10186.	*	12	24968.	*	13	25858.	*	
TOTAL FOR THIS ORIGIN :				817310.															
16	1	3400.	*	3	6300.	*	4	3000.	*										
TOTAL FOR THIS ORIGIN :				12700.															
17	1	9900.	*	5	64000.	*	7	1000.	*	8	4500.	*	9	6300.	*	10	14660.	*	
	11	18700.	*	12	37000.	*	13	106000.	*										
TOTAL FOR THIS ORIGIN :				262060.															
18	1	19500.	*	5	29500.	*	6	12100.	*	8	3100.	*	10	83580.	*	11	6000.	*	
	12	7900.	*																
TOTAL FOR THIS ORIGIN :				160680.															
19	15	45.	*																
TOTAL FOR THIS ORIGIN :				45.				Source: Consultants' estimates.											
21	7	320.	*	10	390.	*													
TOTAL FOR THIS ORIGIN :				700.															
22	5	3120.	*	10	620.	*													
TOTAL FOR THIS ORIGIN :				3740.															

DESTINATION TOTALS																			
	1	801982.	*	2	4036.	*	3	56543.	*	4	32219.	*	5	334548.	*	6	186081.	*	
	7	79194.	*	8	152011.	*	9	107466.	*	10	727249.	*	11	79134.	*	12	128168.	*	
	13	229428.	*	14	66.	*	15	1005.	*	16	104730.	*	17	16097.	*	18	2759.	*	
	19	120.	*	20	2620.	*	21	19924.	*	22	17075.	*							

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Table 4.19

HIGH VALUE COMMODITIES INTER-REGION ORIGIN AND DESTINATION, 1985

ORIGIN ZONE	ZONE	VALUE	*	DESTINATION ZONE	VALUE	*	ZONE	VALUE	*	AND ZONE	VALUE	*	CELL ZONE	VALUE	*	LES ZONE	VALUE	*
1	1	111631.	*	2	6019.	*	3	27847.	*	4	27755.	*	5	22530.	*	6	15926.	*
	7	5949.	*	8	7427.	*	9	4221.	*	10	35015.	*	11	2511.	*	12	6484.	*
	13	9268.	*	16	22059.	*	17	1824.	*	21	2915.	*	22	5017.	*			
	TOTAL FOR THIS ORIGIN :				314399.													
3	16	1362.	*	21	330.	*												
	TOTAL FOR THIS ORIGIN :			1692.														
4	1	478.	*															
	TOTAL FOR THIS ORIGIN :			478.														
5	1	139776.	*	3	672.	*	4	2434.	*	5	79326.	*	6	7275.	*	7	10873.	*
	8	5103.	*	9	2296.	*	10	7961.	*	12	333.	*	13	9744.	*	16	20740.	*
	17	3622.	*	21	248.	*	22	1282.	*									
	TOTAL FOR THIS ORIGIN :			293685.														
6	1	41787.	*	3	5947.	*	5	4471.	*	6	103207.	*	7	8018.	*	8	10806.	*
	10	2179.	*	12	1386.	*	13	691.	*	16	17482.	*	17	1381.	*	22	1072.	*
	TOTAL FOR THIS ORIGIN :			198424.														
7	6	1987.	*	7	41379.	*	16	204.	*									
	TOTAL FOR THIS ORIGIN :			43570.														
8	1	3504.	*	5	1171.	*	7	781.	*	8	38124.	*	9	1695.	*	10	7219.	*
	12	739.	*	13	325.	*	16	445.	*									
	TOTAL FOR THIS ORIGIN :			54003.														
9	1	37088.	*	3	1824.	*	5	989.	*	7	786.	*	8	25135.	*	9	80702.	*
	10	9854.	*	11	4020.	*	12	996.	*	13	1121.	*	16	8307.	*	17	768.	*
	20	1456.	*															
	TOTAL FOR THIS ORIGIN :			173046.														
10	1	45852.	*	5	5568.	*	6	6323.	*	7	1262.	*	8	43204.	*	9	777.	*
	10	157046.	*	11	7383.	*	12	2270.	*	13	18543.	*	14	73.	*	15	538.	*
	16	52289.	*	17	5220.	*	18	3070.	*	20	1451.	*	21	16694.	*	22	8519.	*
	TOTAL FOR THIS ORIGIN :			376082.														
11	1	737.	*	3	127.	*	5	560.	*	6	2691.	*	9	261.	*	10	6926.	*
	11	12005.	*	12	123.	*	13	1718.	*	16	64.	*	17	196.	*			
	TOTAL FOR THIS ORIGIN :			25407.														

Table 4.19 (Continued)

ORIGIN ZONE	ZONE	DESTINATION ZONE	VALUE	ORIGIN ZONE	VALUE	ORIGIN ZONE	VALUE	ORIGIN ZONE	VALUE	ORIGIN ZONE	VALUE	ORIGIN ZONE	VALUE	ORIGIN ZONE	VALUE
12	1	5	1391.	1144.	6	1359.	8	874.	9	717.	10	14656.	*		
	11	12	5307.	41638.	13	7468.	21	484.	22	193.					
TOTAL FOR THIS ORIGIN :		75231.													
13	1	5	3492.	3651.	6	4854.	8	2139.	9	235.	10	48122.	*		
	11	12	3515.	11130.	13	57917.	15	525.	17	88.	21	45.	*		
	22		483.												
TOTAL FOR THIS ORIGIN :		135397.													
14	1	3	373971.	43876.	4	10384.	5	164689.	6	114072.	7	54600.	*		
	8	9	14809.	50555.	10	194430.	11	41010.	12	30849.	13	61286.	*		
TOTAL FOR THIS ORIGIN :		1154539.													
15	1	3	321864.	1704.	4	8804.	5	103697.	6	32341.	7	3467.	*		
	8	9	80900.	19384.	10	447648.	11	15627.	12	38706.	13	40391.	*		
TOTAL FOR THIS ORIGIN :		1114533.													
16	1	3	3746.	8462.	4	3911.									
TOTAL FOR THIS ORIGIN :		16119.													
17	1	5	10242.	83756.	7	1032.	8	3885.	9	7471.	10	16160.	*		
	11	12	22383.	44757.	13	144406.									
TOTAL FOR THIS ORIGIN :		334092.													
18	1	5	21231.	39238.	6	16175.	8	3021.	10	88780.	11	8097.	*		
	12		10774.												
TOTAL FOR THIS ORIGIN :		187317.													
19	15		45.												
TOTAL FOR THIS ORIGIN :		45.													
21	7	10	315.	399.											
TOTAL FOR THIS ORIGIN :		713.													
22	5	10	4034.	724.											
TOTAL FOR THIS ORIGIN :		4758.													

Source: Consultants' estimates.

DESTINATION TOTALS																	
1	1116790.	*	2	6019.	*	3	90456.	*	4	53288.	*	5	514826.	*	6	305412.	*
7	128462.	*	8	235428.	*	9	168313.	*	10	1037119.	*	11	121867.	*	12	192185.	*
13	352876.	*	14	73.	*	15	1109.	*	16	122950.	*	17	13100.	*	18	3070.	*
20	2907.	*	21	20715.	*	22	13567.	*									

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Table 4.20

HIGH VALUE COMMODITIES INTER-REGION ORIGIN AND DESTINATION, 2000

ORIGIN ZONE	D E S T I N A T I O N Z O N E S A N D C E L L V A L U E S																	
	ZONE	VALUE	*	ZONE	VALUE	*	ZONE	VALUE	*	ZONE	VALUE	*	ZONE	VALUE	*	ZONE	VALUE	
1	1	408290.	*	2	52312.	*	3	148262.	*	4	100014.	*	5	194964.	*	6	113728.	*
	7	28602.	*	8	40035.	*	9	55106.	*	10	253572.	*	11	22383.	*	12	30738.	*
	13	30745.	*	16	81053.	*	17	5095.	*	21	5777.	*	22	17074.	*			
	TOTAL FOR THIS ORIGIN :		1592751.															
2	1	5651.	*															
	TOTAL FOR THIS ORIGIN :		5651.															
3	16	10429.	*	21	2162.	*												
	TOTAL FOR THIS ORIGIN :		12592.															
4	1	1877.	*															
	TOTAL FOR THIS ORIGIN :		1877.															
5	1	393649.	*	3	1170.	*	4	7649.	*	5	248161.	*	6	12113.	*	7	15029.	*
	8	8019.	*	9	5046.	*	10	16183.	*	12	3316.	*	13	6885.	*	16	22248.	*
	17	8205.	*	21	224.	*	22	1288.	*									
	TOTAL FOR THIS ORIGIN :		749186.															
6	1	151515.	*	3	11162.	*	5	18174.	*	6	305747.	*	7	35541.	*	8	18296.	*
	10	30495.	*	12	4067.	*	13	516.	*	16	20274.	*	17	10594.	*	22	1164.	*
	TOTAL FOR THIS ORIGIN :		607547.															
7	6	3573.	*	7	112963.	*	16	233.	*									
	TOTAL FOR THIS ORIGIN :		116769.															
8	1	36256.	*	5	15053.	*	7	9431.	*	8	156444.	*	9	13107.	*	10	54920.	*
	12	11608.	*	13	798.	*	16	1646.	*									
	TOTAL FOR THIS ORIGIN :		299263.															
9	1	69386.	*	3	272.	*	5	6983.	*	7	93.	*	8	44228.	*	9	100959.	*
	10	45100.	*	11	11413.	*	12	119.	*	13	67.	*	16	2816.	*	17	3722.	*
	20	236.	*															
	TOTAL FOR THIS ORIGIN :		305392.															
10	1	319964.	*	5	30727.	*	6	24597.	*	7	4155.	*	8	161782.	*	9	20133.	*
	10	471021.	*	11	45429.	*	12	7440.	*	13	78585.	*	14	79.	*	15	648.	*
	16	134440.	*	17	37547.	*	18	7164.	*	20	6564.	*	21	36348.	*	22	20545.	*
	TOTAL FOR THIS ORIGIN :		1407167.															
11	1	10744.	*	3	1084.	*	5	6438.	*	6	21560.	*	9	20136.	*	10	67677.	*

ORIGIN ZONE	ZONE	VALUE	DESTINATION ZONE	VALUE	ORIGIN ZONE	VALUE								
11														
TOTAL FOR THIS ORIGIN :		30736.	12	867.	13	12708.	16	323.	17	3058.				
12														
TOTAL FOR THIS ORIGIN :		11472.	5	4317.	6	4363.	8	2196.	9	14710.	10	70321.	11	23064.
TOTAL FOR THIS ORIGIN :		23064.	12	125055.	13	16843.	19	81.	21	687.	22	305.		
13														
TOTAL FOR THIS ORIGIN :		12864.	5	11027.	6	9746.	8	3691.	9	1057.	10	161811.	11	13769.
TOTAL FOR THIS ORIGIN :		13769.	12	25102.	13	114702.	15	501.	17	919.	19	82.		
14														
TOTAL FOR THIS ORIGIN :		755259.	3	52025.	4	14617.	5	286510.	6	146696.	7	83905.	8	15784.
TOTAL FOR THIS ORIGIN :		15784.	9	83011.	10	286756.	11	79368.	12	31758.	13	71700.		
15														
TOTAL FOR THIS ORIGIN :		585968.	3	1843.	4	10300.	5	149588.	6	34970.	7	2983.	8	79044.
TOTAL FOR THIS ORIGIN :		79044.	9	59208.	10	562998.	11	25003.	12	32967.	13	33059.		
16														
TOTAL FOR THIS ORIGIN :		8307.	3	9643.	4	5487.								
17														
TOTAL FOR THIS ORIGIN :		13913.	5	89966.	7	1710.	8	7176.	9	18284.	10	37296.	11	64771.
TOTAL FOR THIS ORIGIN :		64771.	12	69256.	13	109926.								
18														
TOTAL FOR THIS ORIGIN :		37712.	5	55117.	6	15960.	8	2867.	10	170242.	11	12621.	12	8937.
TOTAL FOR THIS ORIGIN :		8937.												
19														
TOTAL FOR THIS ORIGIN :		45.												
21														
TOTAL FOR THIS ORIGIN :		247.	10	454.										
TOTAL FOR THIS ORIGIN :		700.												
22														
TOTAL FOR THIS ORIGIN :		2623.	10	410.										
TOTAL FOR THIS ORIGIN :		3033.												

Source: Consultants' estimates.

DESTINATION TOTALS															
1	2842828.	2	53312.	3	225461.	4	138067.	5	1119649.	6	693053.	7	294659.	8	539563.
13	476434.	14	79.	15	1194.	16	273472.	17	70141.	18	7164.	19	163.	20	6800.
19	163.	20	6800.	21	48276.	22	40816.								

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CHAPTER 5

TRANSIT TRAFFIC

TRANSIT TRAFFIC

5.1 GENERAL

The routing and volume of traffic between Europe and the Middle East are determined by a combination of political, institutional, and economic factors which make long-term projections and planning hazardous. In the period between the preparation of the traffic forecasts and the production of this report, for instance, a merger between Syria and Libya was announced, a military government took over power in Turkey, and the Iraq-Iran war broke out. The latter resulted in the closure of the border between Syria and Iraq and affected relations between Syria and Jordan. The situation in Lebanon, meanwhile, continues to be uncertain.

In the long run, it is to be assumed that economic factors will prevail and that Syria's key geographic situation will be exploited. The country lies as it has for millenia at the crossroads of major trade routes; the extensive Roman road network and the great desert cities such as Palmyra bear witness to the importance of the location. With the development of major ports at Tartous and Lattakia, and modern highways and railways, the potential for transit traffic development has never been greater. That said, however, the portion of a journey between, say, Essen and Riyadh represented by the transit of Syria is relatively minor; as a result, Syrian conditions and costs cannot have a decisive influence on the choice between overland or sea transport, although their importance in deciding which overland route is taken is more significant. Also, no origin or destination country wishes to become dependent on transit routes through only one other country, and it is to be expected that Iraq, for instance, will encourage the development of routes to Aqaba as a potential counterweight to transiting Syria.

Transit traffic brings both costs and benefits to the host country. If ports are congested or roads deteriorated, it may produce a net disbenefit. This situation probably applied until recently. In general, however, provided that economic rates are charged for port operations and for truck transits, a country with locational advantages such as Syria's should benefit considerably from transit traffic. This is particularly true in the case of railway traffic, where internationally agreed-upon transit rates are well above domestic freight rates and the cost of carrying a marginal addition to traffic is low (see Volume III, Chapter A-6). The current contribution of road transit traffic to the economy is in fact diminished because of

the subsidy provided to diesel fuel oil prices. This should not be available to transit vehicles and could be compensated for by an additional transit tax to bring the fuel price up to world market rates.

Over the period to 2000 the major transit routes, which often coincide with heavily used domestic routes, will be further improved. The Lattakia-Tartous-Homs and Beirut-Damascus-Jordan roads will become autostradas, and construction of the Fourglass-Tadmur road will cut about 140 kilometers from the Tartous-Baghdad trip. The Lattakia-Tartous, Damascus-Jordan, and Deir Ez Zor-Albu Kamal railways should be in operation and train ferries could be operating between Volos and Lattakia/Tartous. Improved links in other countries will also come into use; perhaps the most important is a new railway between Albu Kamal and Baghdad, with probable extensions via Kuwait to Saudi Arabia, enabling through rail shipment between Oslo and Riyadh to be made via Syria without change of gauge.

5.2 TRANSIT ROUTE PATTERN AND VOLUMES.

The majority of transit traffic (excluding crude petroleum, which is not covered in this chapter) currently enters from Lebanon via Al Dabbousieh in the north and Jdaydeh in the south. In 1979 34 percent of all tonnage used the former point of entry and 31 percent the latter. Tartous and Lattakia, although rapidly increasing in importance, originated only 6 percent and 4 percent respectively of the total 1979 traffic of 3.1 million tons. Turkish entry points accounted for 14 percent of traffic, most of it via Bab Al Hawa (9 percent) or by rail via Al Kamishli (4 percent). Of the remaining 11 percent of traffic, 5 percent entered from Jordan via Dera'a and the rest was either subject to inland clearance with the border crossing point unrecorded or passed through smaller centers.

The exit points in 1979 were dominated by the Dera'a and Mafrak crossings into Jordan, which the Consultants estimate, on the basis of truck crossing statistics, handled 57 percent of the tonnage. Iraq accounted for 40 percent of traffic via Abou Shamat (16 percent), Al Kamishli/Ya'roubia (15 percent), and Albu Kamal (9 percent). The remaining 3 percent moved into Lebanon through Jdaydeh.

The total amount of transit traffic has fluctuated considerably in recent years. It reached 2.0 million tons in 1970, but this level was not exceeded until 1974, when the record volume of 3.5 million tons was carried. From 1975 to 1979 traffic fluctuated between 2.3 and 3.2 million tons. The traffic volumes by entry point from 1976 to 1979 are presented in Table 5.1. Exit point volumes for 1979 are shown in Table 5.2.

Table 5.1'

TRANSIT TRAFFIC BY ENTRY POINT

	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1985</u>	<u>2000</u>
<u>Lebanon</u>						
Al Dabbousieh	556	239	668	1,049	1,400	2,000
Jdaydeh	401	1,740	1,252	942	1,300	2,900
<u>Mediterranean Ports</u>						
Tartous	-	45	16	19 ^P	800	2,000
Lattakia	256	103	64	134	570	1,500
<u>Turkey</u>						
Bab Al Hawa	380	346	204	266	400	600
Midan Ikhis	19	83	9	16	250	500
Al Kamishli	391	315	-	123	150	250
Isas	38	24	12	15	30	50
<u>Iraq</u>						
Albu Kamal	6	-	-	-	100	300
Abu Shamat	6	2	-	-	-	100
<u>Jordan</u>						
Dera'a	91	164	138	148	200	600
Mafrak	4	16	9	10		
<u>Inland Clearance</u> ¹						
Damascus	25	25	15	11		
Adra	51	37	24	25	Included above	
Aleppo	32	16	22	31		
<u>All Others</u>	<u>5</u>	<u>13</u>	<u>2</u>	<u>117</u>		
Total	2,261	3,168	2,435	3,085	5,200	10,600

Sources: 1976-79 Central Bureau of Statistics.
1985/2000 Consultants' forecasts.

¹ Entry points not recorded.

Table 5.2

TRANSIT TRAFFIC BY EXIT POINT

(in 000 tons)

	<u>1979</u>	<u>1985</u>	<u>2000</u>
<u>Lebanon</u>			
Jdaydeh	100	150	300
<u>Mediterranean Ports</u>			
Tartous	-	-	400
Lattakia	-	100	200
<u>Iraq</u>			
Albu Kamal	270	930	1,700
Abu Shamat	500	1,000	2,300
Al Kamishli/Ya'roubia	465	750	1,100
<u>Jordan</u>			
Dera'a/Mafrak	<u>1,750</u>	<u>2,270</u>	<u>4,300</u>
Total	3,085	5,200	10,800

Source: Consultants' forecasts.

5.3 TRAFFIC FORECAST

Transit traffic growth is determined by three factors:

- the growth in trade between Middle Eastern countries,
- the growth in trade between Europe and the Middle East, and,
- the change in the share of such trade passing through Syria.

With so many special factors in the last decade distorting both trends in trade and in the modal shares of transit traffic, the past growth pattern provides little guide to the future. The oil price rises stimulated vast changes in trade flows throughout the Middle East after 1973. Some of these were short-lived as the initial strain of new trade overwhelmed the existing infrastructure. The development of port facilities and the reopening of the Suez Canal considerably enhanced the competitive position of the sea routes after the mid-1970s. Overland transport by road was affected by instability in Lebanon and Turkey and in particular by the border closure between Syria and Iraq from November 1977 to October 1978. Rail transport was similarly disrupted by the border closure and by poor service on the part of Turkish Railways, which made it uncompetitive with other modes. Rail transit traffic through Syria in 1979 was only 29 percent of its peak 1975 level of 0.54 million tons, as Table 5.3 shows.

The final origins and destinations of transit traffic from 1976 to 1978 are given in Table 5.4. The dominant flows were from west and north to south and east, with little in the way of reverse flow movements. Saudi Arabia received about half the tonnage and Jordan, Iraq, Lebanon, and Kuwait nearly all the rest. The origin statistics are misleading, showing the origin of the modal transport journey rather than of the goods carried, thus inflating the share of Lebanon.

Important destination countries such as Saudi Arabia, Kuwait, and Iraq all show potential for major growth in trade from a combination of high increases in per capita incomes and in populations and as a result of their major industrial and infrastructural investment programs. The developments in prospect for the land transport routes between Europe and the Middle East, including roll on/roll off services through Mediterranean ports, are likely to increase the share of trade via land and via Syria.

Growth prospects are excellent, but uncertainties are high, and with such a combination it is sensible to use a relatively conservative forecast. A transit traffic volume of 5.2 million

Table 5.3

RAILWAY TRANSIT FLOWS

(in 000 tons)

	<u>1975</u>	<u>1979</u>	<u>1985</u>	<u>2000</u>
Lattakia - Iraq (Albu Kamal)	-	-	250	800
Tartous - Iraq (Albu Kamal)	-	-	30	200
Tartous - Jordan	-	-	-	800
Turkey - Iraq ¹	-	25	250	500
Turkey - Iraq ²	<u>541</u>	<u>131</u>	<u>150</u>	<u>250</u>
Total	541	156	680	2,550

Note: ¹ Via Midan Ikbis - Ya'roubia (1979)/Albu Kamal (1985/2000)

² Via Al Kamishli - Ya'roubia

Flows shown in this table are included in Tables 5.1 and 5.2.

Table 5.4

TRANSIT TRAFFIC BY FINAL ORIGIN/DESTINATION

(in percent)

	<u>Origin</u>			<u>Destination</u>		
	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
Lebanon	23.5	42.1	53.1	5.4	8.4	8.5
Jordan	2.5		4.1	11.7	16.2	26.7
Iraq	0.6		0.1	24.7	12.4	0.1
Saudi Arabia	0.1		0.3	48.6	53.5	50.6
Kuwait	0.1		0.1	6.1	6.4	8.7
Other Gulf/Red Sea States	-		1.1	1.3	-	3.7
Turkey/Europe	69.1	57.9	36.9	1.8	0.2	0.2
Other Countries	4.2		4.4	0.4	2.9	1.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
Tonnage	2,360 ¹	3,168	2,435	2,360 ¹	3,168	2,435

Source: Central Bureau of Statistics.

¹ Discrepancy of four percent in total compared with entry point statistics in Table 5.1.

tons is assumed for 1985. Although this is only about 50 percent above the 1974 peak level, it implies a growth rate averaging 9 percent annually from 1979. From 1985 to 2000 a yearly growth rate of 5 percent is projected to give a volume in 2000 of 10.8 million tons. The volumes in 1985 and 2000 as projected by entry and exit points are given in Tables 5.1 and 5.2. The routing of rail flows included in these tables is shown in Table 5.3. The rail flows in 1985 assume prior completion of the Deir Ez Zor-Albu Kamal line, and flows in 2000 assume that the conversion of the Hijaz line to standard gauge is in operation.

Tripoli and Beirut are likely to remain major ports of entry for transit traffic, but Tartous and Lattakia will offer increasingly attractive alternatives and their share of traffic should rise sharply by 1985. Tartous is then expected to handle 0.8 million tons and Lattakia about 0.6 million tons of inbound transit goods. In addition, Lattakia is forecast to export 0.1 million tons. The Lebanese entry points are projected to originate 2.7 million tons in 1985 compared with 2.0 million in 1979. The split between Al Dabbousieh and Jdaydeh (throughout the chapter Jdaydeh traffic includes that which in the future will use the entry point on the new Beirut-Damascus road) is difficult to predict and traffic is accordingly divided about evenly. Bab Al Hawa, which is serviced chiefly by Iskenderun, is forecast to handle 0.4 million tons, and 0.2 million tons is expected to enter from Jordan via Dera'a/Mafrak. The share of traffic passing into Iraq is forecast to recover to 52 percent (2.7 million tons) from 40 percent in 1979, when it was still suffering from the affects of the border closure in 1978. Jordan is forecast to receive 44 percent (2.3 million tons). Similar exit shares are projected for 2000 but with some return traffic flows expected by rail for export through Tartous and Lattakia. The entry point pattern in 2000 gives shares close to those of 1985 for the Syrian ports, with 2.0 million tons through Tartous and 1.5 million tons through Lattakia, a combined proportion of 32 percent versus 30 percent in 1985. Significantly higher figures than these could be achieved if efficiency is comparable with Lebanese levels, but the split of traffic between the five major ports (including Iskenderun) will depend on the relative economics of the whole journey through each at the time.

Rail transit flows included in the above totals are given in Table 5.3. By 2000 a rail share of about 25 percent of overland traffic is forecast. Major new rail potential will be opened up by the routes through Damascus to Jordan/Saudi Arabia and through Albu Kamal to Iraq/Kuwait/Saudi Arabia. The proportion of traffic that rail will capture is difficult to predict, but for such long hauls an efficient service should be easily capable of achieving the forecast levels. Whether the major flows

come via Turkish Railways or through Tartous/Lattakia depends on the relative efficiencies of the routes. At present the latter route with train ferry from Volos appears likely to be the more important. Flows from Turkey/Eastern Europe however will still provide significant traffic through Midan Ikbis and Al Kamishli. Reverse flows by rail included in Table 5.3 for 2000 are 0.2 million tons from Albu Kamal to Lattakia and 0.1 million tons to Tartous, and 0.2 million tons from Dera'a to Tartous.

5.4 TRANSIT TRAFFIC BENEFITS

Transit truck traffic pays a transit tax of SP 960 per vehicle per round trip. This benefit to the country is offset by the diesel subsidy. A vehicle which travels 1,000 kilometers in Syria, filling up its tank on arrival and before departure, would consume about 325 liters of diesel fuel. This amounts to a subsidy to the foreign truckers of about SP 230. Thus, the net benefit is SP 730, not SP 960. The Consultants have recommended that, and expect economic pressure to force, the Government to abandon the subsidy on diesel. If this happens, the benefit of truck traffic to Syria will be increased.

Rail transit tariffs substantially exceed domestic tariffs, although some reduction is expected in the future. (See Volume III, Chapter A-6, Section A-6.3, and Chapter A-8, Section A-8.6). Three sets of tariffs are applied for rail freight traffic, two for transit and import and export traffic, and one for domestic freight. For international traffic with origin or destination outside of Turkey, Syria, Lebanon, and Iraq (TSLI), the BPO (Bulgarie Proche Orient) tariff applies. For international traffic with both origin and destination in Turkey, Syria, Lebanon, or Iraq, the TSLI tariff applies, but with considerably lower rates than the BPO tariff. Both are set in Swiss francs.

Although the BPO and TSLI tariffs have not been altered for some years, the appreciation of the Swiss franc against all other currencies has meant that their equivalent in Syrian pounds has risen considerably. In July 1979, the Swiss franc was 76 percent above the January 1975 level. This appreciation of what, by domestic tariff standards, was already a high rate has led to a proposal for a 40 percent reduction in both the BPO and the TSLI tariffs.

Corridor Flows

The cumulative transit traffic corridor flows are shown in Figure 5.1.

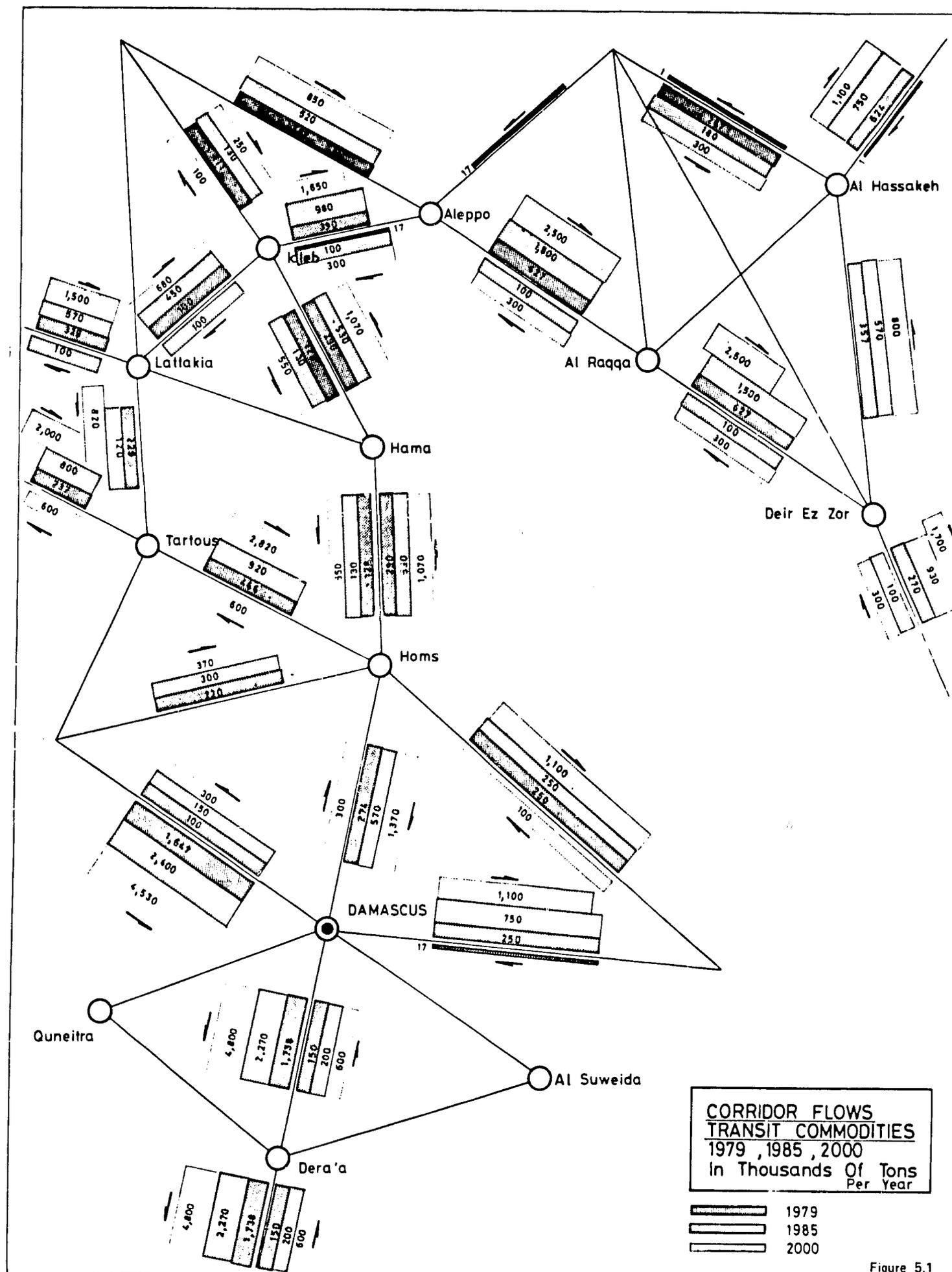


Figure 5.1

CHAPTER 6

PASSENGER TRANSPORT DEMAND FORECAST

Chapter 6

PASSENGER TRANSPORT DEMAND FORECAST

6.1 TOTAL DEMAND

The basic parameter used for forecasting passenger transport demand is the per head trip rate or mobility, that is, the average number of trips each inhabitant of a certain area taken in a given period of time (day or year). The value of this parameter is known for inter-Mantika transport from 1979-1980 surveys for each Mantika and for the whole country. The average was 0.043 trips per inhabitant per day. In other words, in Syria, an average of 1 out of 1,000 inhabitants perform one return trip every day; or, each Syrian resident performs, on the average, one return intercity trip every 45 days, or eight in a year.

Obviously not all parts of the country have the same per capita trip rate. The rate ranges from 75.4 trips per 1,000 inhabitants per day in Damascus to 38.2 in Aleppo, 5.8 in Mhardeh, and 7.3 in Izra'.

The wealthier a Mantika, the higher the per head trip rate. This confirms what has been historically observed in a great number of countries, namely that there is a close relationship between income level and mobility. To substantiate this assumption, the GDP per capita values in 1979 were calculated in each Mantika based on the method described in Chapter 3, and regressions were run to calculate the shape and coefficients of this functional relationship. A power curve fit proved very satisfactory ($R = 0.938$; t -value = 20.2) and is written:

$$(\text{Trips}/1,000 \text{ inhabitants})_{79} = 11.9 (\text{GDP}/\text{Capita}_{79})^{1.221}$$

where GDP/Capita is expressed in thousands of 1975 Syrian pounds.

This equation also states that the income elasticity of passenger transport is 1.221. That is, for each 1 percent increase in GDP per capita in real terms, the demand for intercity passenger transport per person increases by 1.22 percent. The elasticity factor greater than one can be explained by two main considerations. First, the more a region departs from an agricultural economy and tends to an industrial and service oriented economy, the higher the necessity for frequent intercity trips. Second, the higher the disposable income, the lower the share devoted to the satisfaction of basic needs, such as food and clothing, and the higher the share left for other

items such as travel. This increase in income available for transport produces high trip increases, particularly for leisure trips.

Given the low starting level of mobility in Syria, it is believed that the income elasticity of 1.22 established on a cross-section basis for 1979 is applicable without change for the whole forecast period up to the year 2000. Income elasticities higher than or around one are registered presently in a number of European countries, although the present mobility level is several times higher than that in Syria.

Based upon the GDP per capita growth rates determined in the frame of the macroeconomic model, the growth rates for total demand for intercity passenger transport shown in Table 6.1 were found.

These results can also be seen in Figure 6.1, where the transport demand level for varying GDP per capita levels is shown.

The average trip purpose mix as it was surveyed in 1979 was:

<u>Work-Business</u>	<u>Tourism</u>	<u>Social</u>
75%	20%	5%

It is believed that work trips and tourist trips are somewhat over-represented in the survey. This may partly derive from the season in which the surveys were performed; partly from the difficulty interviewers had in understanding the exact difference between the definitions of trip purposes; and partly from the fact that drivers, rather than passengers, were asked the trip purpose question.

The mix of trip purposes will certainly change in the future, and social trips will have a very much larger share. Different growth rates were therefore assumed to compensate for the bias of the base year. The growth rate of social trips was taken to be 2.5 times the average growth rate; whereas work and business trips and tourist trips were assumed to grow 70 percent and 80 percent of the average growth rate, respectively. These rates lead to the following trip purpose mixes for 1985 and 2000:

	<u>Work-Business</u>	<u>Tourism</u>	<u>Social</u>
1985	68.0	18.5%	13.5%
2000	50.0	15.0%	35.0%

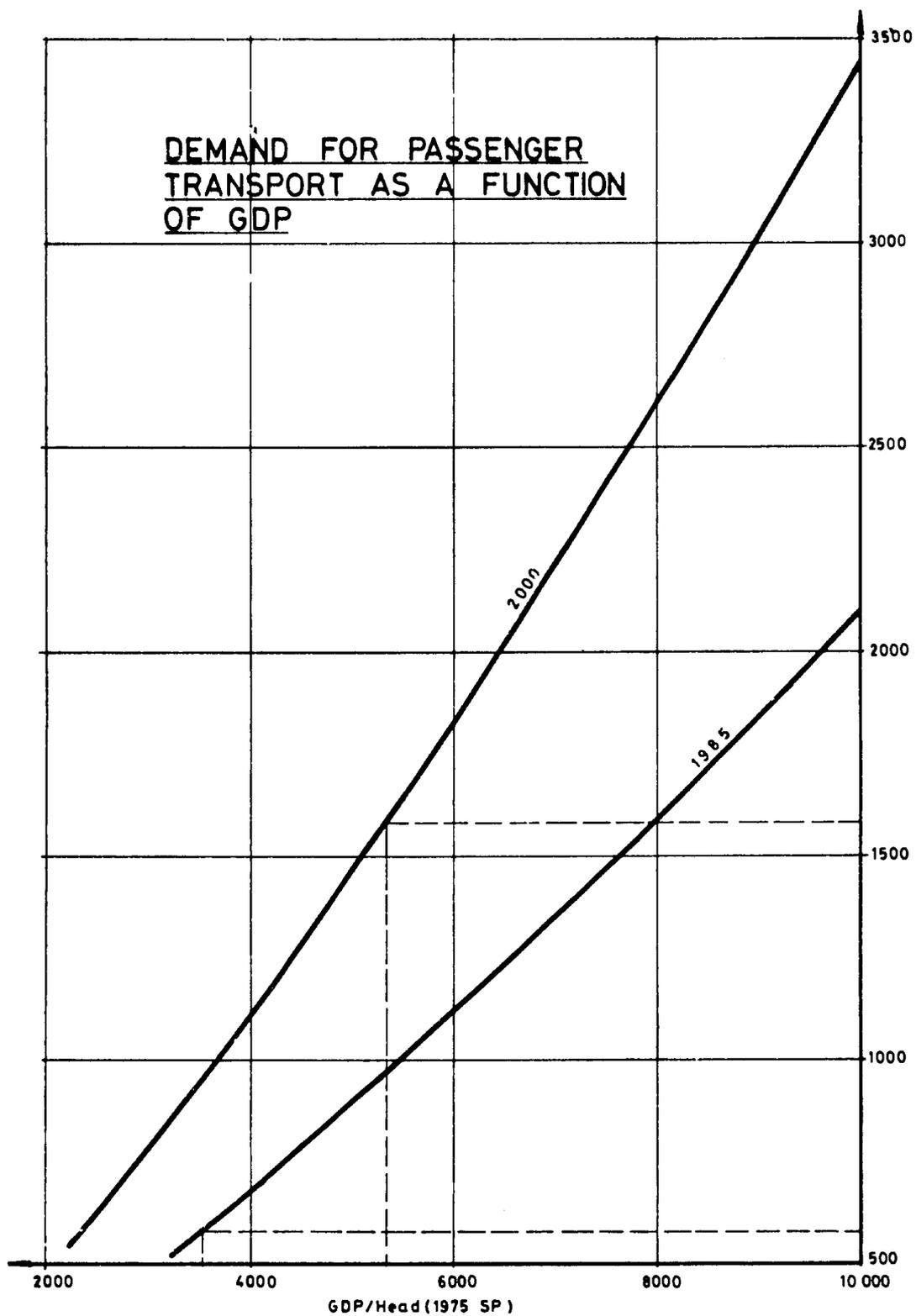
Table 6.1

INTERCITY PASSENGER TRAVEL GROWTH RATES

<u>Period</u>	<u>GDP per Head Growth Rate (% p.a.)</u>	<u>Mobility Growth Rate (2)x1.221</u>	<u>Mobility Growth Factor</u>	<u>Mobility (Trips per 1000 Inhabitants) (4)x42.8</u>	<u>Population Growth Factor</u>	<u>Demand Growth Factor (4)x(5)</u>	<u>Demand Growth Rate (% p.a.)</u>	<u>Total Demand (1000 Trips per day)</u>
1979-1985	3.0	3.7	1.2407	53.1	1.2392	1.5375	7.4%	566.1
1985-2000	3.0	3.6	1.7072	73.1	1.6262	2.7762	7.0%	1571.7
1979-2000	3.0	3.6	2.1181	90.7	2.0152	4.2684	7.2%	1571.7

Source: Consultants' estimate.

Figure 6.1



.2 PRICE ELASTICITY

Given the extremely low level of present tariffs for passenger transport, an increase in relative terms of the cost of traveling must be taken into consideration.

If such an increase were to take place, it would obviously have the effect of suppressing the demand for passenger trips.

An income elasticity of less than one for the per capita trip rate has the effect of increasing the share of the increasing income available for transportation. If however, the real prices for transportation increase, the number of trips which can be afforded decreases or grows more slowly.

The price elasticity is obviously quite different for the different trip purposes. If transport prices are increased, the number of social trips is reduced first, then the tourism trips. However, work trips, normally being a necessity, are not very sensitive to transport price increases.

The price elasticities were assumed to be -0.15, -0.50, and -0.60 for work-business, tourism, and social trips respectively.

Taking into account the changing trip purposes, price elasticities of -0.24 for 1979, -0.27 for 1985, and -0.36 for 2000 were determined. The reduction of the demand for passenger transport with varying ratios of the year 2000 transport costs to the 1980 transport costs is shown in Figure 6.2. For the case taken as the basis for the overall forecast (prices increase at 2 percent per year in real terms), a reduction of total demand by 3 percent in 2000 results.

The grand totals for passenger transport demand are therefore:

1985	562,500 passenger trips per day = 205.3 million passenger trips per year, or 52.8 trips per 1,000 inhabitants per day.
2000	1,382,500 passenger trips per day = 504.6 million passenger trips per year, or 79.8 trips per 1,000 inhabitants per day.

All figures include only those external trips which originate in Syria. External origin trips are not included.

From Figure 6.2, it can also be seen that when tariffs are increased to reach the marginal economic transport costs (for a

detailed description see Volume VII), the total demand would be:

1985	556,900 passenger trips per day = 203.3 million passenger trips per day, or 52.3 trips per 1,000 inhabitants per day
2000	1,215,200 passenger trips per day = 443.6 million passenger trips per day, or 70.2 trips per 1,000 inhabitants per day.

To allow forecasting of total passenger transport demand under different hypotheses of economic growth and transport pricing, the two graphs are combined into a nomogram in Figure 6.3.

The way to use this nomogram is explained in the following example for the year 2000 (see Figure 6.3a):

1. Select the desired GDP per capita level (1975 SP) (A) on the X-axis of left diagram; intersect the relevant curve (B); identify Y value (C); transfer it on the central axis (D).
2. Select the desired relative tariff level (1979 = 100) for 2000 or the yearly increase on the X-axis of right diagram (E) into the relevant curve (F); identify Y value (G).
3. Connect the 100-value of the Y axis of right diagram (H) with (D); extend line until it intersects the lower axis (I).
4. Connect (I) with (G); read final transport demand value at intersection with central axis (J).

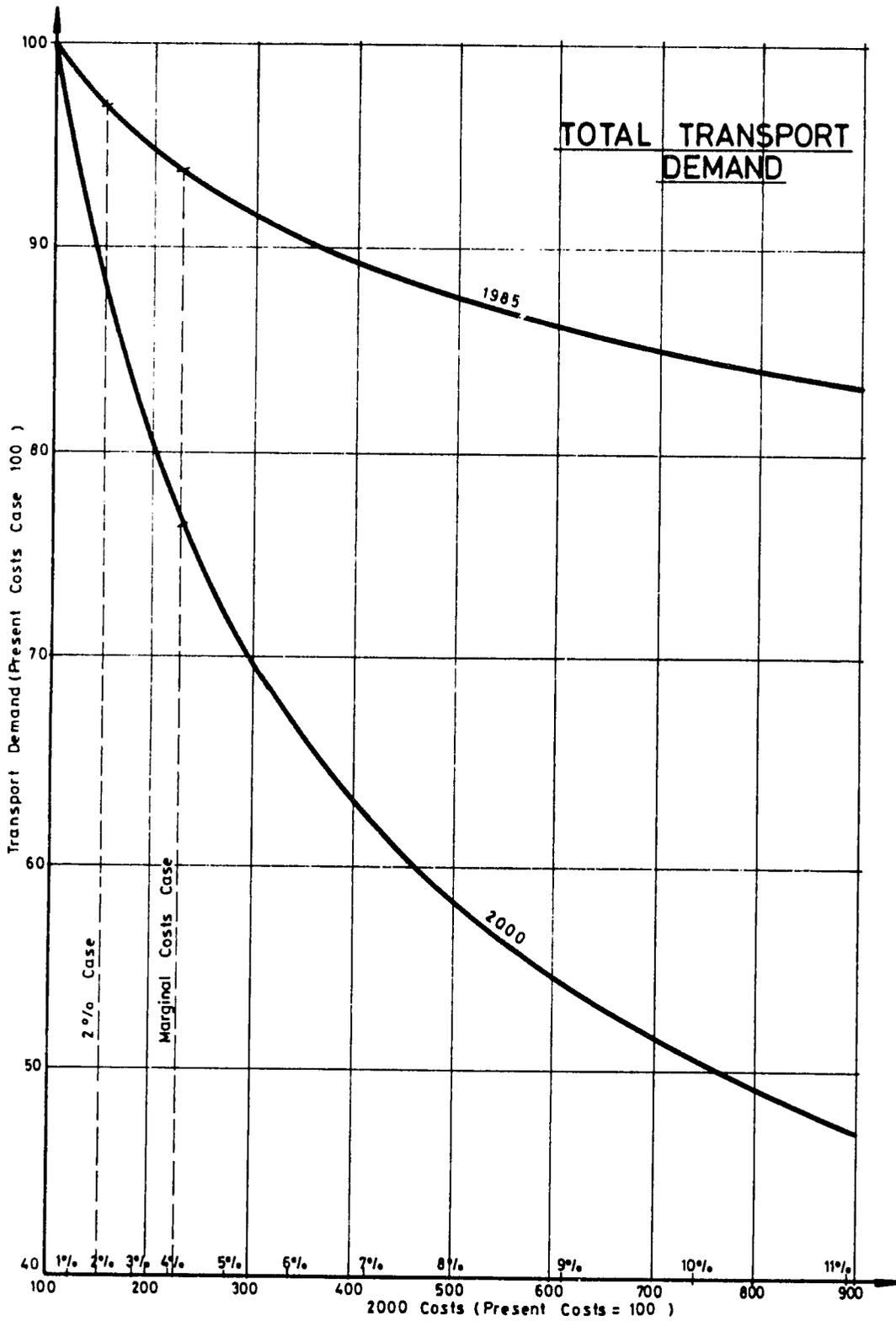
6.3 REGIONALIZATION OF PASSENGER TRANSPORT DEMAND

From the previous considerations, it is obvious that in the future, different levels of per capita trip rates and total demand will be found in the different Manatik, as a consequence of different GDP per capita levels and different populations.

To forecast passenger transport demand by Mantika, the GDP in the years 1985 and 2000 had to be broken down to a Mantika level as well. This was done based on labor force and productivity indicators by the methods described in Chapter 3 of this volume.

The price elasticity which was used for the country as a whole was also used for each Mantika, under the assumption that transport price increases would be the same all over.

Figure 6.2



TOTAL PASSENGER TRANSPORT DEMAND WITH VARYING GDP AND PRICE LEVELS

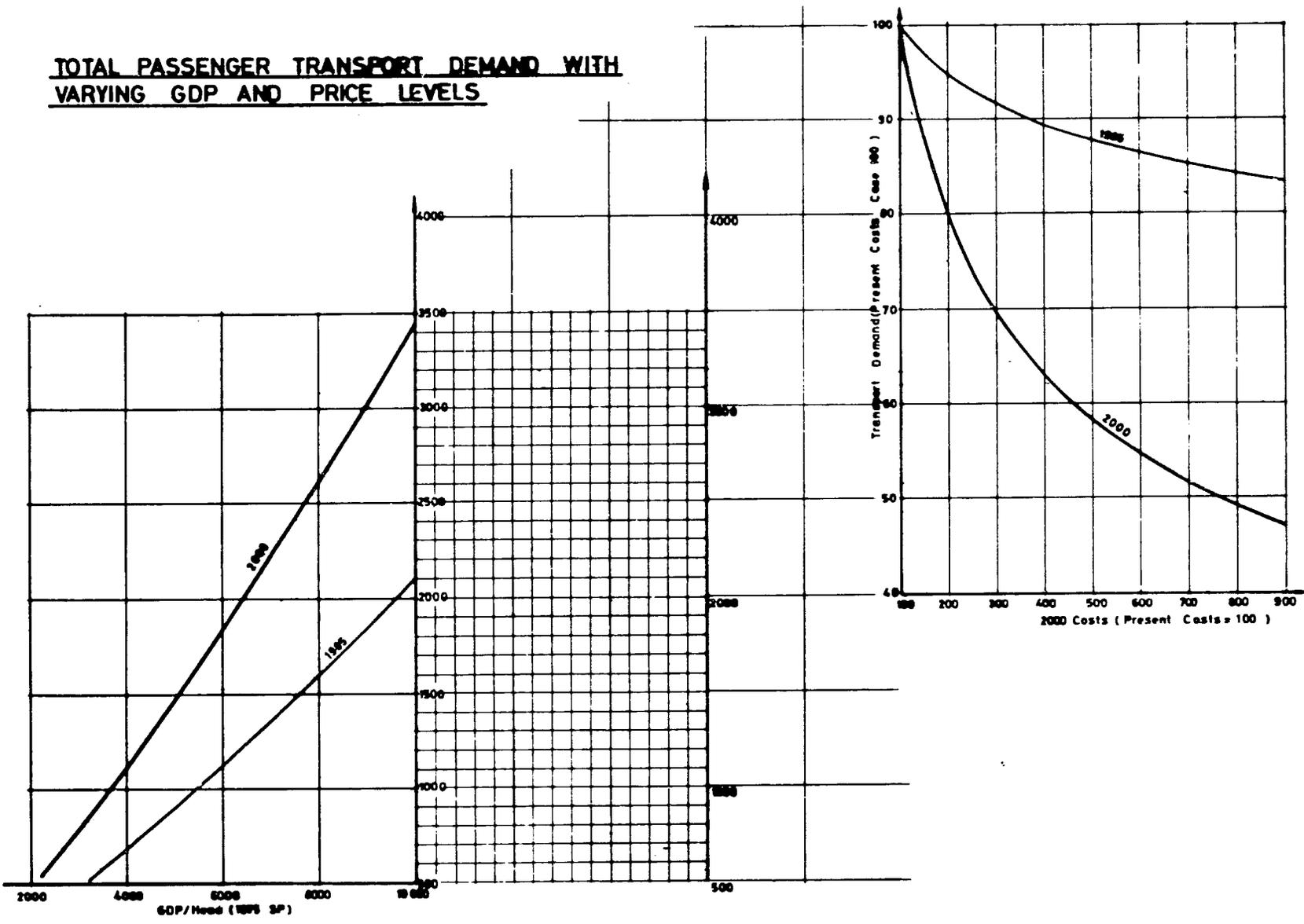
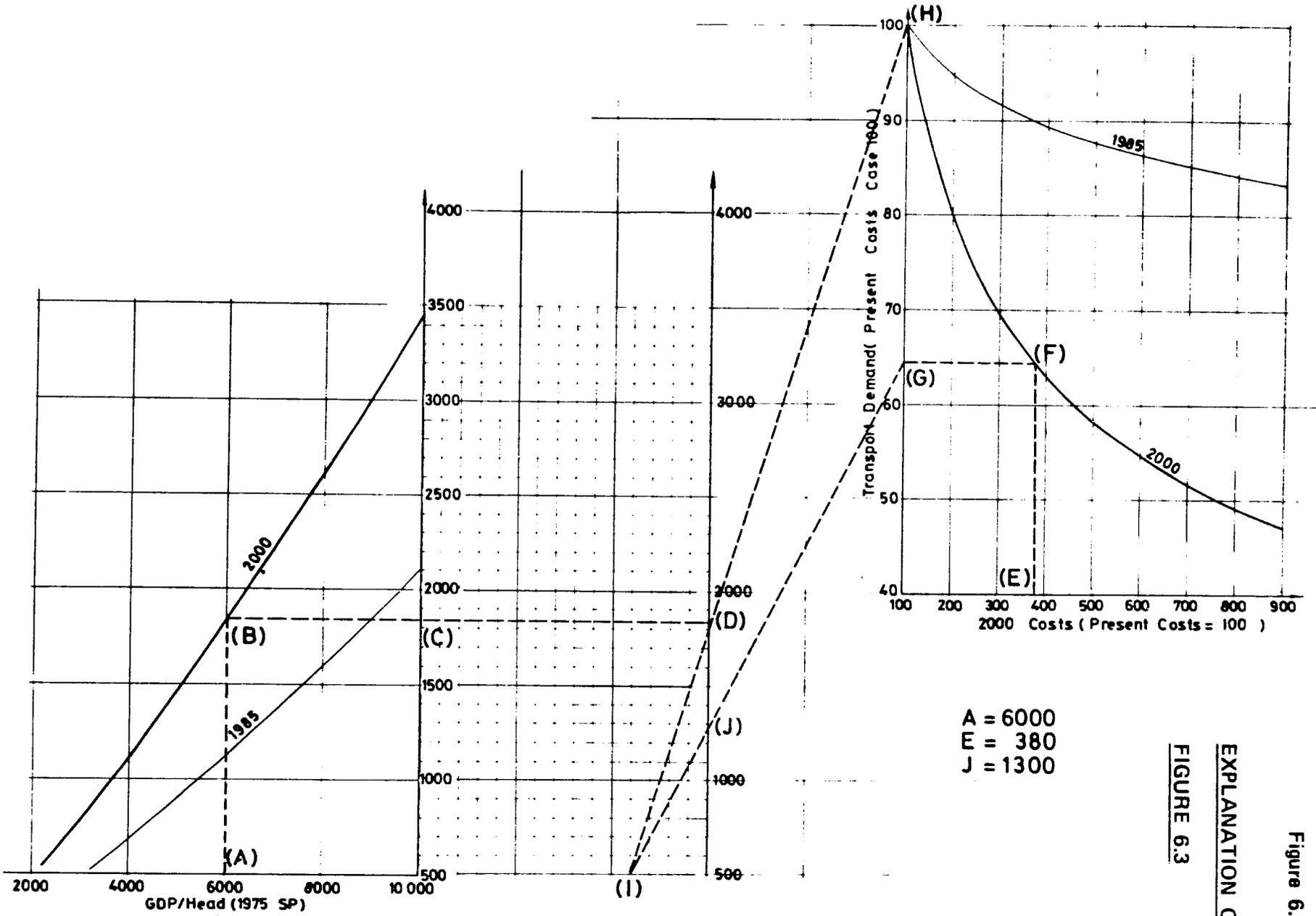


Figure 6.3



EXPLANATION OF
FIGURE 6.3

Figure 6.3a

If $GDP_{i,y}$ = GDP per head in Mantika i, year y

$MOB_{i,y}$ = Per head trip rate in Mantika i, year y

then

$$MOB_{i,y} = MOB_{i,1979} \left(\frac{GDP_{i,y}}{GDP_{i,1979}} \right)^{1.221}$$

The per annum growth rates for each Mantika are shown for 1985 and 2000 in Table 6.2.

Besides the fact that the Manatik of Quneitra and Fiq show extremely high growth rates, due to their very low bases, the other interesting fact to be observed is that the growth rates for Damascus, Aleppo, and, to a much lesser extent, Lattakia have the opposite trend from all other Manatik. In 1979-1985 these three Manatik will grow more slowly than the national average, and after 1985 they will grow faster than the national average. This derives from a slightly accelerating GDP per capita trend (e.g., in Damascus the GDP per capita increase for 1979-1985 is 1.4 percent yearly; it is 2.1 percent yearly after 1985). This results from the reduction of inter-Mantika migrations after 1990. Whereas the GDP produced in Damascus and Aleppo keeps growing, the population grows at a slower pace and the GDP per capita increases more than proportionally. Because the income elasticity is higher than one, the decelerating growth of population is more than compensated for by the accelerated growth of GDP per capita.

These trend differences become less evident, or disappear, in the marginal cost case.

The total traffic outflowing from each Mohafaza in 1979, 1985, and 2000 can be seen in Figures 6.4, 6.5, and 6.6. (The outflowing traffic of a zone contains traffic generated in that zone plus the back travel and trips attracted by the zone.)

It is interesting to analyze the density distribution of passenger trips:

PERCENTAGE OF TOTAL INTERCITY PASSENGER TRIPS BY ORIGIN

<u>Year</u>	<u>Damascus</u>	<u>Damascus + Aleppo</u>	<u>All Mohafaza Centers</u>	<u>All Other Mantika Centers</u>
1979	25.8%	36.8%	63.9%	36.1%
1985	24.5%	34.6%	62.9%	37.1%
2000	24.1%	35.0%	62.0%	38.0%

Table 6.2

YEARLY GROWTH OF TRAFFIC DEMAND BY MANTIKA

(Growth rates in %)

	<u>2% Price Increase per Year</u>		<u>Marginal Economic Costs Recovered</u>	
	<u>Growth Rate 79-85</u>	<u>Growth Rate 85-2000</u>	<u>Growth Rate 79-85</u>	<u>Growth Rate 85-2000</u>
Damascus City	5.5	6.4	5.3	5.6
Douma	8.2	6.0	8.0	5.2
Al Tal	8.1	6.1	7.9	5.3
Zabadani	9.0	6.0	8.8	5.2
Qatana	8.7	6.0	8.5	5.2
Quoteifeh	9.1	5.2	8.9	4.4
Nabek	8.1	6.2	7.9	5.4
Darayya	7.3	6.3	7.1	5.5
Yabroud	11.1	5.1	10.9	4.3
Quneitra	9.4	13.5	9.2	12.7
Fiq	0.0	66.6	0.0	65.8
Izra'	10.0	5.5	9.8	4.7
Dera'a	8.5	6.2	8.3	5.4
Shahba	10.2	5.2	10.0	4.4
Salkhad	10.0	5.3	9.8	4.5
Al Suweida	7.8	6.2	7.6	5.4
Tadmur	9.5	6.5	9.3	5.7
Tal Kalakh	9.3	5.1	9.1	4.3
Al Rastan	8.9	4.9	8.7	4.1
Koussair	8.4	5.3	8.2	4.5
Al Mouharram	9.6	4.8	9.4	4.0
Homs	9.6	4.8	9.4	4.0
Al Salamieh	9.5	6.2	9.3	5.4
Al Ghab	9.8	5.6	9.6	4.8
Missiaf	9.5	5.5	9.3	4.7
Mhardeh	11.8	5.8	11.6	5.0
Hama	8.3	6.3	8.1	5.5

Table 6.2 (Continued)

YEARLY GROWTH OF TRAFFIC DEMAND BY MANTIKA

(Growth rates in %)

	<u>2% Price Increase per Year</u>		<u>Marginal Economic Costs Recovered</u>	
	<u>Growth Rate 79-85</u>	<u>Growth Rate 85-2000</u>	<u>Growth Rate 79-85</u>	<u>Growth Rate 85-2000</u>
Banias	9.3	5.8	9.1	5.0
Tartous	8.0	6.0	7.8	5.2
Safita	9.7	5.3	9.5	9.5
Sheikh Badr	10.8	5.5	10.6	4.7
Dreikish	10.8	5.4	10.6	4.6
Lattakia	5.9	6.1	5.7	5.3
Djableh	8.7	5.8	8.5	5.0
Al Hiffeh	10.6	5.5	10.4	4.7
Qirdaha	10.6	5.4	10.4	4.6
Idleb	7.7	5.8	7.5	5.0
Ariha	8.8	5.7	8.6	4.9
Jisr Al Shughour	8.5	5.8	8.3	5.0
Harem	10.2	5.5	10.0	4.7
Ma'arrat Al Nu'o'man	8.6	5.8	8.4	5.0
Jabal Sam'an	6.0	6.7	5.8	5.9
Isas	8.8	5.2	8.6	4.4
Al Bab	8.0	5.7	7.8	4.9
Jarablus	9.7	4.5	9.5	3.7
Ifrin	8.6	5.0	8.4	4.2
Ain Al Arab	8.8	4.6	8.6	3.8
Manbedj	8.5	5.4	8.3	4.6
Sfeira	10.4	4.5	10.2	3.7
Tal Abiad	10.2	5.1	10.0	4.3
Al Raqqa	8.0	6.3	7.8	5.5
Albu Kamal	9.0	5.8	8.8	5.0
Al Mayadin	8.7	5.7	8.5	4.9

Table 6.2 (Continued)

YEARLY GROWTH OF TRAFFIC DEMAND BY MANTIKA

(Growth rates in %)

	<u>2% Price Increase per Year</u>		<u>Marginal Economic Costs Recovered</u>	
	<u>Growth Rate 79-85</u>	<u>Growth Rate 85-2000</u>	<u>Growth Rate 79-85</u>	<u>Growth Rate 85-2000</u>
Deir Ez Zor	7.4	6.3	7.2	5.5
Al Hassakeh	8.3	6.1	8.1	5.3
Ras Al Ain	9.1	5.3	8.9	4.5
Al Kamishli	7.9	6.2	7.7	5.4
Al Malkieh	9.2	5.3	9.0	4.5
Syria Total	7.3	6.2	7.1	5.4

Source: Consultants' estimates.

Figure 6.5

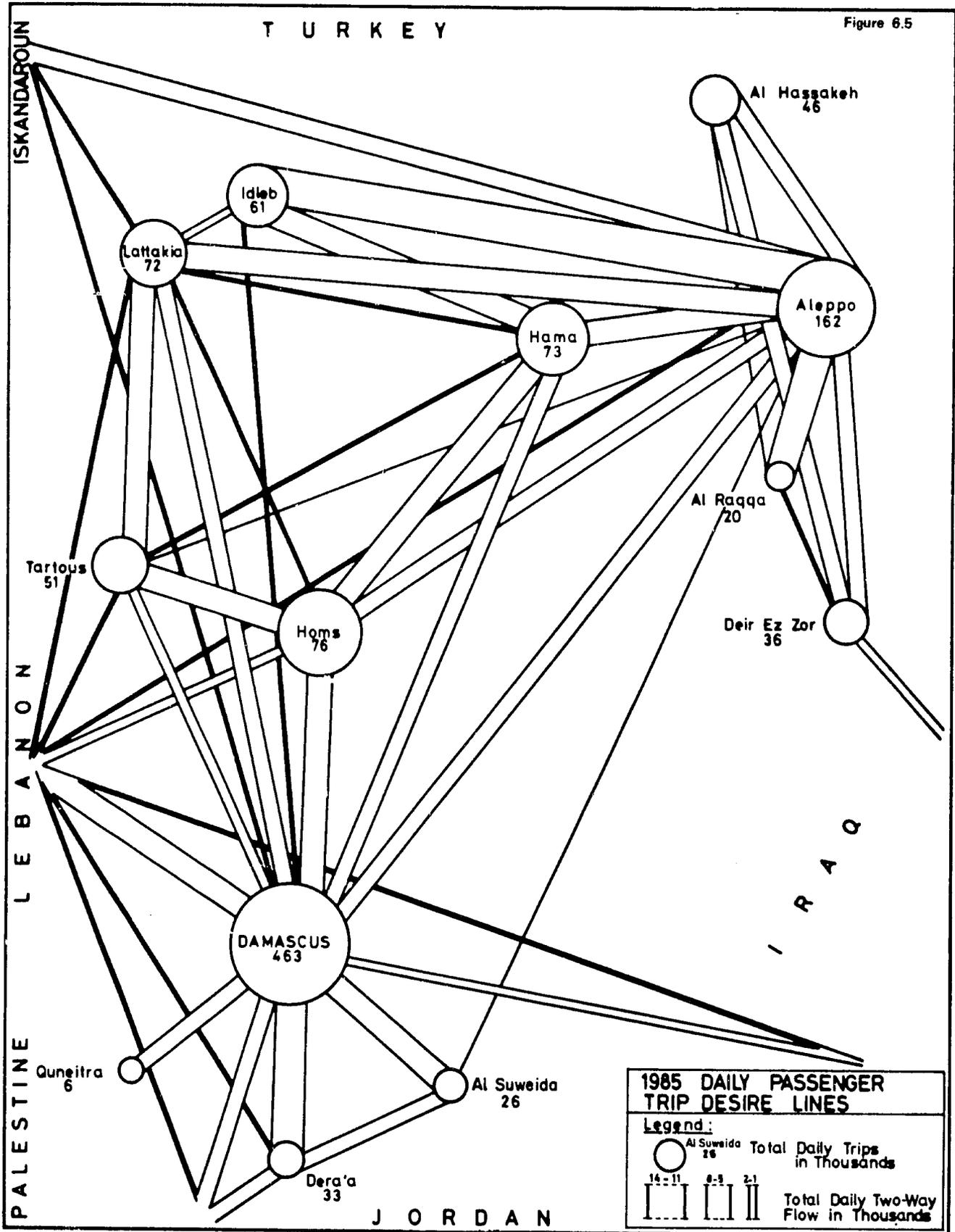
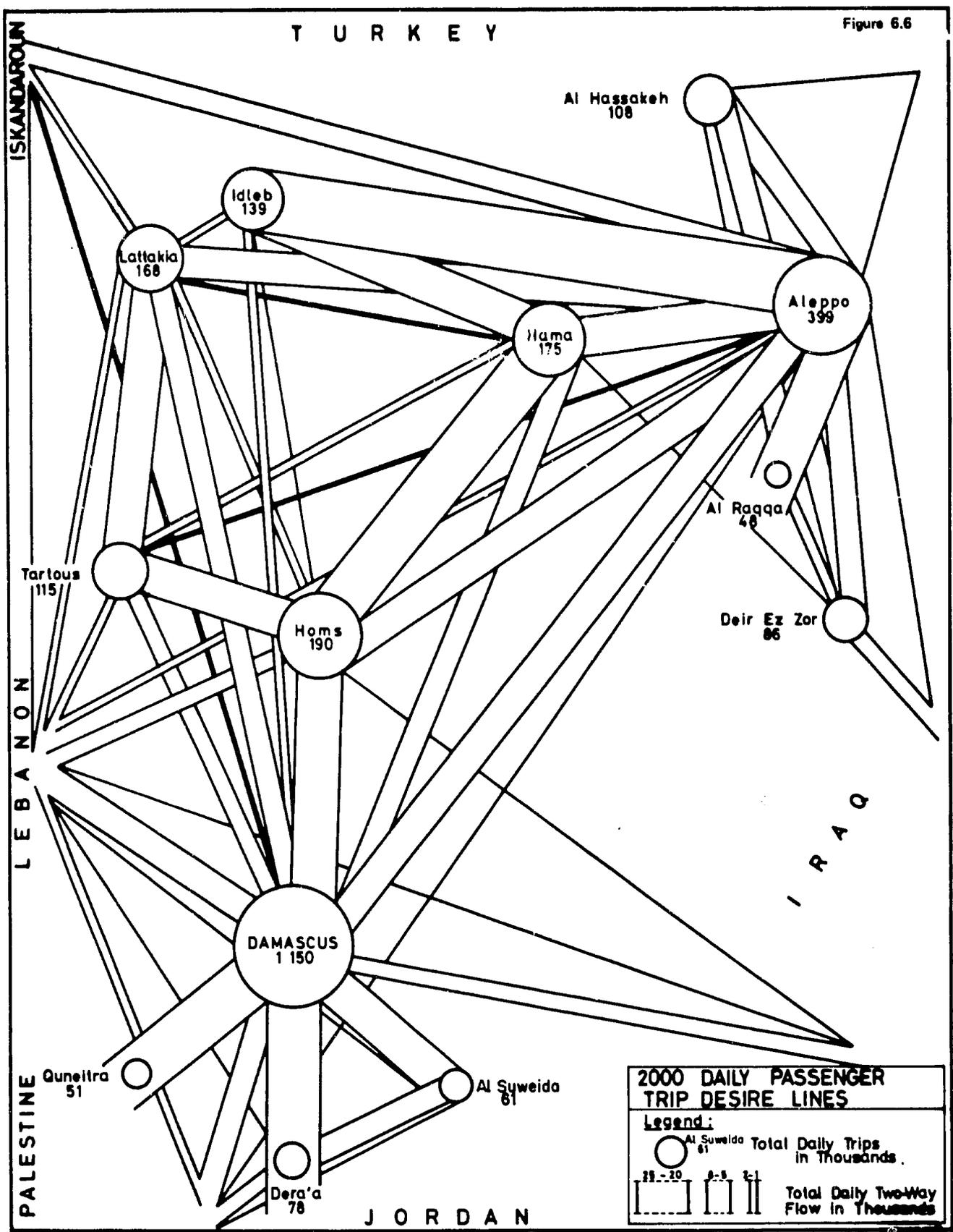


Figure 6.6



It can be seen that a modest trend towards a reduced predominance of the major centers will occur in the future. The trend is consistent with the decentralization policy aimed at reducing internal economic imbalances.

6.4 ORIGIN-DESTINATION PASSENGER TRANSPORT DEMAND

The transformation of the two arrays containing the growth rates for the single Manatik into origin-destination matrices was performed by means of the Fratar method, where the revised 1979 passenger traffic matrix was taken as a basis. (For a detailed description and discussion of the Fratar method, refer to Volume VII, Chapter 1, Section 1.2.1. of the Final Phase I Report.)

The change in traffic patterns can be seen in Figure 6.7, where the shares of trips by origin and destination falling into certain categories are shown.

It appears, therefore, that trips within the Damascus Mohafaza will continue being by far the largest share and amount to approximately one-third of total trips.

The share of trips between Damascus, Aleppo, and the other Mohafaza centers will decrease to 1985 and then pick up again to 2000. This can be explained by the migration patterns. Until 1990 inter-Mohafaza migrations will continue, mainly migration to Greater Damascus. This growth of relative weight in Damascus reduces the need for trips between Damascus and the other Mohafaza centers.

The reduced scale of the shift in traffic is not surprising. Two phenomena are connected with decentralization. On the one hand, economic activity and wealth are also decentralized and so is traffic. On the other hand, the formation of new centers all over the country induces more trips between these centers, partly cancelling the other effect.

When the inter-Mohafaza migrations decrease, the intra-Mohafaza migrations will still go on, leading to the creation of sub-centers whose traffic with Damascus and Aleppo will increase.

The share of traffic between Aleppo and other Mohafaza centers grows steadily as a result of the accelerated development of the northeast region, for which Aleppo serves as a center.

There are no significant changes of pattern or ranking for the other types of O-Ds (Table 6.3).

Table 6.3 shows that the strongest seven O-D pairs do not change and their total traffic amounts to more than one-third

Figure 6.7

DISTRIBUTION OF PASSENGER TRAFFIC

1979 Grand Total : 359,700 (Passenger Trips per Day)

	DAMASCUS MOHAFAZA	ALEPPO	ALEPPO MOHAFAZA	OTHER MOHAFA- ZA CENTERS	OTHERS
Damascus City	33.5 %	1.6 %		12.8 %	
Damascus Mohafaza	0.1 %			5.7 %	
Aleppo City			5.8 %	8.2 %	
Aleppo Mohafaza			0.0	3.9 %	
Mohafaza Centers				6.8 %	19.2 %
Others					2.4 %

1985 Grand Total : 562,500 (Passenger Trips per Day)

	DAMASCUS MOHAFAZA	ALEPPO	ALEPPO MOHAFAZA	OTHER MOHAFA- ZA CENTERS	OTHERS
Damascus City	33.0 %	1.3 %		8.5 %	
Damascus Mohafaza	0.5 %		5.6 %		
Aleppo City			6.7 %	8.8 %	
Aleppo Mohafaza			0.0	3.3 %	
Mohafaza Centers				6.8 %	19.9 %
Others					5.6 %

2000 Grand Total : 1,382,500 (Passenger Trips per Day)

	DAMASCUS MOHAFAZA	ALEPPO	ALEPPO MOHAFAZA	OTHER MOHAFA- ZA CENTERS	OTHERS
Damascus City	32.1 %	1.4 %		11.7 %	
Damascus Mohafaza	0.2 %		5.9 %		
Aleppo City			5.8 %	9.7 %	
Aleppo Mohafaza				4.4 %	
Mohafaza Centers				6.5 %	17.6 %
Others					4.7 %

SOURCE : CONSULTANTS' PROJECTIONS.

of total traffic in all years. The first six O-D pairs are from Damascus to places within its Mohafaza or in adjoining Mohafazat.

Similarly, flows from Aleppo to its surrounding area and close Mohafazat constitute another important share of the 20 highest flows.

However, the growth pattern of Damascus and Aleppo (more than the national average in 1979-1985 and at the national average in 1985-2000) has the effect of reducing the relative importance of the total of the 20 strongest flows in 1985 as a whole; it also affects the ranking of some of the flows in that year. A pattern very similar to 1979's is found again in the year 2000.

In conclusion, it can be stated that, although some shifts will occur in the distribution patterns of passenger trips within Syria, no dramatic changes are to be expected. This is an obvious consequence of the general development pattern expected for the country, which aims at more balance among all parts of Syria, and of the fact that the present passenger transport system, if not fully satisfactory, is certainly adequate. As a consequence, no sizeable unfulfilled demand, which could be released by changes in the system, presently exists.

The resulting total daily corridor passenger flows for 1979, 1985, and 2000 are shown in Figure 6.8.

Table 6.3

TWENTY HIGHEST O&D FLOWS 1979, 1985, AND 2000

		1979		1985		2000	
		Rank	% of Total Traffic	Rank	% of Total Traffic	Rank	% of Total Traffic
Damascus	-Douma	1	9.7	1	9.7	1	9.9
Damascus	-Darayya	2	7.6	2	7.3	2	7.6
Damascus	-Qatana	3	5.6	3	5.5	3	5.5
Damascus	-Zabadani	4	4.5	4	4.5	4	4.5
Damascus	-Dera'a	5	3.7	6	2.4	5	3.2
Damascus	-Quoteifeh	6	3.0	5	2.9	6	2.8
Aleppo	-Al Raqqa	7	2.3	7	2.2	7	2.3
Damascus	-Al Suweida	8	2.3	16	1.4	10	2.0
Aleppo	-Idleb	9	2.1	18	1.4	8	2.2
Damascus	-Homs	10	1.9	8	1.7	9	2.1
Aleppo	-Lattakia	11	1.8	14	1.4	17	1.5
Lattakia	-Djableh	12	1.8	10	1.7	11	1.8
Damascus	-Aleppo	13	1.6	17	1.4	13	1.7
Homs	-Tartous	14	1.6	9	1.7	12	1.8
Hama	-Aleppo	15	1.5	19	1.4	16	1.5
Damascus	-Nabek	16	1.5	13	1.5	15	1.6
Aleppo	-Al Bab	17	1.5	12	1.5	18	1.5
Homs	-Hama	18	1.4	11	1.6	14	1.7
Aleppo	-Harem	19	1.4	15	1.4	19	1.5
Deir Ez Zor	-Albu Kamal	20	1.4	20	1.3	20	1.4
		58.2		53.8		57.7	

Source: Consultants' projections.

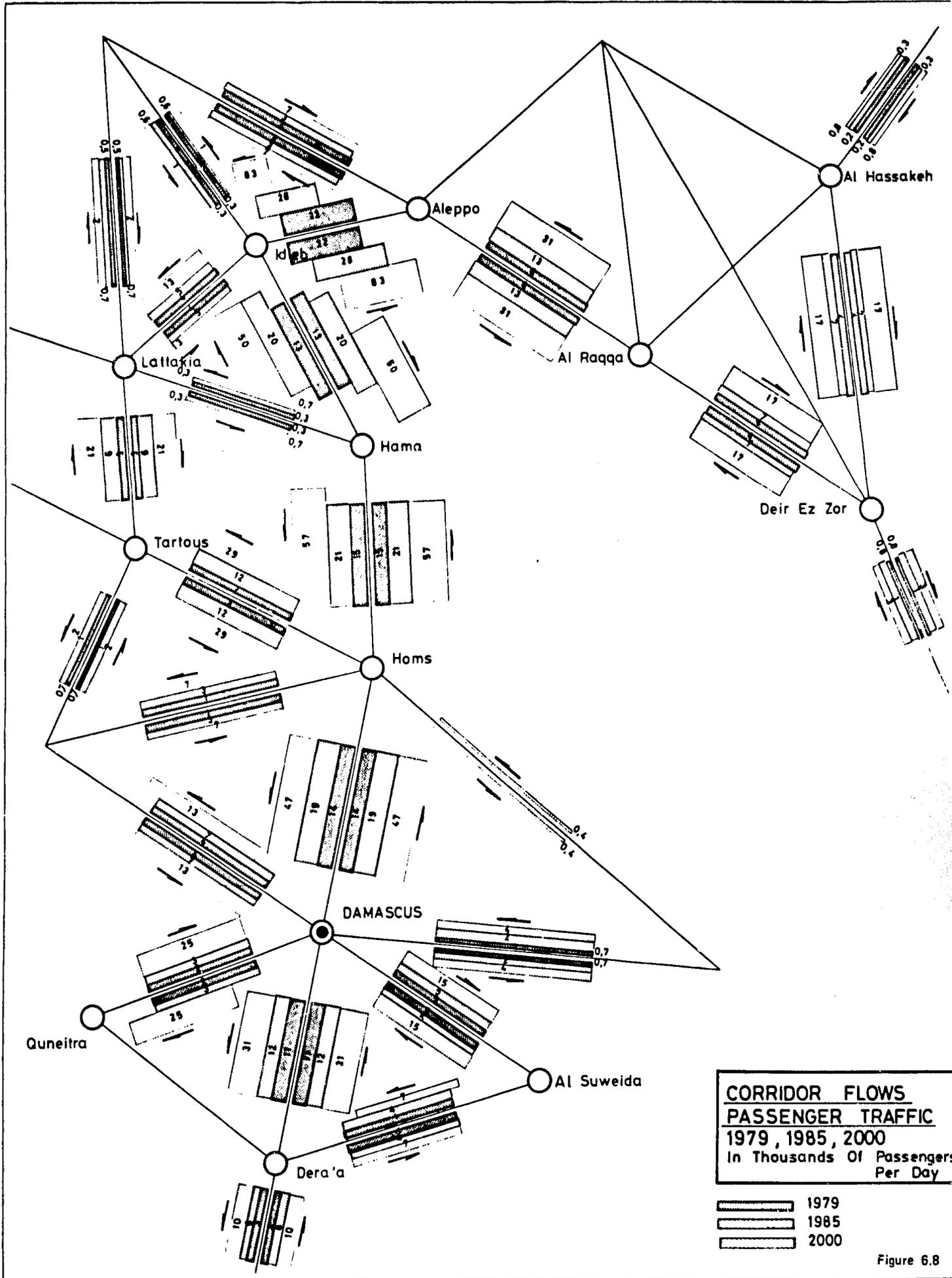


Figure 6.8

CHAPTER 7

TOURIST TRAFFIC

Chapter 7

TOURIST TRAFFIC

7.1 GENERAL

Syria is well endowed with tourist attractions ranging from historic sites, mountains, and forests to sandy beaches on the Mediterranean. The recent growth of the tourist industry as measured by tourist arrivals has been moderate by international standards, however. The country remains relatively untouched by developers, and the tourist potential is as yet untapped as a significant source of revenue. The political situation in the Middle East is a contributing factor in making projections of tourists highly uncertain, but budgetary constraints and Government priorities are perhaps the primary factors responsible for the existing shortage of adequate infrastructure and marketing efforts for the tourist industry. The objective of this analysis is to determine transport demand attributable to tourism rather than to conduct an exhaustive study of the industry.

7.2 TOURISM PLAN

Planning for the tourist industry is carried out as part of the national planning process. As set forth in the 4th Five-Year Plan, the objectives for tourism are:

Defined Objectives

- Increase the number of transit beds in the country from 18,500 in 1975 to 35,000 in 1980 through the public and private sectors.

General Objectives

- Encourage the private sector to construct tourist establishments other than hotels, such as furnished apartments and villas, within the tourism plan.

- Establish a number of tourist camps in Damascus, Aleppo, Homs, and Lattakia Mohafazat.

- Open a number of tourist-hotel centers to be used as training centers for qualifying staff needed by the tourism industry in the country.

- Endeavor to exploit mineral and sulfuric sources in the country.

- Endeavor to join all cities and tourist centers in the country and Arab capitals with a regular network of comfortable transport, by increasing the potential of the Karnak Company for tourism.

Financial estimates set forth in the 4th Five-Year Plan appear in Table 7.1. Including reserve projects, the Ministry of Tourism was allocated 1.1 percent of the total capital investment authorized under the plan. The Damascus Meridien Hotel was completed in 1976, and the Damascus Sheraton Hotel followed in 1978. The training center in Damascus is operational, and work on other projects is continuing, with the development of Ras Al Basit receiving emphasis. With the successful operation of the two international class hotels in Damascus, the potential of the tourism industry as an earner of foreign exchange is gaining recognition, and Syria is becoming more realistic about improving the viability of this sector.

7.3 TRENDS AND PROJECTIONS

The data presented by the Central Bureau of Statistics tend to be misleading in that all non-Syrians entering the country appear under the heading "Tourist Arrivals." Thus, people in business, public and private technical personnel and their families, students attending Syrian educational institutions, and other categories, such as foreigners visiting Syrian friends, are classified as tourists. While this classification system could adversely affect a tourism planning study, it is less significant in the context of demand for transport facilities.

Table 7.2 presents data on tourist arrivals and hotel use from 1969 to 1978.

The geographic distribution of hotels in 1978 appears in Table 7.3. Using the quantity of 21,383 beds available and the total of 3.12 million hotel bed nights from Table 7.2, the prima facie average occupancy rate is 40 percent. This low rate undoubtedly masks shortages in specific locations and by hotel class. The distribution of accomodation by hotel class shows about 72 percent of the beds in third class hotels and hostel establishments. It is doubtful that this situation coincides with the requirements of the international tourist market. Deluxe and international class hotels are available only in Damascus.

The share of tourist arrivals on each mode is presented in Table 7.4.

Table 7.1

4TH FIVE-YEAR PLAN - MINISTRY OF TOURISM

(SP million)

<u>Project</u>	<u>Total Cost of Project</u>	<u>Investment of Plan</u>
<u>A. Forward Projects</u>		
1. Complete Sheraton Hotel, Damascus	80.0	9.5
2. Complete Meridien Hotel, Damascus	80.0	28.0
3. Meridien Hotel, Aleppo	40.0	30.0
4. Meridien Hotel, Palmyra	40.0	24.6
5. Meridien Hotel, Lattakia	45.0	35.0
6. Idydet El Wadi Motels	<u>4.0</u>	<u>2.9</u>
Subtotal	289.0	140.0
<u>B. New Projects</u>		
7. 25% Participation, New Hotels	120.0	30.0
8. Participation Tourist Villages	900.0	100.0
9. Training Center, Damasus	40.0	40.0
10. Training Center, Lattakia	30.0	30.0
11. Tourist Camps	10.0	10.0
12. Rest Houses	3.5	3.5
13. Expropriations	137.0	137.0
14. Public Utilities	50.0	50.0
15. Internal Projects	100.0	25.0
16. Study, Abouraba Baths	0.1	0.1
17. Study, Sheikh Issa Baths	<u>0.2</u>	<u>0.2</u>
Subtotal	1390.8	425.8
<u>C. Reserve Projects</u>		
18. Training Center, Aleppo	<u>30.0</u>	<u>30.0</u>
Total Ministry of Tourism	1709.8	595.8

Source: 4th Five-Year Plan.

Table 7.2
TOURISM STATISTICS, 1969 - 1978
 (000)

Year	Arrivals			Foreign Hotel Residents			Foreign Hotel Nights			Syrian Nationals	
	Arab	Foreign	Total	Arab	Foreign	Total	Arab	Foreign	Total	Hotel Residents	Hotel Bed Nights
1969	667	130	797	NA	NA	NA	619	189	808	NA	NA
1970	656	214	870	331	78	409	653	186	839	1,322	2,224
1971	1,194	129	1,323	380	76	457	822	171	993	1,426	2,141
1972	885	154	1,038	334	106	439	722	231	952	1,446	2,275
1973	505	145	650	345	96	441	730	260	991	1,422	2,146
1974	677	244	922	373	131	504	767	307	1,074	1,453	2,093
1975	837	378	1,215	462	215	678	817	425	1,242	1,280	2,393
1976	1,048	315	1,363	310	483	793	1,192	396	1,588	1,239	1,959
1977	935	314	1,249	454	227	681	868	484	1,352	1,237	1,824
1978	823	250	1,074	440	215	655	767	529	1,296	1,296	1,824

Source: Central Bureau of Statistics.

Note: NA = Not available.

Table 7.3

HOTEL ACCOMMODATIONS, 1978
(Number)

	<u>Total</u>		<u>Hostels</u>		<u>Hotels by Class</u>										
	<u>Beds</u>	<u>Hotels</u>	<u>Beds</u>	<u>Hotels</u>	<u>Third</u>		<u>Second</u>		<u>First</u>		<u>Deluxe</u>		<u>International</u>		
					<u>Beds</u>	<u>Hotels</u>	<u>Beds</u>	<u>Hotels</u>	<u>Beds</u>	<u>Hotels</u>	<u>Beds</u>	<u>Hotels</u>	<u>Beds</u>	<u>Hotels</u>	<u>Beds</u>
Damascus	9,619	180	677	24	4,760	120	1,779	25	562	4	741	5	1,100	2	
Aleppo	4,955	138	593	32	3,742	97	411	7	209	2	-	-	-	-	
Hama	632	27	65	5	527	21	40	1	-	-	-	-	-	-	
Homs	875	29	121	7	531	16	223	6	-	-	-	-	-	-	
Lattakia	2,203	71	494	31	1,405	36	304	4	-	-	-	-	-	-	
Tartous	1,046	34	112	8	677	22	195	3	62	1	-	-	-	-	
Dera'a	64	2	-	-	30	1	34	1	-	-	-	-	-	-	
Al Suweida	75	1	-	-	-	-	-	-	75	1	-	-	-	-	
Idleb	249	13	-	-	190	11	59	2	-	-	-	-	-	-	
Deir Ez Zor	733	23	-	-	693	22	40	1	-	-	-	-	-	-	
Al Raqqa	239	9	-	-	239	9	-	-	-	-	-	-	-	-	
Al Hassakeh	693	16	-	-	511	13	182	3	-	-	-	-	-	-	
Total	21,383	543	2,062	107	13,305	368	3,267	53	908	8	741	5	1,100	2	

Source: Ministry of Tourism.

Table 7.4

TOURIST ARRIVAL MODE
(Percent)

<u>Year</u>	<u>Air</u>	<u>Sea</u>	<u>Land</u>
1975	9.4	0.4	90.2
1976	10.5	3.5	86.0
1977	15.0	1.6	83.1
1978	9.3	1.2	89.5

Source: Central Bureau of Statistics.

7.4 TOURIST FLOWS

Details of the road origin & destination survey (O & D) conducted by the Consultants are presented in Volume IV. Tourist movement data from the survey are analyzed here. As domestic air and rail currently transport a minor portion of passenger traffic and land arrivals comprise the vast majority of all arrivals, the road O & D is the best indicator of tourist movement into and within the country. Tourism trip origins and destinations shown in Table 7.5 are based on O & D survey data. Both internal and external movements are displayed and represent flows comprising both foreign and Syrian tourists.

Considering internal flows only, Damascus is the principal attraction and generator, accounting for 37.7 percent of trip originations and 21.6 percent of trip destinations. Lattakia, Aleppo, Hama, and Zabadani complete the top five in ranking with a cumulative total of 69.6 percent of trip origins and 62.7 percent of trip destinations. Iraq (traffic zone 78) ranks first among out-bound border crossings with 38.6 percent of the total, while Jordan (traffic zone 61) accounts for 45.5 percent of inbound traffic. Based on an average of the last three years available in the Central Bureau of Statistics' publications, seasonal variations of tourist arrivals are listed in Table 7.6. July and August account for the largest monthly inflows of tourists.

Table 7.5

TOURIST FLOWS, 1979

<u>Rank</u>	<u>Traffic Zone</u>	<u>Location</u>	<u>Percent of Category</u>	<u>Cumulative Percent</u>
<u>Internal Origin</u>				
1	1	Damascus	37.7	-
2	33	Lattakia	12.3	50.0
3	42	Aleppo	7.8	57.8
4	22	Homs	7.2	65.0
5	4	Zabadani	4.6	69.6
6	29	Tartous	2.7	72.3
7	27	Hama	2.5	74.8
8	35	Al Hiffeh	2.4	77.2
9	15	Salkhad	2.3	79.5
10	37	Idleb	2.0	81.5
11	28	Banias	1.6	83.1
12	34	Djableh	1.6	84.7
13	13	Dera'a	1.3	86.0
14	16	Al Suweida	1.2	87.2
<u>External Origin</u>				
1	61	Jordan	45.5	-
2	78	Iraq	23.5	69.0
3	66	Al Dabbousieh	15.8	84.8
4	64	Jdaydey	12.4	97.2
<u>Internal Destination</u>				
1	1	Damascus	21.6	-
2	4	Zabadani	12.8	34.4
3	42	Aleppo	11.4	45.8
4	33	Lattakia	11.0	56.8
5	22	Homs	5.9	62.7
6	29	Tartous	5.5	68.2
7	13	Dera'a	3.5	71.7
8	35	Al Hiffeh	3.4	75.1
9	27	Hama	2.3	77.4
10	34	Djableh	2.0	79.4
11	37	Idleb	1.8	81.2
12	19	Al Rastan	1.5	82.7
13	28	Banias	1.4	84.1

Table 7.5 (Continued)

TOURIST FLOWS, 1979

<u>Rank</u>	<u>Traffic Zone</u>	<u>Location</u>	<u>Percent of Category</u>	<u>Cumulative Percent</u>
<u>External Destination</u>				
1	78	Iraq	38.6	-
2	61	Jordan	17.6	56.2
3	64	Jdaydey	12.3	68.5
4	66	Al Dabbousieh	9.3	77.8
5	65	Jusieb	7.5	85.3

Source: Consultants' estimates.

Table 7.6

TOURIST ARRIVALS BY MONTH

<u>Month</u>	<u>Percent of Annual</u>
January	6.9
February	6.5
March	7.5
April	8.1
May	8.1
June	7.9
July	10.8
August	11.0
September	8.1
October	8.7
November	8.6
December	7.8

Sources: Central Bureau of Statistics and Consultants' estimates.

CHAPTER 8

TRAFFIC SUMMARY

TRAFFIC SUMMARY

Analysis of movements of passengers and commodities, present and future, have been presented in the previous chapters. This chapter summarizes such traffic movements in general indicators such as passenger-kilometers and ton-kilometers. These macro-indicators show a general trend of changing transport demand in the country.

8.1 PASSENGER TRAFFIC

The total domestic inter-zonal passenger traffic was estimated at 137 million in number and 12 billion in passenger-kilometers for 1979. Even in terms of passenger-kilometers by which rail and air mode show higher shares because of longer average trip lengths, shares of the rail and the air mode were only 3.1 percent and 0.4 percent, respectively, reflecting the poor service availability of the rail mode and the high cost of the air mode.

By 1985 the total number of passengers would grow by 53 percent over the 1979 level, but the total passenger-kilometers would grow by 39 percent. This discrepancy is due to the fact that by 1985 all major cities in Syria will be connected by high quality highway and railway links, which shorten trip distances among major cities. With the expanded railway lines it is expected that the railway would capture 12 percent of domestic passenger traffic in term of passenger-kilometers.

The amount of passenger traffic in the year 2000 would depend on the pricing policy. If a policy of achieving the marginal cost pricing by year 2000 is adopted, the total number of passengers would be 3.4 times more than the 1979 level and the share of the railway would grow to 13 percent. If a more modest price increase policy (2 percent per annum instead of 4 percent per annum as in the marginal case) is adopted, the total number of passengers would be more than 3.8 times the 1979 level and the share of the rail mode will be 11 percent. The Consultants recommend the former policy.

Table 8.1 summarizes 1979 passenger traffic and projections.

8.2 NON-TRANSIT COMMODITY TRAFFIC

In 1979 an estimated 44 million tons of Syria-originated or Syria-destined commodities were moved, amounting to 11 billion total ton-kilometers, of which 42 percent were carried by trucks, 3 percent by the railway, and 55 percent by the pipeline, as shown in Table 8.2.

Table 8.1

PRESENT AND PROJECTED PASSENGER TRAFFIC

(in million passengers and in billion passenger kilometers)

	<u>Road</u>	<u>Rail</u>	<u>Air</u>	<u>Total</u>
<u>1979</u>				
Passengers	135.8	1.32	0.13	137.3
Passenger-Kilometers	11.55	0.37	0.05	11.97
Percent Share (Passenger-Kilometers)	96.5	3.1	0.4	100.0
<u>1985</u>				
Passengers	203.4	7.4	0.26	211.01
Passenger-Kilometers	14.70	1.95	0.12	16.77
Percent Share (Passenger-Kilometers)	88.7	11.60	0.7	100.0
<u>2000</u>				
Passengers	436.7	24.6	1.3	462.6
Passenger-Kilometers	32.2	5.0	0.4	37.72
Percent Share (Passenger-Kilometers)	85.6	13.2	1.2	100.0

Source: Consultants' estimates.

Table 8.2

PRESENT AND PROJECTED COMMODITY TRAFFICNON-TRANSIT TRAFFIC

(in million tons and in billion ton-kilometer)

	<u>Road</u>	<u>Rail</u>	<u>Pipeline</u>	<u>Total</u>
<u>1979</u>				
Tons	30.4	1.3*	12.3	44.1
Ton-Km	4.64	0.33	6.02	10.99
Percent Share (Ton-Km)	42.2	3.0	54.8	100.0
<u>1985</u>				
Tons	33.6	5.5	12.06	51.08
Ton-Km	6.6	1.7	5.7	14.08
Percent Share (Ton-Km)	47.1	12.1	40.7	100.0
<u>2000</u>				
Tons	64.3	13.9	18.56	96.76
Ton-Km	12.5	4.7	7.57	24.8
Percent Share (Ton-Km)	50.4	19.0	30.6	100.0

Source: Consultants' estimates.

* Excludes railway construction materials.

Total tonnages as shown in Table 8.2 indicate only modest growth rates, 2.5 percent per annum for the period 1979-1985 and 4.4 percent per annum for the period 1986-2000. These low rates of growth are largely due to stagnant pipeline transport of crude oil. Excluding pipeline tonnage, corresponding growth rates are 3.4 percent per annum and 4.7 percent per annum respectively. These tonnages for the combined modes of the rail and the road, however, are still misleading. Table 8.3 shows estimated 1979 tonnages and projected 1985 and 2000 tonnages of commodities moved between zones by major commodity groups excluding pipelines.

In terms of total tonnage the commodity group of sand, gravel, and cement blocks is by far the largest in 1979, 43 percent of the total. However, these commodities move only for a short distance, mostly within a traffic zone (Mantika) or among neighboring zones. The amounts shown in Table 8.3 are mostly for those moving among neighboring zones. These movements require little line-haul transport facilities.

As explained in Chapter 4, the production of sand, gravel, and cement blocks in the year 1979 and immediately preceding years was extraordinary. The production tonnages and transport tonnages (although short distance) were far beyond the reasonable range relative to the size of the general construction industry. This phenomenon was probably due to the intensive earthwork throughout the country for highways and railways in addition to the building boom. For 1985 and after, more ordinary amounts of sand, gravel and cement blocks were estimated in line with construction industry estimates.

By the year 2000 total ton-kilometers of non-transit commodity traffic excluding pipelines would grow 3.5 times the 1979 level and the rail mode should capture 27 percent of the total.

8.3 TRANSIT COMMODITY TRAFFIC

Uncertainties concerning the transit traffic through Syria are indeed large. Nevertheless the results of Consultants' analysis presented in Chapter 5 are summarized in Table 8.4. Excluding crude oil, growth rates of 9 percent per annum for the period 1979-1985 and 5 percent per annum for the period 1986-2000 were estimated by the Consultants in terms of total tonnage.

Table 8.3

PRESENT AND PROJECTED COMMODITY TONNAGES MOVED

(in million tons)

	<u>1979</u>		<u>1985</u>		<u>2000</u>
<u>Bulk Commodities</u>					
Sand, Gravel, and Cement Blocks	13.8	(-0.3)	13.5	(4.0)	24.3
Refined Petroleum	4.5	(4.2)	5.7	(5.0)	11.8
Cement and Wheat and Barley	3.2	(6.3)	4.6	(3.9)	8.1
<u>Intermediate Commodities</u>	6.2	(6.3)	8.9	(5.8)	20.8
<u>High-Value Commodities</u>	3.1	(6.5)	4.5	(5.5)	10.1
Phosphate	<u>1.2</u>	<u>(4.6)</u>	<u>1.5</u>	<u>(4.6)</u>	<u>3.0</u>
Total	31.9	(3.4)	39.0	(4.7)	78.2
Total Excluding Sand, Gravel, and Cement Blocks	18.1	(5.9)	25.5	(5.1)	53.9

Source: Consultants' estimates.

Note: Figures in parentheses indicate percentage growth rates per annum for the period between the years.

Table 8.4

PRESENT AND PROJECTED TRANSIT TRAFFIC
(in million tons and in billion ton-kilometers)

	<u>Road</u>	<u>Rail</u>	<u>Pipeline</u>	<u>Total</u>
<u>1979</u>				
Tons	2.93	0.16	7.40	10.49
Ton-Km	1.19	0.02	3.70	4.91
Percent Share (Ton-Km)	24.2	0.4	75.4	100.0
<u>1985</u>				
Tons	4.5	0.7	7.4	12.6
Ton-Km	1.8	0.4	3.7	5.8
Percent Share (Ton-Km)	30.2	6.0	63.8	100.0
<u>2000</u>				
Tons	8.2	2.6	7.4	18.2
Ton-Km	2.9	1.4	3.7	8.0
Percent Share (Ton-Km)	36.4	17.6	46.0	100.0

Source: Consultants' estimates.