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**ASSESSMENT OF INTRAREGIONAL AND INTERREGIONAL TRANSPORT
LINKS AND INFRASTRUCTURES**



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Preface

The present study was prepared within the framework of the 1997-1998 programme of work of the Transport Section of the ESCWA Sectoral Issues and Policies Division. It represents a review of the established transport infrastructure in the ESCWA region, with special attention given to the impact of recent regional and international events, mainly the peace process, on transport infrastructures. The prospects for the increasing role of the private sector in the development of the transport infrastructure are reviewed. However, the study concentrates on the situation in Egypt, which is presented as a case-study.

The study will be submitted as background material for the expert group meeting to be held in the last quarter of 1997 to review this subject.

The study is largely based on reports by Riad Khouri and Abdel Kader Lashine, who worked as consultants and thereby contributed to the present publication. Special thanks are also extended to the Amman office of the Regional Economic Development Working Group for their valuable contribution to the preparation of this study.

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ABBREVIATIONS

BOT	Build, operate, transfer
BOOT	Build, own, operate, transfer
BROT	Build, rent, operate, transfer
EC	European Commission
ECU	European currency unit
EPZ	Export processing zones
EU	European Union
FTZ	Free trade zone
GARBLT	General Authority for Roads, Bridges and Land Transport (in Egypt)
GATS	General Agreement on Trade in Services
GATT	General Agreement on Tariffs and Trade
GCC	Gulf Cooperation Council
GDP	Gross domestic product
INRETS	Institut national de recherche sur les transports et leur sécurité
JRV	Jordan Rift Valley
KM	Kilometres
MENA	Middle East/North Africa
MFN	Most favoured nation
REDWG	Regional Economic Development Working Group
RMF	Road maintenance fund
ROT	Rehabilitate-operate transfer
SEMED	South-east Mediterranean
TEAM	Taba-Eilat-Aqaba-Macro
TEM	Trans-European North-South Motorway
WTO	World Trade Organization

Introduction

It is a well established fact that transport costs can be a significant portion of the total cost of goods. In the industrialized countries, this portion can be approximately 4.4 per cent of the total cost of goods, while in developing countries the portion can be as high as 25 per cent. A major factor in high transport costs is the lack of an integrated transport system that will allow rapid and uninterrupted movement of goods. Efficient transport enhances economic and social development and offers investment opportunities.

The last two decades in particular have seen worldwide changes towards economic globalization. This change in global trade necessitates vast improvements in transport technologies and in communications. A new concept of "hub" has thus emerged in today's transport schemes.

Transport infrastructure is one of the most important elements of the transport system. The quality, adequacy and condition of its infrastructure will determine the quality of functioning of a country's entire transport system. In some cases, infrastructure can be a major constraint on an efficient transport system. However, a well organized and well maintained transport infrastructure, together with other elements, can provide the necessary conditions for an efficient transport system. It is universally recognized that once the infrastructure is developed and set in place, the transport system is capable of fulfilling its role in the economic and social development of a given country and/or region. It is also recognized that the smooth flow of passengers and goods and the ease of movement and travel of individuals across the countries of the ESCWA region requires, in addition to the provision of infrastructure, a complete management system with unified objectives to make efficient use of all available facilities. A successful transport system, therefore, should be responsive to the surrounding economic, social and political environment.

Transport infrastructures play a major role in the development of countries. It is well known that, as the agricultural, industrial and tourism sectors expand, this generates more transport needs, and transport infrastructures are expected to provide the integral link between producers and destinations in these sectors.

Transport infrastructures, however, should not be viewed as a separate entity, but rather should be integrated in an overall policy of sustainable development. Transport infrastructures, whether airports, ports, highways or passenger terminals, are very costly and require intensive manpower and financial resources, not only to build but to maintain. The extension of transport infrastructures is therefore restricted by financial resources. There must therefore be regulatory instruments which will ensure the best possible use of established infrastructures and increase their efficiency. These instruments include regulations dealing with the technical design of the infrastructures, traffic management dealing with intermodal cooperation and maintenance management, market regulations such as those covering the public-private partnership in infrastructure construction, and regulatory instruments dealing with prices and taxes. Transport policies should ensure optimized demand for transport infrastructure. One main tool for this is more efficient management of infrastructure capacities. This is accomplished by many means, including the upgrading of technical innovations, improved maintenance and repair management.

The Middle East has traditionally served as a strategic crossroads for both land and sea transport. The region has the unique advantage of connecting three continents—Asia, Africa and Europe—in addition to two oceans. The region also has an inherent potential to serve as a logistic hub for interregional trade.

There is no doubt that the Middle East peace process is one of the key landmarks in the recent history of the region; such a political process should be perceived and prepared for accordingly. The expected increase in trade and the consequent increased transport demand should be met by providing the needed transport infrastructure. The Middle East peace process will bring about political, economic and cultural changes, the consequences of which will be felt throughout the world, but most notably within the Middle East, and in particular the "core" countries. The core area comprises Egypt, Israel, Jordan and the area governed by the Palestinian Authority. The countries external to the core area that could have an impact,

from the demand point of view, upon the transport network of the core area are the neighbouring countries of Iraq, Lebanon, the Libyan Arab Jamahiriya, Saudi Arabia, the Sudan and the Syrian Arab Republic, as well as these countries' trading partners, namely Bahrain, Kuwait, Qatar, Oman, Turkey, the United Arab Emirates and Yemen.

Improving the capacity and efficiency of transport systems in the ESCWA region is critical for facilitating economic interaction and lowering the costs of trade in the region and with the outside world. Within the ESCWA geographical area, the core parties of the Regional Economic Development Working Group (REDWG)—Egypt, Israel, Jordan and the area governed by the Palestinian Authority—are attempting to cooperate in the development of a subregional transport sector. The economic justification is that there are substantial potential benefits for all concerned to improve the capacity and efficiency of the subregion's transport. The issues, however, are not solely those of providing or upgrading physical infrastructure. Within the Middle East, particularly in the Mashreq subregion (including Egypt, Israel, Jordan, Lebanon, the Syrian Arab Republic and the area governed by the Palestinian Authority) in the south-eastern Mediterranean area, the problems involving political and other relations between Israel and the Arab world—as well as to a lesser extent the relations of the latter (such as Jordanian-Palestinian economic integration and Jordanian-Iraqi transport and trade links)—have an enormous impact on transport issues. The emergence of the World Trade Organization (WTO) and its impact on the existing and proposed major infrastructures is also potentially enormous. However, recent regional developments, including the peace process, have not had a major positive short-run impact on the traffic flows in the region. In addition, so far the WTO has had only limited impact on trade volumes and patterns within the ESCWA member States and between the ESCWA region and other regions. Nevertheless, over the long term, the peace process will redraw the economic and transport map of the Middle East. The opening up of trading links, as well as increased tourism and the generation of further local and international traffic, will place additional strains on the transport system although, since the scope and pace of the peace process have been, and will continue to be, subject to wide variations, it is difficult to formulate precise scenarios in this regard.

Within these scenarios, however, forecasts may be made as to where demand is likely to be concentrated so that new investments can be focused on priority corridors and modes of transportation—road, rail and maritime. In addition, air transport must be taken into consideration. A REDWG Middle East regional transport study is being undertaken and should produce a comprehensive transport model which will estimate the future transport needs of the region. Although focusing primarily on the four REDWG core parties, the model will also estimate likely traffic flows from neighbouring countries. The REDWG study, which will provide estimates of the costs of the various modes of transport, will be used as one of the bases for establishing the necessary infrastructure.

The present study is divided into five chapters. Chapter I describes the established transport infrastructure in the ESCWA region. Chapter II presents a detailed review of regional developments that will have a critical effect on the future and planning of transport infrastructure in the region, including the peace process and the emergence of the World Trade Organization; the transport projects that were submitted to the various regional conferences are also analysed. To analyse closely the effect of these developments, chapter III focuses on Egypt as a case-study and presents in detail an assessment of the country's transport infrastructure projects. Chapter IV covers the various schemes of financing transport infrastructure projects in the ESCWA region. Chapter V presents the conclusions of the study, and summarizes its findings.

I. TRANSPORT INFRASTRUCTURES IN THE ESCWA REGION

INTRODUCTION

The transport infrastructures in the ESCWA region have developed in a continuous but varied manner since the middle of this century. It should be noted that at the time when most of the transport infrastructures were constructed, they were not considered regional links. Rather, the transport infrastructures were built to serve as national links and later as sections of regional links, and not vice versa.

Most of the ESCWA member States have isolated modal networks. The transport infrastructure, in general, is oriented towards roads, which take most of the land transport market, including the market in those countries that operate railways.

A. ROADS

The main objective in an analysis of road infrastructure in the region is to identify the principal shortcomings and required improvements in order to increase trade and facilitate transport. The countries in the ESCWA region have launched a vigorous campaign aimed at constructing roads that will meet the demand rising from the increasing socio-economic needs of the region. The total length of the road network in the ESCWA region increased from approximately 86,000 km of paved road in 1981 to approximately 132,000,000 km in 1995; this represents a very large increase. Table 1 shows the lengths of both paved and unpaved roads in selected ESCWA member countries, and table 2 shows the lengths of paved roads as a percentage of the total area of selected ESCWA member countries.

The increase in the number of paved roads was simultaneously accompanied by a similar increase in the number of vehicles in the ESCWA region. This increase was mainly attributed to the increasing income per capita, especially in the countries in the Gulf region; this can be seen in the ratio of vehicles per capita shown in table 3. The higher ratios, mainly those above 0.30, are comparable with those in the developed countries. Lebanon had a higher ratio than those countries with parallel income per capita, and this is attributed to the relaxed policies regarding importation of vehicles and the prevailing low customs imposed on the purchase of vehicles.

The most important regional roads in Iraq are Baghdad-Mosul-Tel Koteh at the Syrian borders, and Baghdad-Kirkuk-Mosul-Zakho at the Turkish borders. The six-lane 1,264 km international expressway that links Safwan (on the Kuwaiti borders) with the Jordanian and Syrian borders was completed in mid-1990. Studies were prepared on constructing a 525 km road linking Baghdad and Zakho on the Turkish borders; the road will cost an estimated US\$ 4,500 million.

In Jordan, the main regional transit route runs north from Amman to the Syrian borders and south to the Saudi Arabian borders. The northern leg of the route was improved and upgraded in most sections to a four-lane separated highway. A new border terminal at Jabir was completed but is still not open to traffic. This will be a tremendous improvement over the currently used Ramtha border crossing point and the stretch of highway that is a two-lane road passing through a populated area. The section to the south, which connects to Aqaba with branches to the Saudi Arabian border, was considerably improved in the late 1980s, when most of the 330 km highway was upgraded to a four-lane highway. Work is under way to upgrade the last stretch of 33 km at the southern end.

In Bahrain the main land link is with Saudi Arabia. This was made possible after the completion in 1986 of the 25 km causeway which links Bahrain with Saudi Arabia. This land connection is the only land access for Bahrain. It is a four-lane divided highway and has modern border terminals for both countries.

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The number of vehicles crossing this causeway in the first year of operation exceeded 1.3 million. Another major causeway construction was begun in 1993 to connect the capital of Manama to Muharraq.

TABLE 1. LENGTH OF MAIN ROADS IN SELECTED ESCWA MEMBER COUNTRIES
(Thousands of kilometres)

	1991	1992	1993	1994	1995
Bahrain					
Paved	2 010	2 052	2 079	2 101	-
Unpaved	661	688	688	715	-
Total	2 671	2 740	2 767	2 816	-
Egypt					
Paved	37 871	-	38 500	-	44 238
Unpaved	11 332	-	-	-	9 098
Total	49 203	-	-	-	53 336
Jordan					
Paved	4 226	4 470	4 627	4 719	4 844
Unpaved	1 898	1 900	2 051	2 137	2 289
Total	6 124	6 370	6 678	6 856	7 133
Oman					
Paved	5 232	5 621	5 831	6,200	6,529
Unpaved	18 918	20 660	23 371	23,939	24,276
Total	24 150	26 281	29 202	30,139	30,805
Syrian Arab Republic					
Paved	31 806	33 252	34 209	35,377	37,096
Unpaved	2 150	3 003	2 168	2,098	2,237
Total	33 956	36 255	36 377	37,475	39,333
Saudi Arabia					
Paved	31 411	32 129	33 481	-	43,000
Unpaved	83 176	88 913	92 811	-	-
Total	114 587	121 042	126 292	-	-
Yemen					
Paved	4 779	4 920	4 987	5,130	5,220
Unpaved	2 299	2 344	2 794	2,855	3,012
Total	7 078	7 264	7 781	7,985	8,232

Source: Statistical Abstract of the ESCWA Region, sixteenth issue, 1996.

TABLE 2. LENGTH OF ROADS PER SQUARE KILOMETRE IN SELECTED ESCWA MEMBER COUNTRIES

Country	Area in sq km	Length of paved roads	Km paved road/sq km area
Bahrain	695	2235	3.22
Egypt ^{a/}	997,738	44238	0.04
Jordan	91,860	4844	0.05
Oman	212,457	6529	0.03
Syrian Arab Republic	184,050	37096	0.20
Yemen	536,869	5220	0.01

Source: Statistical Abstract of the ESCWA Region, sixteenth issue, 1996.

a/ Replies to ESCWA questionnaire.

TABLE 3. POPULATION OF ESCWA MEMBER COUNTRIES IN 1995 IN COMPARISON WITH NUMBER OF VEHICLES

Country	Population in thousands	Number of vehicles	Vehicles per person
Bahrain	590	153 681	0.26
Egypt	59 230	1 565 039	0.026
Iraq	20 380	1 081 497	0.053
Jordan	5 440	252 955	0.046
Kuwait	1 690	792 116	0.468
Lebanon	3 010	1 282 257	0.426
Oman	2 130	293 510	0.137
Qatar	610	221 575	0.363
Saudi Arabia	18 040	5 802 292	0.321
Syrian Arab Republic	14 190	387 008	0.027
United Arab Emirates	1 911	380 329	0.199
Yemen	15 030	528 746	0.035

Source: *Statistical Abstract of the ESCWA Region*, sixteenth issue, 1996. April 1997.

In Oman, construction of the country's road network increased dramatically, as evidenced by the increase in the total number of paved roads from only 10 km in 1970 to approximately 6,213 km in 1995. With regard to its regional links, Oman has four border links with the United Arab Emirates. The main road is Route No. 5, which connects the capital of Muscat to Seeb, Wajaja, the border point of Hatta and finally to Dubai. This road is a very modern four-lane highway with service and rest areas. The second road is Route No. 7, which is a two-lane highway that starts from Muscat and connects with the United Arab Emirates at the border centre of Breemi. From that point until it reaches Abu Dhabi, it is a four-lane modern highway. Route No. 21 connects the central parts of Oman with the United Arab Emirates; it is a two-lane highway and connects with the United Arab Emirates at the border point of Hafit. The northern parts of Oman are connected with the Emirates through Route No. 3, which has some sections that are unpaved. This route starts from Khasab to the border point of Siwara, passes through extremely mountainous terrain, and will only serve local traffic from the north.

In Saudi Arabia, the road network has undergone large-scale expansion; the total network exceeded 43,000 km of paved roads at the end of the fifth plan. The extensive expenditure on road construction in Saudi Arabia and other Gulf countries is explained by the absence of a reliable railway system and the relatively low cost of fuels, which makes land transport less expensive than other modes.

Qatar has a 105 km road linking the capital of Doha to Salwah at the Saudi Arabian border. This link was completed in 1971. This link continues westward to Jordan from the Saudi Arabian border point of Al Omani. Qatar is connected to the rest of the Gulf States via the road linking it to Abu Dhabi. This link is 418 km long and was constructed by Qatar in conjunction with Abu Dhabi.

In the Syrian Arab Republic, there are well established road links that still need some upgrading. The Syrian Arab Republic is connected with Jordan and Saudi Arabia through a highway that was upgraded in most of its sections to a four-lane highway. This highway extends north to Turkish territory from the Bab al Hawa border point. From that point on, it links with the Trans-European North-South Motorway project (TEM). TEM has become the major highway for Eastern and Mediterranean countries. The construction of the Istanbul-Bosphorus bridge and the bridge over the Golden Horn eliminated a major transport bottleneck

between Europe and Western Asia. To the east, TEM is connected with Iraq at two border points. The first connects Damascus with Baghdad and meets the Iraqi borders near Al Tanaf. The section in the Syrian border is a four-lane highway and extends westward to Beirut. The other link is the road connecting Aleppo to Abu Kamal and Tel-Kojak on the Iraqi borders. It is important to note that there is also a good road network that connects the main Syrian ports on the Mediterranean with the other countries in the region.

The United Arab Emirates is connected by excellent road links with all other Gulf States. There is an east-west connection that connects the United Arab Emirates with Oman at more than one border point, as noted above, and continues west to Qatar and thereafter to Saudi Arabia, Kuwait and through the causeway to Bahrain.

There are many problems concerning the regional road links. Although most road links are physically completed, it is difficult to assume that the present network is functional and serviceable. The following are the major deficiencies in the road transport links.

(a) There are some connections that are not established yet. One connection is between Oman and Yemen; the missing connection between Salalah in Oman and Mukalla in Yemen is under construction. The other road connection connects Egypt with Saudi Arabia near Yanbu. There is a need to construct a causeway similar to that connecting Bahrain with Saudi Arabia.

(b) The regional links suffer from diversified design standards and specifications. The design speed, for example, can vary from 60 km in one section to 120 km in another. The design parameters of the road section are not consistent, and these include the width of lanes, shoulder widths, cross and side slopes and median widths. The diversity of the design standards of the regional links is a major obstacle to the integration of these road networks.

(c) The regional links in many cases pass through densely populated areas, which makes travel more lengthy and interrupted. In some links, where the regional link passes major cities, outer ring roads were built as in Damascus and Riyadh. However, in many cases the regional links are part of the local city and town road network.

(d) The corridors of the regional links are not identified or marked with clear signs. It is very common for travellers, such as those travelling through the regional link between Jordan and Lebanon, to lose their way. The services provided for travellers are in many cases inadequate or are only provided near the residential areas of the link. Some regional links, however, provide high levels of travel service, such as those in the Gulf region, where travellers can find gas stations and car maintenance service, food and medical facilities, telephones and emergency services.

In summary, regional road links still need significant improvement before they reach a level where travel can be considered convenient. Roads should be well marked with signs clearly indicating north-south and east-west links. Signs on these roads should be of similar design and acceptable levels of service should be provided for travellers. Regional links should be constructed to ensure control of access and should bypass residential areas with heavy local traffic. Up-to-date maps with regional numbering should be established and made accessible to all travellers.

B. RAILWAYS

In comparison with other modes of transportation, railways in the ESCWA region have not been highly developed, since they mainly serve national traffic, and little attention has been given to their use as regional links. In the ESCWA region, rail transport does not play the same intermodal role as it does in

developed countries. Most of the railways in operation in the ESCWA region are independent small networks and efforts to link them still remain far from realized.

However, railway transport is bound to play a more effective role in the transport of both goods and passengers in the ESCWA region owing to many factors, including the following:

- (a) Railways have higher capacities than all other modes of traffic and are not affected as much by weather changes;
- (b) Railways are very safe;
- (c) Railways are cost-effective and the cost of transporting by railway per unit weight is less than all other transport modes;
- (d) Railways are environment-friendly.

1. Existing railways in the ESCWA region

Currently only six countries in the ESCWA region have railways: Egypt, Iraq, Jordan, Lebanon, Saudi Arabia and the Syrian Arab Republic. The current length of the railways in the ESCWA region is approximately 11,402 km, of which 10,199 km are standard length and 1,203 km are narrow gauge. The whole rail network is non-electrified. The existing lines for each country are shown in table 4.

TABLE 4. LENGTH OF RAILWAYS IN THE ESCWA REGION

Railway	Distance between tracks	Single track	Dual track	Total length
Hejaz Jordan Railway	Narrow	495	-	495
Aqaba Railway Corporation	Narrow	292	-	292
Saudi Railways Organization	Standard	1 047	318	1 365
General Corporation for Syrian Railways	Standard	1 754	-	1 754
General Railway Corporation for the Syrian - Hejaz line	Narrow	327	-	327
General Corporation for Iraqi Railways	Standard	1 941	104	2 045
National Corporation for Lebanese Railways	Standard	284	-	284
	Narrow	89	-	89
Egyptian National Railways	Standard	3 494	1 215	4 751
Total		9 723	1 637	11 402

In the Syrian Arab Republic, the railway system is comprised of two main lines. The first is the General Establishment for Syrian Railroads, 1,754 kilometres in length, connecting north with the European rail lines through Turkey, south through the ports of the Syrian Arab Republic and Lebanon, and with Iraq at one point in the north-east. Work is ongoing to find another connection with Iraq in the Al Qaim-Abu Kamal region. This railway line is of special interest since it meets international standards for railways and forms the main link within the Syrian Arab Republic by covering most of the region. As for the second line, the General Railway Corporation for the Syrian-Hejaz line, it is comprised of 327 kilometres, of which 120 kilometres make up the line that connects Damascus with Medina. This line has been out of order with extensive damage throughout, except for the part connecting Damascus to Amman which is still partially

operational. The Hejaz line is a narrow-gauge track, which is why it could not be connected to the first line. The second part of the track, which connects Damascus with Beirut, is another connection between the Syrian Arab Republic and Lebanon but with narrow-gauge standards that match the Hejaz line. The first railway line meets with the second at two points; the first point is at the Al Qadem Syrian station and the second point is at the Lebanese station of Riyaq. It is well known that the line that connects to Lebanon is only being used partially within Syrian territory because the railway section in Lebanon is not operational. As for the Hejaz line connecting Damascus with Medina, there are studies under way for reconstructing it to international standards. The Syrian Arab Republic has started work on its territory reaching the Jordanian borders, but no work has started yet inside Jordan or Saudi Arabia.

The General Corporation for Iraqi Railways is comprised of 2,045 kilometres of track and covers the whole region, especially the mineral-rich areas. The only connection for this railway network is the Syrian railway network. The railway is of international standard and is therefore considered to provide a direct connection to Europe through the Syrian Arab Republic and Turkey. As for the existing narrow-gauge tracks in Iraq, they have not been used for some time, except for some vital parts which have been upgraded.

The National Corporation for Lebanese Railways controls the railway network inside Beirut and its outskirts; the network is 415 kilometres in length. This network consists of two lines. The first, which is of international standard, runs along the coast; it connects to the Syrian Arab Republic in the east at two points. The first point is the Alaakari Station, then the city of Homs, connecting to the European network through the Syrian Arab Republic and Turkey. The second connecting point is the line from Riyaq Station in Lebanon to Homs in the Syrian Arab Republic. Another narrow-gauge track connects Beirut to Riyaq Station, at which the standard-gauge track meets with the narrow-gauge track and runs in the direction of the Syrian-Lebanese border at Syrgaia and then on to Damascus, another narrow-gauge connection with the Syrian Arab Republic. This line is comprised of 84 kilometres of track and is not operational owing to extensive damage throughout the network.

The Egyptian National Railways Corporation is responsible for operating the Egyptian railway network, which is comprised of 4,769 kilometres of track. This railway network, despite its age, conforms to international standards and is used extensively in the transportation of goods and passengers. This network none the less is totally isolated from other neighbouring networks. Plans are under way to connect the Egyptian railway network to Morocco upon the construction of a planned coastal railway network in the Libyan Arab Jamahiriya. There are also plans to connect the Egyptian network to the Sudanese network, but owing to the differences in the gauges, a border station will be constructed in order to transfer the goods or passengers from one line to the other. The Egyptian network is divided into two main divisions: the north-south network, which connects Cairo with Aswan and follows through all the way south to the Sudan, and the east-west network, which mainly runs along the coast and the regions around the coastal line, and connects Cairo to Al Salloum. There are also secondary lines connected to the capital that cover the other regions such as the Delta and Suez. In Cairo, the first part of the metro system has been established and work on the second is under way. The railway network, together with the metro system, will be mainly responsible for moving goods and passengers in Egypt.

The Jordanian section of the narrow gauge Hejaz railway runs from the Syrian border, via Amman and Ma'an, to the Saudi Arabian border. A 115-km link to a phosphate export terminal at Aqaba was constructed in the 1970s. Phosphates account for virtually all Jordan's current rail traffic and approximately 3 million tons of phosphates are carried by this railway annually. Serious plans were made to study the feasibility of constructing a 1,000-km railway between Amman and Baghdad in 1989 but were abandoned after the political events in the region. It has been proposed to build a railway to link the main port of Aqaba to the industrial zone at Wadi II and the phosphate mines at el-Shidiya.

The rail infrastructure in Saudi Arabia and the rolling stock are not being utilized to their full capacity. The 580-km dual-track railway between Dammam and Riyadh carries passengers and bulk freight. However, for passengers a new direct 309-km railway was constructed and has reduced the travel time from seven to four hours. This railway connection is vital since containers arriving at Dammam port can be shipped for customs clearance to the dry port in Riyadh. Plans are under way to reconstruct the Hejaz line to standard gauge since it has not been operational for a long time.

2. *Future plans for regional railway links*

Railways will play a major role in the future of the region and will provide the most economic solution for the rising cost and volume of traffic. The main criteria for deciding the location of the future rail links should be as follows:

- (a) The topography of the proposed alignment since there are restrictions on the maximum slopes for railway tracks;
- (b) The expected immediate and projected passenger and freight flows on the proposed link;
- (c) The need to propose links which will use existing lines as much as possible;
- (d) The need for the links to pass as many cities and ports as possible since these are the main traffic generators for the railway;
- (e) The need to consider the links in conjunction with other existing transport infrastructures such as ports, highways, dry ports and airports.

The following are some proposed rail links that meet one or more of the above criteria and are based on proposals dealing with the connection of Arab countries to main rail links. The Middle East and Gulf link consists of 1,700 kilometres of track and will connect the Syrian Arab Republic with Lebanon and Iraq. It will be considered as the main connection between Europe and the Gulf via Turkey as well as the main land connection between the Mediterranean ports of the Syrian Arab Republic, Lebanon on one side and Basrah port on the Gulf on the other side. This link will be important owing to its accessibility to multimodal transport. The Arab Gulf link, consisting of 1,860 kilometres of track, will connect by railway Kuwait and Saudi Arabia as well as the rest of the Gulf Cooperation Council members and end in Muscat. The Arab Peninsula link, consisting of 2,580 kilometres of track, will connect the eastern part of the Arab Peninsula and the western part by railway to Jordan. The Hejaz railway line link, consisting of 1,900 kilometres of track, will connect the Syrian Arab Republic, Lebanon, Jordan and Saudi Arabia. Part of this link is a narrow-gauge track, and there will be some necessary changes in it. The southern Arab Peninsula link, consisting of 4,000 kilometres of track, will connect by railway Muscat, Jeddah and Yemen. The link will branch off to a line connecting to Sana'a. This link will extend along the southern coast from east to west, at which point it will run north along the Red Sea coast to Jeddah.

Standardization of rail gauges and rolling stock is particularly important if the above proposed projects are to be implemented. There is a need to draw up strategies for railway projects, since implementation of these projects requires sizeable budgets. There will also be a need to secure budgets for construction since these projects might not attract the interest of the private sector, except for a very small number of sections where traffic demand is very high.

C. PORTS

Introduction

The ports of the region have experienced periods of varying importance over the years and have not had a fixed role in overall transport activities. In general, the ports of the ESCWA region are on three main bodies of water: the Mediterranean, the Red Sea and the Arab Gulf. The names of the ports in the region are shown in table 5. In general, it can be observed that the ESCWA region has a large number of ports and that every country is served by one or more ports. The area governed by the Palestinian Authority currently has no port; there are studies being conducted in order to build a port at Gaza; however, there are still no indications that it will be constructed in the near future.

The ports of the region are situated along major maritime routes. The ports that are located on the Mediterranean Sea can receive traffic generated from North America and Europe. Traffic originating from the Far East, India and Pakistan can either use the ports which are on the Red Sea or those on the Gulf; these areas are considered the main sources of trade with the ESCWA region. Sea traffic from East Africa and other parts of Africa may opt to use the ports on the Gulf or the Mediterranean.

1. Assessment of the functional performance of ports

Although there are many ports in the region, they still need, in varying degrees, to respond more to the changing trends in the international maritime industry and trade. Some ports, like Jeddah, do not operate at full capacity while others, like Aden, are not yet developed to meet the demand. Owing to their strategic locations, it is envisaged that these ports will play a more active role in such areas as transshipment, container handling, and maintenance centres. Port activities should become more and more integrated in the overall transport chain. These ports should act as one link in the transport chain and not as separate entities. They should respond more positively to international changes such as the use of highly automated cargo container vessels.

The new trend in international trade is to rely heavily on containerization. Container ships are destined to continue to increase their share of the world's shipping fleet and to increase in size. The development of container terminals has made acceptable progress in the ports of the ESCWA region, most notably Dubai, Jeddah in Saudi Arabia and Damietta in Egypt. However, other ports, such as Beirut, Lattakia, Umm Qasr and ports in Yemen, still need to upgrade their container terminal equipment. For ports that are situated far from populated and consumer centres, development of inland container depots should be considered. In the ESCWA region, there is currently only one such depot in Riyadh which receives cargo from Dammam port. Such depots should be constructed to serve ports such as Aqaba in Jordan and Tartous and Lattakia in the Syrian Arab Republic, in addition to some Egyptian ports.

To serve international trade more efficiently and reduce the total cost of transport, the ESCWA member States should seriously consider the development of hub ports transshipping to other ports. From 1992 to 1994, the throughput at key hub ports in the region increased by approximately 30 per cent. These included Dubai, Fujairah and Dammam. The selection of such hubs should be based on extensive feasibility studies which include geographical location with respect mainly to maritime routes, availability for present and future terminal berths, large-volume storage and handling capacities of the ports, navigational factors, availability of feeder vessels, electronic data interchange and information-handling capacities, and other factors. Where cargo has to be transported to other locations by land (for instance from Aqaba) or by air (as in Dubai), the accessibility and proximity of infrastructure is a major consideration. In order for ports to operate transshipment facilities, they should also have free-trade zone status, and the required administrative set-up has to be established to secure this. Dubai port, for instance, receives large shipments that are finally destined for Oman despite the fact that the port of Raysut in Oman is at a shorter navigational

TABLE 5. PORTS IN THE ESCWA REGION

Mediterranean ports										
Egypt	Abu Kir	Abu Zenima	Ain Sukhna	Alexandria	Damietta	Geisum Terminal	Hamrawen	Hurghada		
	Kosseir	Mersa Al Hamra	Mersa Matruh	Nuweiba	Port Said	Ras Budran	Ras Charib	Ras		
Lebanon	Ras Sudr	Safaga	Sidi Kerir	Suez	Adabiya	Suez Canal	Wadi Feiran	Shukheir		
	Beirut	Selaata	Sidon	Sour	Tripoli	Zahrani Terminal		Zeit Bay		
Syrian Arab Republic	Baniyas	Lattakia	Tartous							
Red Sea ports										
Jordan	Aqaba									
Area under the	Mina Gaza									
Palestinian Authority										
Saudi Arabia	Jeddah									
Arab Gulf ports										
Bahrain	Mina Sulman	Sitrah								
Iraq	Basrah	Fao	Khor Al Amaya	Mina Al Bakr	Umm Qasr	Khor Al Zubair				
	Khor Al Mufatta	Kuwait	Mina Abdulla	Mina Al Ahmadi	Mina Saud	Shuaiba				
Oman	Mina Al Fahal	Mina Raysut	Port Sultan	Qaboos						
Qatar	Doha	Halul Island	Messai'eed							
Saudi Arabia	Dammam	Dhuba	Gizan	Jubail	Rabigh	Ras Al Khafji	Ras Al Mishab	Ras Tanura		
	Juaymah Terminal	Yanbu								
United Arab Emirates	Abu Al Bukoosh	Abu Dhabi	Ajman	Arzanah Island	Das Island	Dubai	Fateh Terminal	Fujairah		
	Hamriyah	Jebel Dhanna	Ruwais	Khor Fakkan	Mina Saqr	Mubarek Terminal	Mubarras Island	Sharjah		
	Umm Al Qaiwain	Zirku Island								
Yemen	Aden	Hodeidah	Mokha	Mukalla	Nishtun	Ras Isa Terminal	Saleef			

distance since ships have to pass through the Strait of Hormuz to enter the United Arab Emirates. Nevertheless, cargo intended for Oman is shipped first to ports in the United Arab Emirates and later shipped to Oman through feeder vessels. The candidate ports to now play this role are Dubai in the United Arab Emirates, and Sirwat in Oman, when it is expanded. For the Mediterranean, the ports of Beirut, Tartous, or Lattakia are potential candidates. The port of Aden, if upgraded, is an excellent prospective hub. The port of Aqaba can play a major role in receiving cargoes arriving from the Far East and destined to Iraq and the Syrian Arab Republic. This would be cheaper because no fees would be paid on passage through the Suez Canal. Specialized terminals, in particular industrial and oil terminals, are starting to develop to meet increasing demand for export of industrial products. Examples are the terminal in Aqaba for utilities and Sahar in Oman. There is a potential for some of the region's ports to be further developed if export processing zones (EPZ) are established in association with them.

D. AIRPORTS

The number of airports in the region is ample; these airports serve domestic, regional and international traffic. In fact, in every ESCWA member State there is at least one airport that serves international flights, as indicated in table 6. Some of the airports, especially in the eastern part of the Gulf, are located very close together.

The airports of the ESCWA region should play a more active role as a possible chain in multimodal transport, when air transport can provide a more economical alternative. Dubai, for instance, utilizes air transport from its airport to ship cargo which arrives for the Far East to be transported to its final destination in Europe. Collaborative arrangements between regional airports would be beneficial, as under such arrangements airports located close to each other could be used as joint way stations for international traffic. Such collaboration, for instance between the airports of Amman, Damascus, Beirut and Cairo or between the airports in the eastern part of the region, including King Khaled, Manama, Dubai, Abu Dhabi and Doha, would compensate for the lack of scale economies which impede the possibility of developing any of these airports as a hub.

TABLE 6. ESCWA MAIN INTERNATIONAL AND DOMESTIC AIRPORTS

	Bahrain	Egypt	Jordan	Kuwait	Iraq	Lebanon	Oman	Qatar	Saudi Arabia	Syrian Arab Republic	United Arab Emirates	Yemen
International Airports	Bahrain	Cairo	Queen Alia	Kuwait	Saddam	Beirut	Seeb Salalah	Doha	King Khaled King Abdulaziz Dhahran Madinah	Damascus	Abu Dhabi Al Ain	Sana'a Aden
Domestic airports		Aswan Sharm El Sheikh Alexandria Hurghada Port Said Luxor	Aqaba Marka		Basrah Nineveh				Hofuf Qureit	Aleppo		

II. IMPACT OF THE PEACE PROCESS AND OTHER REGIONAL DEVELOPMENTS ON TRANSPORT INFRASTRUCTURES

INTRODUCTION

The ESCWA region, at the crossroads of three continents, occupies a very important role in world transport and trade activities. Traditionally this region has been subjected to continuous disputes and armed conflicts. There has been little cooperation in the region towards formulating well-integrated and harmonious transport strategies that will utilize the unique and abundant transport facilities available. This lack of coordination has resulted in the construction of separate transport entities that function independently and without regard to being integrated in a multimodal transport chain that can benefit all States in the region. This explains the abundance of roads and airports and the scarcity of railways.

The peace process initiated in the Middle East affects directly the future of traffic flows in the region. It will open previously closed routes, some of the existing routes and originate new ones. The following review focuses on the expected new developments, in particular the work that has been undertaken by REDWG.

Improving the capacity and efficiency of the ESCWA region's transport system is critical in order to facilitate economic interaction and lower the costs of trade in the region and with the outside world. On a subregional level, the core parties of REDWG—Egypt, Israel, Jordan and the area governed by the Palestinian Authority—are attempting to cooperate in the development of transport. Particularly in the Mashreq subregion (including Egypt, Israel, Jordan, Lebanon, the Syrian Arab Republic and the occupied territories), problems of political and other relations between Israel and the Arab world as well as to a lesser extent intra-Arab relations (such as Jordanian-Palestinian economic integration, and Jordanian-Iraqi trade links) have a major impact on transport issues. The emergence of the WTO and its impact on the existing and proposed major infrastructure is also important.

REDWG has helped to define four multimodal transport corridors within the subregion that could constitute the base of a subregional network and an ESCWA region network. The corridor concept is large in scope, and is not linked to specific projects. It is designed to allow planners to decide on investment priorities in an objective and coherent manner. It should also help to ensure that the costs and benefits of regional cooperation in the transport sector can be balanced within a broader and longer-term perspective. This transport network of priority corridors will be developed to facilitate economic interaction and lower the costs of trade both within the region and internationally.

Such a methodology seeks to link the short-term activities which are under way or envisaged with longer-term strategic planning and to articulate more clearly a common and coherent approach to regional economic development and cooperation as a basis for transport planning. Accordingly, it is imperative to locate this strategy within the framework of an agreed understanding of the future role of the region in the world economy. Finally, this methodology should allow for a widening in the scope of cooperation to include all ESCWA member countries, and to ensure cooperation both within the region and throughout the world via the Red Sea and the Mediterranean. For destinations within the European Union, a number of ports, such as Beirut in Lebanon and Lattakia in the Syrian Arab Republic, have a significant effect on the amount of trade handled by the Arab core party seaports. Tariffs on freight being shipped to European destinations from Middle East ports are more competitive than tariffs on freight being shipped in the opposite direction. Tariffs are affected by a number of factors, such as port policies, number of route stopovers and direction of travel, and consequently there is no direct relation between journey distance and tariff. It is possible to obtain completely different tariffs and travel times from different shipping companies; for

example, some companies use a main port to unload/load goods and then distribute them locally by means of coastal shipping while other companies have direct services.

1. *REDWG activities in the transport sector*

For REDWG, the purpose of regional cooperation in transport is to stimulate economic and social development and to reduce regional economic disparities. Such cooperation must be voluntary, with all parties gaining in the process, and transport sector activities are governed by a well-articulated policy framework with all parties obtaining fair reciprocal advantages. No project should be to the disadvantage of any regional party. Regional cooperation in transport should promote integration into global markets and will require the active assistance and full commitment of the international community. Such cooperation requires a gradual approach and careful preparation, and partners may proceed at different paces towards common objectives. Regional institutions and international financial facilities should be used where appropriate to support efforts towards regional cooperation in transport.

Thus, through REDWG, the core parties have agreed to remove the obstacles to a more prominent role for the private sector and to exploit fully their respective advantages by promoting regional trade, facilitating investment, developing infrastructure, and encouraging the free flow of people, goods, services and information on capital within the region.

In developing its regional transport programme, REDWG remains mindful of the following:

- (a) Although effective cooperation is essential between the public and private sectors, it is recognized that private sector financing will need to grow substantially to meet the projected demand for infrastructural investment;
- (b) The countries in the region vary markedly in size, levels of development and resource endowment. It is important to ensure that all partners have a full say in the development of regional initiatives and can benefit from involvement in their implementation;
- (c) Although the improvement of intraregional links is a high priority, an important objective of cooperation must also be to enhance the region's integration into the global economy;
- (d) In developing regional plans and priorities, it is important to keep in mind the future involvement of Lebanon and the Syrian Arab Republic in all aspects of regional cooperation;
- (e) Regional infrastructure should be developed in a manner that allows for the strengthening of links with a wider region, and especially with the countries of North Africa and the Gulf.

These considerations provide a general policy background within which criteria for selection of regional projects could be developed. Such criteria would be based on the premise that improved infrastructure linkages facilitate intraregional exchange of goods and services, thus enabling exploitation of regional complementarities. Thus, an enlarged market, served by this improved infrastructure, will make it possible to exploit economies of scale.

Regional projects should therefore involve more countries; for this reason, greater priority will be given by the REDWG core parties to projects involving the widest possible participation. All this should support rather than pre-empt private sector initiatives, by allowing private businesses to assume their rightful role in transport infrastructure development, ownership and management.

In the new methodology and plan of action for its work in the transport sector, REDWG seeks to link the short-term schemes which are under way or envisaged with longer-term strategic planning, to articulate more clearly a common and coherent approach to regional economic development and cooperation as a basis for transport planning, to locate this strategy within the framework of an agreed understanding of the future role of the region in the world economy, and to allow for a widening in the scope of cooperation to include Lebanon, the Syrian Arab Republic and the countries of the Gulf.

The four REDWG core parties, together with officials from the European Commission, are working to oversee the development of the region's transport networks. In order to plan for the future, they must forecast where demand is likely to be concentrated so that new investments can be focused on priority corridors and modes of transportation. Consultants are conducting the above-mentioned Middle East regional transport study and preparing a comprehensive transport model to include the existing and planned transport networks for the period 1994-2020. Although focusing primarily on the four core parties, the model will also estimate likely traffic flows from neighbouring countries. The most important component of the Middle East regional transport study will be a traffic model developed to include all existing and planned transport networks, using 1994 as a base year and projecting forecasts for the years 2010 and 2020.

2. *Transport corridors*

One of the essential components for developing transport operations in the region would be to improve the existing physical transport infrastructures. In addition, other measures are needed, including easing restrictions, controls and procedures associated with intraregional transportation, in order to improve trade and tourism within the region. The REDWG Transport Strategy Group has therefore identified a number of multimodal transport corridors within the region which constitute the base of the regional network.

This regional transport network of priority corridors will be developed to facilitate economic interaction and lower the costs of trade both within the region and internationally. Initial work has begun to define and develop investment projects in each corridor. This concept is multimodal and large in scope, and is not linked to specific projects. It is designed to allow planners to decide on investment priorities in an objective and coherent manner. It should also help to ensure that the costs and benefits of regional cooperation in the transport sector can be balanced within a broader and more long-term perspective. The isolated discussion of individual projects makes this very difficult to achieve. The following or other multimodal corridors within the subregion could therefore constitute the base of a subregional network and an ESCWA region network:

- (a) A northern "east-west" corridor linking the north of Israel, north of the area under the Palestinian Authority, and the north of Jordan and beyond;
- (b) A coastal corridor along the Mediterranean coast from the Nile Delta, through the area under the Palestinian Authority and by maritime and/or rail links in Israel, to Lebanon and beyond;
- (c) An eastern "north-south" corridor running from Turkey, to Aqaba, through Jordan, with a connection to Israel (Eilat) and Egypt, and beyond;
- (d) An east-west axis corridor linking the urban areas of Egypt, Israel, the area under the Palestinian Authority and Jordan and beyond.

It is imperative to base this strategy within the framework of an agreed understanding of the future role of the region in the world economy. This cannot be viewed as a static strategy but rather as a dynamic one which allows for a widening in the scope of cooperation to include all ESCWA member countries.

Of the four corridors defined above, the basic descriptions of three of them were agreed upon in June 1996. The fourth corridor, which was also accepted in principle, will need further discussion to define more

precisely its substance. The infrastructures considered concern all modes (rail, road, sea and air), and encompass both linkage infrastructures (roads and railways) as well as important terminals (main stations, ports, airports, multimodal freight platforms and multimodal passenger terminals). These nodes are very important in the definition of the corridor, as they are the points where different types of traffic can interconnect and interchange.

There are non-infrastructureal problems that are of two types: issues that could improve transport in the corridor, and to which a solution does not imply infrastructureal projects but harmonization and facilitation; and issues that will not be solved by transport measures.

(a) *The northern (east-west) corridor*

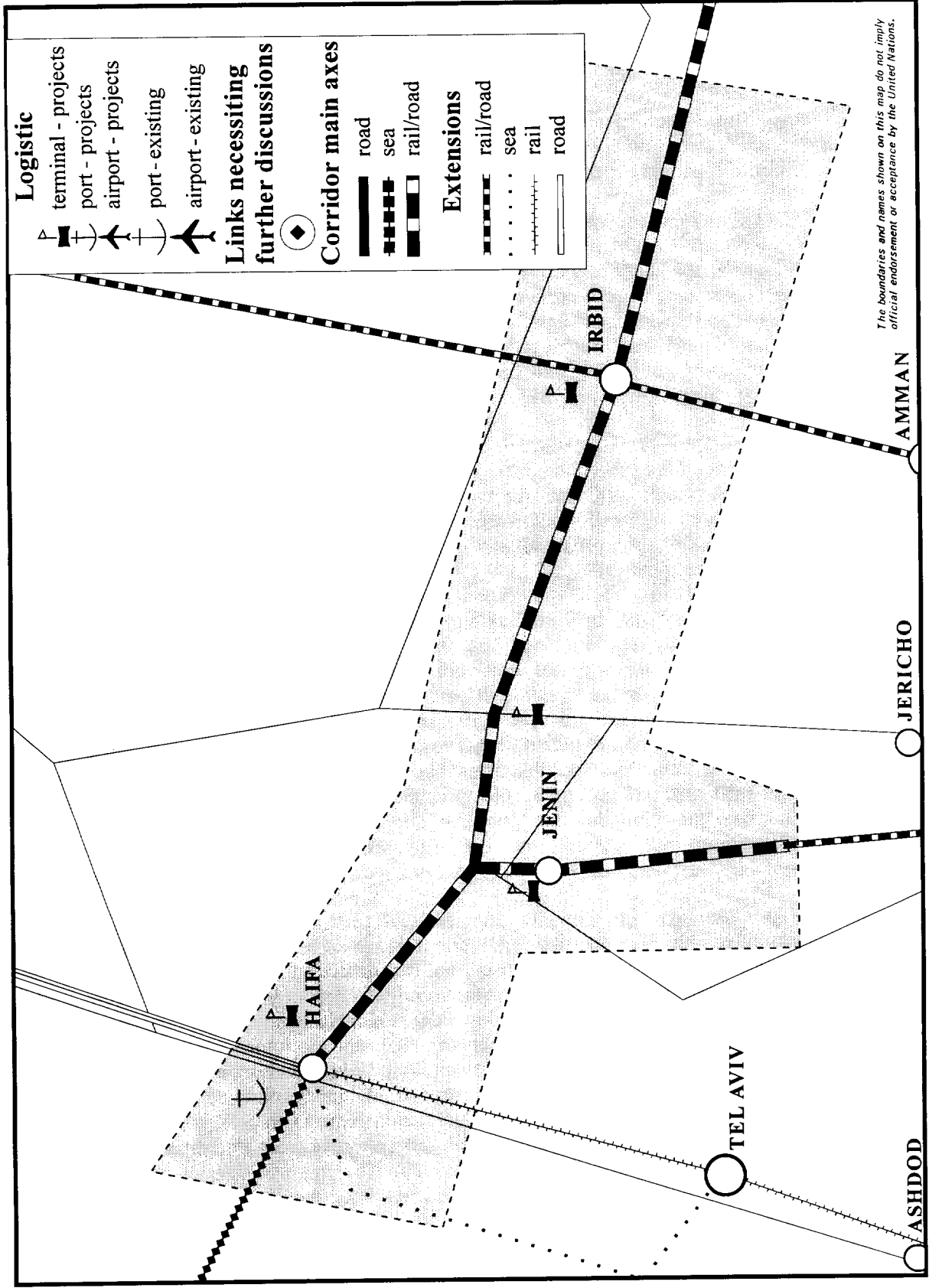
This corridor is in the northern part of the area and links the north of Israel, the north of the area under the Palestinian Authority, and the north of Jordan and beyond, as shown in figure I. The corridor is an international and transit corridor for freight. It brings a Mediterranean access to the northern parts of the West Bank and Jordan. It will also provide a Mediterranean access for freight coming from further east. Thus it can be seen as both enlarging and improving the Haifa port hinterland, and as providing a Mediterranean access to inland Jordan and West Bank production areas.

This corridor has also an important role to play in regional and bilateral transport between the northern parts of Jordan, the West Bank and Israel. Relations between these dynamic economic areas should increase significantly in the future. The corridor also bears national traffic between the Jordan Rift Valley and the Irbid heights, between the Israeli coastal area and the Jordan Valley, and in the northern part of the West Bank. There are important population areas on the Israeli coast, in the West Bank, and around Irbid, which could generate important flows.

Depending on the way tourism will develop, tourist flows can become important in the above corridor, but the focus is not yet on these flows. The terrain in the passage from the Rift Valley to Irbid remains too steep to allow the construction of major infrastructures. Further, Lake Tiberias and the Golan Heights form a natural barrier along the corridor. Risks to nature and tourist sites are mainly related to the Lake Tiberias area. The western part of the corridor is heavily populated and the implementation of new projects could prove difficult. A main function of this corridor is to open all the northern part of the region to a Mediterranean access. It has a natural sea extension westward at Haifa. It is also opened eastward towards Iraq through road connections, and a railway connection may be the eventual option. Upon the conclusion of a just, lasting and comprehensive regional peace, the issue of competition from a future corridor linking Beirut to Damascus, and a corridor from Lattakia to Baghdad for Asia-Mediterranean sea transit, should be considered.

The main axis of the corridor links Haifa to Irbid. The corridor is a multimodal (rail-road-sea) corridor, and all options remain open for study. A first option would be to have a road and rail corridor all along the axis. The ancient tracks could be followed, but it is difficult to link the Yarmuk valley with the Irbid heights. An engineering study for the alignment of a railway between Irbid and the Jordan Valley was recently carried out, and concluded that a direct alignment is technically possible, in spite of the difficult terrain. Another option could consist of a rail axis between Haifa and the Jordan Valley and a road axis from the Jordan Valley to Irbid, with the construction of a multimodal terminal around north Shouna. In both cases, large-scale upgrading or new infrastructures are needed. A branch of the corridor consists of the link of the main axis with the northern part of the West Bank, from Jenin to Nablus, with the possibility of an extension to Ramallah and Jerusalem. This branch will first be a road axis, with an important multimodal terminal linking it to the main axis.

Figure 1. Corridor No. 1—northern east-west corridor



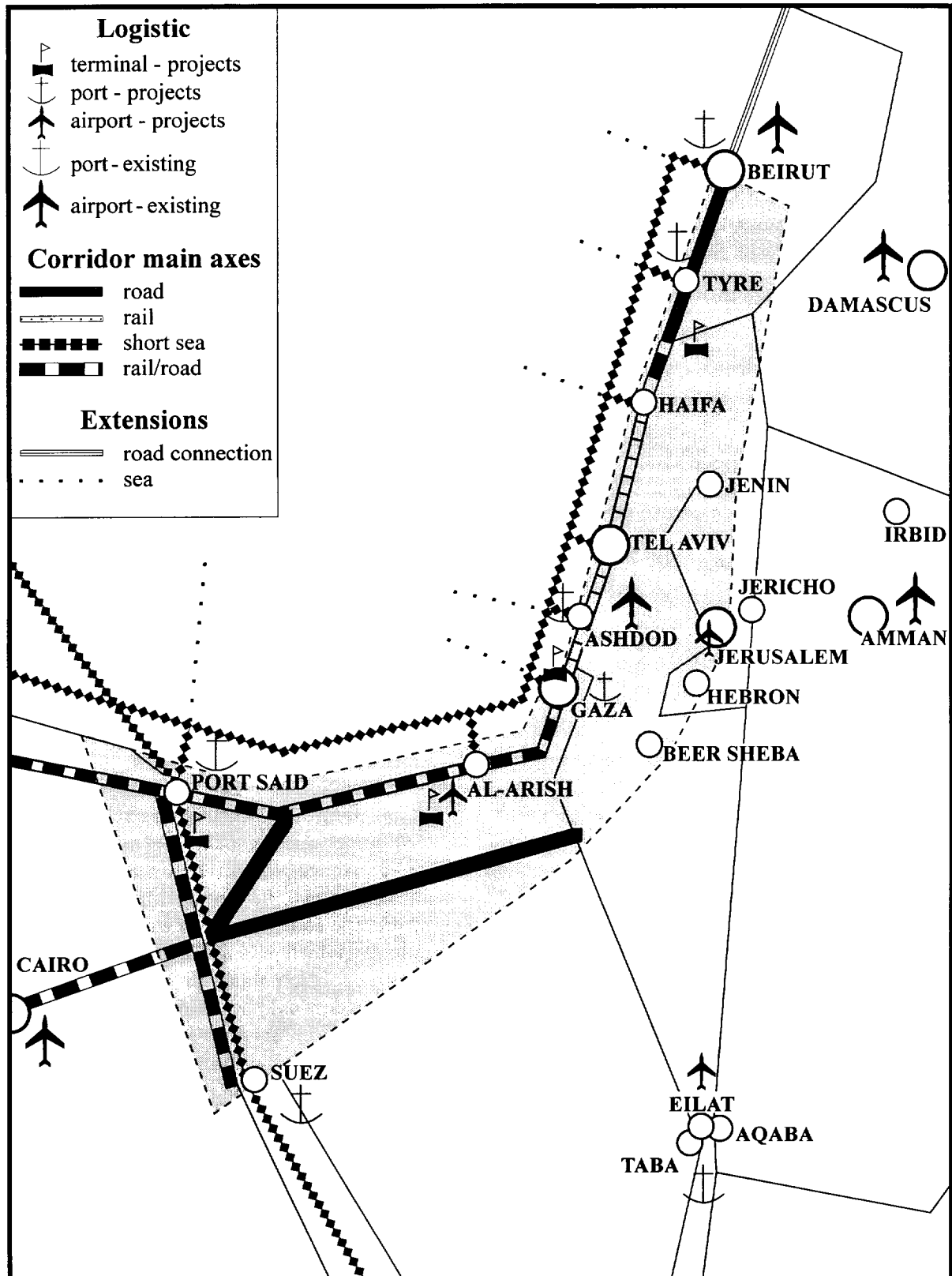
Large-scale upgrading or new infrastructure is needed on all this branch. On a long-term basis, this branch could be multimodal, with a railroad connection from Afula in Israel to the centre of the West Bank. One of the key elements of the corridor is Haifa port, which should be the location for a multimodal terminal. No airports of importance are located in the area, but connections through the coastal corridor, or the north-south corridor link the area with the main airports of the axis corridor (Tel Aviv, Amman). In this multimodal corridor, transport terminals and logistic operations are of particular importance as they are interfaces between different scales and different axes. The first terminal is Haifa, which would handle the operation of transshipment at the port and local dispatching of long distance flows in the city (rail-road-sea). The second terminal is Jenin in the West Bank, linking the two branches of the corridor, in addition to local dispatching of long distance flows in the West Bank (rail-road). This should be located at the border between Afula and Jenin, on the site of the joint industrial zone which was agreed upon in the peace treaties. The North Shouna terminal will serve as a transport facility and for rail-road transshipment and local dispatching in the Jordan Valley (rail-road). The Irbid terminal will provide local dispatching of long distance flows, and serve as a node between main north-south and east-west flows (road or rail-road).

However, if four terminals are established, the small length of the corridor (200 km) might mean that it would not be efficient; further studies are needed on this subject. One solution could be to make each terminal specialized. From this approach, the nature of a terminal in North Shouna could be determined. Present obstacles within this corridor, not linked to infrastructure, include the densely populated areas, which sometimes pose problems with regard to finding sites for new infrastructure (Haifa, for example), as well as local traffic, with congestion and pollution (such as that around Haifa), problems of harmonization and facilitation, and trade regulations. Major impediments to the success of this corridor are the great discrepancies between populations (cultural and economic), which could mean a very broad diversity of transport users whose needs and means are different. In particular, this has to be taken into account in considering private financing for projects.

(b) *The coastal corridor*

This corridor runs along the Mediterranean coast, from the Nile Delta, through the area under the Palestinian Authority, and by maritime and/or rail links in Israel to Lebanon and beyond, as shown in figure II. This corridor is the historic first natural axis to go round the Mediterranean Sea. Its main role today and in the near future, however, is to provide national and regional connections between adjacent areas. For freight, this corridor can play an important role in regional relations between Egypt and the other core parties, and in transit between Egypt and Asia. It is also the axis for international relations between the Middle East and Africa. In the northern part of this corridor, the transit function may be less obvious, as the corridor crosses heavily inhabited areas. For north-south transit (from Europe and Turkey, down to the Aqaba Gulf or Africa), the main axis will remain the eastern north-south corridor, which passes through semi-desert areas, on flat terrain. Furthermore, the topography and the density of population along the coast in Israel and in Lebanon should help to divert transit to the east. Mostly bilateral traffic would be involved for ground modes along this corridor, with short-sea shipping a possible alternative. If this corridor is to carry some transit traffic, it would be by train to avoid overloading the busy road network. For short and medium distances, the potential for this corridor is very important, as it serves the traffic between Gaza and the Israeli coast, as well as between Gaza and Egypt, and improves the link between the Sinai coast and Egypt's mainland. The corridor can serve for long-distance passenger trips between the Nile Valley, Gaza and Israel, and further north, for passengers using trains. This corridor is very important for medium-distance trips for passengers, all along the coast, mainly for linking the main cities located between Al Arish in Egypt and Haifa in Israel (or even Beirut), through train and short-sea shipping. It can also serve as a route to carry passengers, which would help the development of the Sinai coast.

Figure II. Corridor No. 2—coastal corridor



The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

This corridor could be the backbone for the development of Mediterranean coast tourism in the area. With good connections with the two east-west corridors, it is possible to combine sea tourism and historical tourism in the heights eastward. The topography relief does not seem to pose major difficulties in this corridor. The Suez Canal is an obstacle at the western end of the corridor which should be overcome by bridges, which are under construction. In the northern part of the corridor, in Lebanon, the terrain is more difficult.

The demographic situation is a study in contrasts. At the western end (Nile Delta), the corridor reaches heavily populated areas. In the corridor's southern part (Sinai), there are no major population centres, and no big obstacles to new projects. However, in most of the central and northern part (Gaza, Israel and part of Lebanon), the area is very densely inhabited, and there is not much land for new projects. Heavy industry is not common in this area, but light industry will continue to develop and further expand. Some important agricultural land can be found in Gaza and in the Nile Delta, making the area of available land there even more scarce and new infrastructural projects more difficult. Consideration should be given to avoid polluting natural sites (such as beaches) and the rest of the environment, as the region has a strong potential for tourism, and is already marred by congestion and density of construction.

This corridor has several extensions westward, using the main ports of the area. It also has important eastward connections through the two east-west corridors. It can be prolonged northward to Lebanon and the northern part of the Syrian Arab Republic, though for long distance and transit the eastern north-south corridor will be used. It also opens up to important areas of Egypt (such as the Delta).

The corridor is a typical multimodal axis. A first mode is short-sea shipping, including possible feeding lines between small and major ports which could be developed all along the coast from Alexandria to Beirut, with services used by all the ports of the area, including Sinai, Gaza, Ashdod, Tel Aviv, Haifa and Tyre. The possibilities for passenger transport (with high-speed vessels) can also be explored. In parallel to short-sea shipping, there is a need for inland transportation. The route will run along the coast in the Sinai, with two branches westward: one road to Cairo, the other rail/road to the Delta. These roads already exist, but some parts need to be upgraded, as does the Suez crossing. Two parallel roads in Sinai (coastal and Ismailia [Egypt]-Nizzana [Israel]) are part of the corridor, the southern one being more specialized for freight. This will traverse the Gaza Strip as a rail/road axis (which needs upgrading or rebuilding) up to the Erez crossing point in Israel, with a road prolonging it towards the West Bank. From the northern limit of the Gaza Strip, the corridor is a railway axis up to Haifa (with improvement of the existing lines). North of Haifa, up to Beirut, the axis will be mainly a road axis, which needs considerable improvement in the south of Lebanon, with the possibility for rail service not excluded.

There are three main airports in the corridor: Tel Aviv, Cairo and the future Gaza airport. The port infrastructure is of great importance for this corridor. The ground network will need to be adequately linked to the main ports of the area, which can provide short-sea shipping for both passengers and freight.

Multimodal terminals will be very important in this multimodal corridor. Most of these terminals are also part of other corridors (coastal and north-south) as they are interfaces between different scales and different axes. Two important terminals are also parts of the axis east-west corridor. These are the multimodal facilities at the Egyptian border (near Rafah) and at the Erez crossing point, where the rail/road operation between Israeli trains and the Gaza road system needs to be more efficient. Other multimodal facilities could be located near Port Said, in a link with the Suez Canal. A last transborder terminal could be located at the Lebanese border.

A multimodal infrastructure of passenger terminals (airport, railway stations, bus stations) could be developed in this corridor, with harmonized terms of reference (security, reservations system, level of service

in line with domestic airlines) in order to link efficiently by public transport the main passenger traffic nodes of the corridor, such as city centres, airports and other main activity centres. Short-sea shipping ports should be part of this system. This would link by public transport the very large urban centres of Egypt (Cairo, the Delta) with the main cities along the coast, with the possibility of extension to the main cities of the axis east-west corridor. The focus should be put on intermodal (rail/road/short-sea) passenger terminals (in particular between the Israeli railway system and the Gaza and Egyptian road system).

Present obstacles within this corridor not linked to infrastructure include the presence of dense areas with little space to accommodate new infrastructure, especially in Gaza. There is also a lack of a comprehensive Mediterranean port scheme, and an institutional framework for regional services (in particular short-sea shipping), in addition to security matters.

(c) *The north-south corridor*

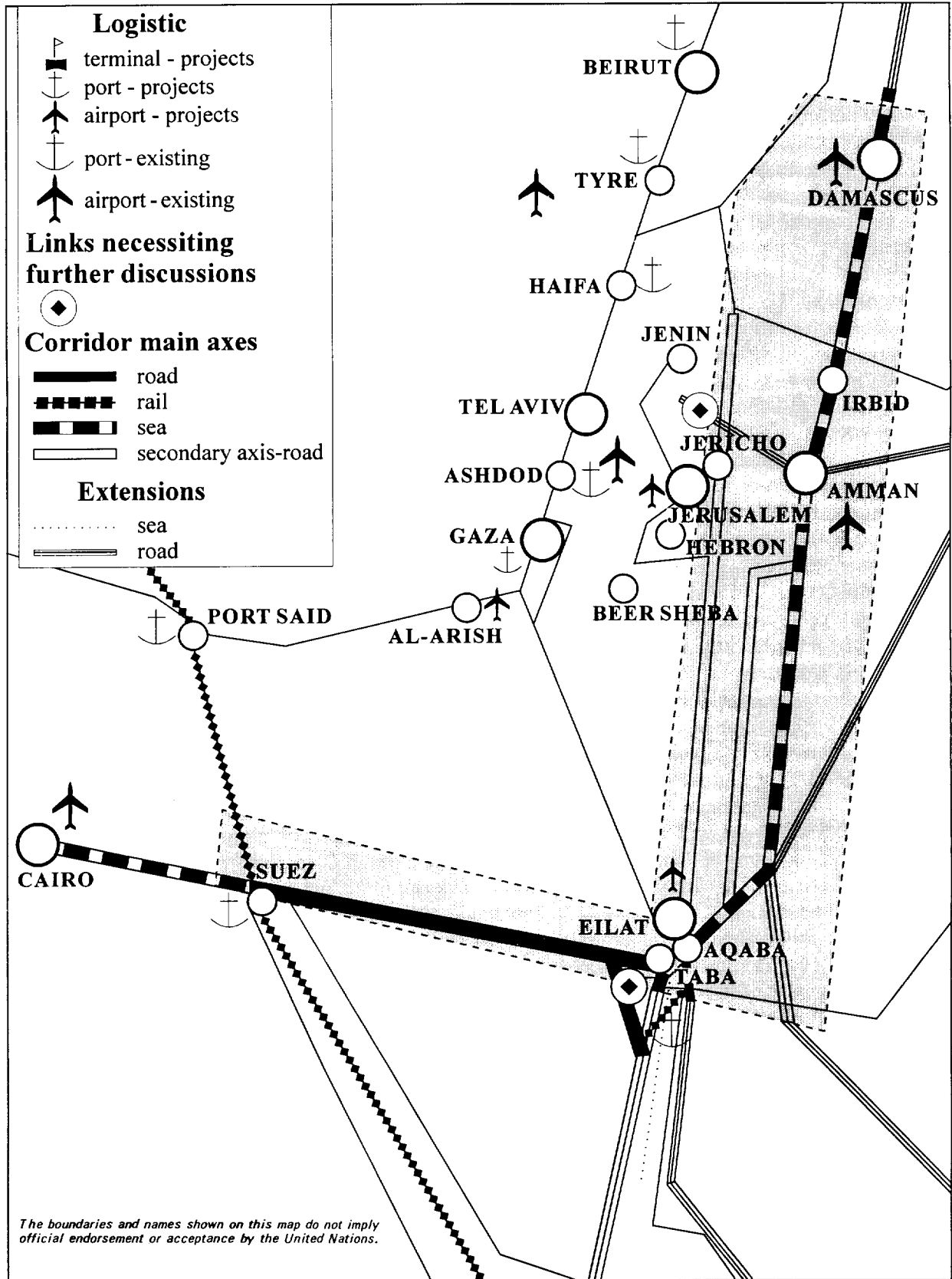
This corridor is shown in figure III. Its main function is to serve north-south transit, mainly from Turkey or Europe toward the Aqaba Gulf and further south to the Arabian Peninsula. This transit also includes an important eastward extension to Asian traffic (historically Iraq-Aqaba). Westward, it is linked to the southern part of the coastal corridor for potential important African-Asian traffic. In its most southern part, it can also serve traffic between Africa, Egypt and the Arabian Peninsula. This transit activity already exists, and the flows are considerable.

In addition to pure transit, the north-south corridor is an important artery for international traffic, linking the core parties and the Syrian Arab Republic with countries north (Turkey and European countries) and south (Arabian Peninsula). For all bus and car long-distance passenger traffic, this corridor is important for flows between the north and the south of the Middle East, mainly Turkey, the Syrian Arab Republic, Jordan, Egypt and the Arabian Peninsula. With its connections, it should also ensure the links of these areas with Israel, the West Bank and Gaza (especially between the Arabian Peninsula and the area under the Palestinian Authority). With improvement in the quality of the connections, this corridor could see important flows between the Amman and Damascus areas, with a prong towards Beirut.

This corridor serves five main tourist areas: the Aqaba Gulf and the Red Sea, the Jordan Rift Valley and its heights (from the Dead Sea to Wadi Rum), the Tiberias area, the Roman ruins north of Amman, and the historical sites in the Syrian Arab Republic. It is also linked with the biblical sites of Palestine. Thus, the provision of excellent conditions of service on this corridor will be of major importance for the development of Middle East tourism. It is also a major corridor for Muslim religious tourism (towards Mecca) and can bear important north-south traffic from Turkey, Iraq, the Syrian Arab Republic, Jordan to Arabia, as well as east-west traffic from northern Africa and Egypt to Arabia.

The major topographic relief in this corridor runs north-south, parallel to the main axis of the corridor. Some areas in the south can present difficulties. For example, the Gulf of Aqaba is surrounded by high and steep hills, and the Gulf and the main desert ground are separated by difficult terrain. The main problems within this corridor are the east-west links between the Desert and the Rift Valley. In the north, the terrain is more difficult around and north of Amman. Most of the area is not densely populated, and the main arteries run mostly in the desert. The areas that could cause problems are the Amman and Damascus areas. The northern Jordan Rift Valley is also relatively densely populated, with many villages.

Figure III. Corridor No. 3—north-south corridor



With regard to heavy industry, there are some important mining sites in the southern part of the corridor and at Aqaba port. Important agricultural lands are located in the northern Jordan Rift, and in part of the highlands between the desert and the Rift. Owing to the small size of the good agricultural lands, it will be difficult to find available ground for infrastructures in the northern Jordan Valley. As noted, this corridor encompasses major tourist sites, which will need good transport connections, but for which great care is needed in order not to damage historical sites. Thus, the impact of new projects on the Dead Sea area, the Aqaba Gulf, Wadi Rum, or the King's Highway will need to be cautiously analysed before launching construction projects which could harm these sites. Particular focus should be on the Aqaba Gulf, where already both industrial and tourism developments coexist in a narrow area.

This corridor has access to the Mediterranean Sea through a Beirut-Damascus extension. The corridor is also prolonged northward (the Syrian Arab Republic, Turkey, Europe), eastward around Amman or from Ma'an (Iraq, Asia), southward (Aqaba and Red Sea, Arabian Peninsula), and westward (Egypt, Africa). A small extension of the corridor prolongs it along the Aqaba Gulf up to Sharm el Sheikh, serving tourist stations. This corridor is mainly a road and rail corridor with some multimodal aspects, even if the rail part is not operated efficiently all along the corridor; there is an important volume of road traffic. The basic axis runs mostly in the desert from Damascus to Amman, Ma'an and the Gulf of Aqaba. This axis is mainly a road axis, having as a core the Desert Highway in Jordan. A rail connection exists, linking Jordanian desert mining activities to the Aqaba port. Other rail connections are in poor shape. The Syrian-Jordanian border crossing at Jaber is a new and modern facility that does not require any major improvement. The Syrian road axis needs major improvements. For local and tourism traffic, two parallel roads should be included in the corridor: one on the heights (including such historical landmarks as Petra, the King's Highway and Jerash), and the other in the Jordan Rift (Tiberias, Dead Sea, Aqaba) also serving mining activities around the Dead Sea. The roads are already constructed (they are sometimes duplicated on both sides of the valley) but need improvement. On the Jordan side, the North Shouna-South Shouna section can also be used for freight. The axis has a branch continuing towards Saudi Arabia (road, and possibly rail in the long term). Another branch links the Aqaba area to Suez and further to Cairo and the Delta. This is a road link which will need upgrading. For this east-west axis, two arteries in the Aqaba Gulf are possible: the Ring Road or the ferry connections already in operation.

One of the important points of this corridor is the Aqaba Gulf ports, which provide access to the Red Sea and the Indian Ocean for northern and eastern countries (as is already the case). The port complex also encompasses the facilities for east-west ferries. The port connections with the road and rail system need to be carefully analysed to link with the tourism development of the Gulf. Two main international airports are located in the corridor, one in Amman (Queen Alia) and the other in Damascus. Another important airport is the Amman Civil Airport. Small airports exist in Aqaba and Eilat, and a project for a common airport is under consideration. Another project for an Egyptian airport in Ras El Naqab also exists (some work on it has already been done), and coordination of the airport facilities in the Aqaba Gulf area is needed. For the efficiency of the corridor, good multimodal terminal infrastructure is needed. Most of these terminals are also part of other corridors (coastal and north-south) as they are interfaces between different scales and different axes. A good rail-road port terminal is needed for the operations of the Aqaba port. Other terminals (rail-road terminals) will be needed at the connections with the east-west corridors around Amman and Irbid. The conditions for a transport terminal between Jordan and the Syrian Arab Republic are linked with the Irbid platform. The platform in Amman could serve for local dispatching, as well as for connecting east-west and north-south flows.

More study has to be undertaken with regard to the road infrastructure in the Jordan Rift Valley, the Aqaba Ring Road and the connected ferry services, and also with regard to the Aqaba-Eilat-Ras El Naqab airports and the central north-south railroad in Jordan.

There is strong potential for bilateral and regional traffic between the important, populated cities in this corridor, some of them very close to each other, and this is the main issue. The cities are located very close together, even if there are constraints because of the terrain (in particular in the Jordan Rift Valley). Without any barriers, this could generate very heavy traffic flows and consequently this area could become a very large metropolis (as a network of urban centres). However, the speed for realizing this potential will depend on the relations between the core parties. Many barriers are linked to security matters, economic differences, social and cultural differences, or institutional problems, such as control systems and harmonization of regulations; these should slowly decrease. However, the rate of decrease and the equilibrium to be achieved are more of a political issue. These barriers will decrease differently according to the type of populations concerned. Populations with more cultural differences will maintain strong border controls. For instance, one can expect a rapid increase of Palestinians crossing Jordan both ways, while the number of crossings of Israelis into Jordan will remain rather low at first. This potential for short and medium distance traffic concerns both freight and passenger transport. The primary role of this corridor should not be for transit. The whole area will be an important traffic pole, and traffic to and from it will be heavy. However, transit traffic in areas that will have important local and regional flows in urban or semi-urban contexts might not prove desirable. Nevertheless, the corridor will bear some transit traffic owing to its location, mainly between Africa and the Jordanian heights (north-south corridor). Thus, alternative transit routes within the corridor will have to be identified. Owing to the difficult terrain, the number of possibilities will be low for this alternative, one being through the King Abdullah Bridge. North-south transit can also go by train along the coast, as part of the traffic of the coastal corridor. International flows to and from the area will be important. Flows to and from the core of this corridor (Amman, West Bank, Jerusalem, Tel Aviv, Gaza, Al Arish) will have to be efficiently channelled. The international infrastructures will serve also the rest of the region (airports and ports). One of the key points will be to organize the transport system in the corridor so that these flows entering the region through these nodes can be diverted from the central areas efficiently.

There is a high potential for very important historical and religious tourism, in particular in Jerusalem. The areas of significant interest are mostly linked with urban centres. Tourism areas with lower potential include the north of the Dead Sea and the Mediterranean beaches. The risks to natural and tourist zones caused by new infrastructures needs to be evaluated. The terrain is difficult and mountainous, and the Jordan Rift Valley represents an obstacle to east-west links (between Jordan and the rest of the area). The corridor is heavily populated, with big urban centres and densely inhabited agricultural zones. Ground for new infrastructure is scarce, and its cost could be very high.

(d) *The east-west axis corridor*

This corridor links the urban areas of Egypt, Israel, the area under the Palestinian Authority, and Jordan. The most important aspect of this corridor is its potential to carry heavy two-way and regional traffic to the area's important, populated cities. The cities in this area are very close to each other, even though there are terrain constraints (in particular the Jordan Rift Valley). Without any barriers, this could mean heavy flows and the area could become a very large metropolis (as a network of urban centres). Thus potential for traffic is high. However, the speed with which this potential is realized will depend on the evolution of the relations between the core parties. Many barriers, linked to security matters, economic differences, social and cultural differences, or more institutional issues such as control systems and harmonization of regulation, should slowly be lifted, but the rate of this lifting of barriers and the balance to be achieved are political issues. These barriers will be lifted at different rates of speed, according to the type of populations concerned.

Owing to the difficult terrain, the number of possible routes will be low for this corridor, one being through the King Abdullah Bridge. North-south transit can also be by train along the coast, as part of the

traffic of the coastal corridor. International flows to and from the area will be important. Flows to and from the core of this corridor (Amman, West Bank, Jerusalem, Tel Aviv, Gaza, Al Arish) will have to be efficiently channelled. The international infrastructures, including ports and airports, will also serve the rest of the region. One of the key points will be to organize the transport system in the corridor so that flows entering the region through these nodes can be diverted from the central areas efficiently.

As noted, this corridor is potentially very important for cultural and religious tourism. The areas of significant interest are mostly linked with urban centres. Tourism areas with lower potential include the north of the Dead Sea and the Mediterranean beaches. The terrain is difficult and mountainous, and the Jordan Valley represents a strong obstacle to east-west links (between Jordan and the rest of the area). The corridor is heavily populated, with big urban centres and densely inhabited agricultural zones. Ground for new infrastructure is scarce, and could be very costly. No heavy industry exists, except at the edge (mines around the Dead Sea), and potentially in the main ports (Ashdod and Gaza). There is an important agricultural zone between the populated areas. The risks to natural and tourist zones owing to new infrastructure needs to be evaluated.

This corridor is prolonged south-westward (Cairo, Nile Valley) by the coastal corridor. Towards the northern part of the coast (Haifa, Beirut) the coastal corridor also makes possible train and short-sea shipping connections. It is connected to the eastern north-south corridor around Amman. This allows connections to the north (Irbid, Damascus) as well as the Gulf of Aqaba and the Arabian Peninsula. This corridor is opened to the Mediterranean Sea through important port opportunities (Ashdod, Gaza). A second connection links the centre of the corridor to the northern part of the West Bank. It is also opened eastward to Asia for international transport by road between the area of the corridor and Asia.

The network of the corridor should achieve two purposes. First, it should ensure efficient connections between the urban centres of the corridor. Secondly, it must organize efficient connections between the international nodes and the other corridors. For instance, the airports (Amman and Tel Aviv, and later Gaza) could be linked to the main inland infrastructure, and traffic not aimed at the corridor itself could be diverted from the central areas. The eastern part of the corridor links Amman and Jerusalem. Owing to the topography, it should be mainly a road infrastructure. Part of the route has already been built as a highway in Jordan. For the crossing of the valley, no suitable infrastructure is yet in place. One axis links Jerusalem with Tel Aviv. It could be a road or rail-road axis (or both). Infrastructures already partly exist. One axis links Jerusalem to the south of the West Bank. This axis should first be a road axis. The quality of the existing roads is bad, and should be upgraded to link the main southern cities of the West Bank to the main cities of the corridor. The route then links Gaza to the West Bank. From Gaza, the route goes southward to the Egyptian border and Al Arish. Possibilities for both rail and road modes are to be studied. In both cases, improvement of the existing network is needed. A last axis links Gaza to Tel Aviv. Possibilities of rail and road modes are to be studied, bearing in mind the effect of additional road traffic on the area which will result in further congestion and pollution. A road mode would be dedicated to short distance trips in this part (between Gaza, Ashdod, Ashkelon and Tel Aviv) while longer distance trips should use other modes (short-sea shipping, train) as described in section (b) above on the coastal corridor.

An alternative route for transit in the area needs to be identified, possibly through the King Abdullah Bridge, linking the south of the Gaza Strip with Beersheba and Amman. Transit between the Mediterranean Sea and eastern countries should be encouraged to use the northern east-west corridor. The area includes two important established or future ports (Gaza and Ashdod) and several large international airports. The port of Gaza will have to be linked to the rail-road system of the corridor, in order to be fully opened to its hinterland in the corridor to avoid the densest areas. The link of the port of Ashdod with the inland network will depend on the choices made regarding the Gaza-Tel Aviv branch (rail, road, both), but should follow the same principles. Amman's Queen Alia International Airport is linked to the corridor through the existing

Jordanian highways. The Tel Aviv international airport (Ben Gurion Airport) should also be directly linked to the corridor (as it already is by road and, possibly, by rail). Other airport possibilities which need to be further discussed (such as Jerusalem or Gaza) should also be linked directly to the corridor's main infrastructures. Owing to the difficult terrain, the number and the function of each airport will need to be reviewed, in order to avoid over capacities and over competition. The linkage should also enable easy diversion of traffic not aimed at the urban centres of the corridor.

Strategic platforms will be needed in this corridor. A first set of terminals will consist of local ones mainly dedicated to attracting the long distance traffic of each large city and dispatching it to the local destinations. These platforms will be needed for each main city, should be located near the main routes of the corridor, and should be multimodal wherever necessary. Other very important platforms should be located in several places along the corridor. Most of these terminals are also parts of other corridors (coastal and north-south) as they are interfaces between different scales and axes. These include a multimodal (rail-road) terminal at the Egyptian border at Rafah, for the long distance traffic to and from the Gaza Strip. This should ensure the dispatching of long distance traffic, and improved customs facilities. This platform could also be used as a node point for transit between Egypt and Africa on one side and east and north on the other, and would make it possible for traffic not destined for the corridor to bypass it. Another multimodal (rail-road-sea) terminal is at Gaza port. This logistic terminal could also be associated with an industrial development in the port area. It could also be linked to a transborder terminal between the Gaza Strip and Israel (or even a transborder activity zone). The proposed multimodal (rail-road) terminal around the Jerusalem area should be linked to the three branches of the corridor, as well as to the road extension to the northern part of the West Bank. Finally a multimodal (rail-road) terminal around Amman will be the interface with the eastern north-south corridor for servicing the main urban areas of the corridor.

A multimodal infrastructure of passenger terminals (seaports, airports, railway stations, bus stations) could also be developed in this corridor, with harmonized terms of reference (including security, booking system, level of service), in order to link efficiently by public transport the main passenger traffic nodes of the corridor (city centres, airports, main activity centres). The basic reasons for such a multimodal public transport system are manifold. They include the existence of high population densities (with resulting dense flows and risks of congestion); the difficulty of building a railway system everywhere owing to the topography; and the presence of many borders, which means there is a need for harmonization and a high level of security.

Four main areas will need further discussions between some or all of the core parties before the successful completion of this corridor. These include the link between Gaza and the West Bank, the east-west transit route, the passage around Jerusalem, and finally the possibility of developing an airport in Jerusalem. In addition, many of the projects and routes in the corridor depend on the outcome of bilateral negotiations. Therefore, technical adjustments will be made according to the results of these negotiations.

(e) *Corridor interrelations*

Although each corridor can be considered a separate entity, and in principle does not depend on the other corridors, there are some distinct interrelations that need to be identified in order to understand better the global framework of the proposed transport system in the region. The following are brief descriptions of these connections between corridors.

Corridors 1 and 2: Corridor 1 (northern east-west) is directly linked with corridor 2 (coastal) on its western part, where the coastal corridor prolongs it to the south (rail and short sea links) and the north (road connection potential to Lebanon).

Corridors 1 and 3: Corridor 1 is also linked in its northern part to corridor 3 (north-south corridor) around Irbid, which would allow direct road/rail connections to the Syrian Arab Republic northward and Amman and the Gulf of Aqaba southward. If these connections materialize, the northern east-west corridor can provide an access to the Mediterranean Sea to large northbound transit flows.

Corridors 1 and 4: The main axes of Corridor 1 (northern east-west) and corridor 4 (axis east-west) run parallel. There could be some competition between these corridors but, more probably, the northern corridor will retain most of the east-west transit (towards the Mediterranean), while the axis corridor will have a more regional and local role. Thus, the two corridors can be complementary.

Corridors 2 and 4: Corridor 2 (coastal) also encompasses the coastal part of corridor 4 (axis east-west corridor), which provides access to main cities (Jerusalem, Amman) and to the south of the West Bank. It gives access to traffic from the west (Egypt and beyond) to the central core of the region.

Corridors 3 and 4: Corridor 3 (eastern north-south) is linked to corridor 4 (axis east-west corridor) around Amman, allowing long distance traffic from the south (Aqaba, Saudi Arabia), the east and the north to reach the central urban areas of the region.

Corridors 2 and 3: Corridor 2 (coastal) is linked to corridor 3 (eastern north-south corridor) through the transit axis of the axis east-west corridor. This branch ensures road transit between the north and the east towards Egypt, leaving the coastal corridor near Rafah at the edge of the Gaza Strip. Thus the two north-south corridors are complementary, one being aimed at national and regional traffic (coastal) and the other at transit traffic. This connection needs to be carefully analysed because it will have to divert the road transit from the centre of corridor 4: one possibility could be to have it use one of the Jordan River crossings North of the Dead Sea, and then run along the Dead Sea before going east towards Gaza. Another possibility could be to have it going directly east from the Jordan River crossing, using a connection between the West Bank and the Gaza Strip. One of the key points of corridor 4 will be to establish good links between its international nodes and the other corridors, so that all kinds of transit traffic not necessarily directed to the area can be diverted to more suitable axes. Thus, inland transit should bypass the central area, while traffic using the international nodes (airports and ports) needs to be efficiently channelled out of the corridor. Discussions about these connections are very important for the functioning of the corridors, and for ensuring regional integration. For all these connections, multimodal centres (or terminals, or platforms) can play a very important role by making possible the reorganization of traffic at intersections of large transit axes, and by connecting efficiently different scales of traffic, and/or different modes.

3. Fast track projects

In order to ensure the minimum of delay in the implementation of concrete, practical projects with tangible benefits from regional economic cooperation, the European Community has established a Steering Committee to begin implementing a number of fast track transport infrastructure projects. Fast track projects constitute some vital components of one or more of the corridors whose implementation will yield tangible effects on the situation of transport in the region. The fast track programme has identified a list of priority projects. After the core parties have selected a group of high priority projects from this list, efforts will be made to secure suitable financing for implementation. Such projects should not be critically dependent on other investment decisions relating to the overall integrated planning of the regional transport network, and should be relatively self-contained; they should not pre-empt or reduce broader development options. Other criteria which should be taken into consideration include: the size and the related cost of implementing the project so that it will not exceed US\$ 30 million; the ease of implementation so that no substantial complex institutional support is required; and finally a time frame for planning and implementing projects of three to four years duration.

The fast track projects for more rapid implementation (phase 1) originally were:

Sinai-Gaza Highway.

Gaza-Rafah Road No. 4.

West Bank: North-South Access Road Link.

Irbid-North Shouna Highway.

Sheikh Hussein - North Shouna Link.

Haifa-Irbid Road: Section Sheikh Hussein-Afula-Jenin.

Aqaba Ring Road.

King Hussein Bridge.

Rafah Crossing Point.

Auga Crossing Point.

Mediterranean Coastal Railway.

Gaza Strip-Israel Rail Connection.

Gulf of Aqaba Vessel Traffic Management System (subsequently removed from the fast track category).

Phase 2 of the fast track project is for a longer time scale than the phase 1 projects and the projects for this latter phase are not considered to be implementable by the year 2000 or soon thereafter.

The phase 2 fast track projects are:

Gaza-Rafah Coastal Road.

Irbid Ring Road. West Bank: East-West Access Road Link.

Main Road Bisan-Jericho.

Sinai-Central Road.

Sinai-Southern Road.

Kufur Huda Damia Junction Highway.

Aqaba Coastal Highway.

South Shouna-Naur Dead Sea section IV.

Ghor Safi-Aqaba Back Road.

King Abdullah Bridge.

Sheikh Hussein Bridge.

Prince Mohammed Bridge.

Ras El-Naqab Crossing Point.

West Bank Regional Railway.

Rail link Aqaba Wadi II.

Al Arish Port.

Gulf of Suez.

Adabiya Port.

Aqaba port, passenger berth.

Ras El-Naqab Airport.

In addition to phases 1 and 2 of the fast track projects, there are other national projects that are expected to have been completed and which will have an effect upon transit and international freight and passenger movements. These include the expansion of the ports of Haifa and Ashdod, the expansion of Ben Gurion airport, the construction of Highway 6 forming the Tel Aviv ring road and the deepening of the Suez Canal.

REDWG recognizes that increasing the efficiency of the intraregional transport network requires that bottlenecks, or potential bottlenecks, at the various crossing points be dealt with on an urgent basis. There is little point, however, in upgrading a road to gain minutes on a long-distance journey if inadequate border facilities or unnecessarily complex border procedures add hours to the trip. Facilitating the movement of people and goods through the borders is an important priority for business and, in particular, for the tourism industry. As a first step, the core parties have identified priority projects for immediate implementation that focus on the improvement of existing border bridges and border facilities. These projects are:

- (a) Sheikh Hussein Bridge (also known as the Jordan River Crossing Point) and King Hussein Bridge (also known as the Allenby Bridge);
- (b) Rafah and Auga Crossing Points (two projects).

These projects were initially presented to the 1995 Amman MENA (Middle East/North Africa) Economic Conference.

4. *Subregional planning within the REDWG core area*

Superimposed on, but not necessarily directly related to, the corridor system, three subregional areas have been identified within REDWG core party areas for an integrated development approach. These are:

- (a) The Jordan Rift Valley (JRV) area;
- (b) The Taba-Eilat-Aqaba-Macro (TEAM) area;
- (c) The South-east Mediterranean (SEMED) development area.

(a) *Jordan Rift Valley*

The JRV area, which includes Lake Tiberias, the Dead Sea, the southern Ghor, Wadi Araba and the northern Red Sea shore, has abundant development potential owing to its unique topography, its location on a natural trade route and its rich history. The JRV has special significance in such areas as tourism, and regional transportation and shipping which could provide large scope for public and private sector entrepreneurs. In mid-1995, through the World Bank, a consulting firm was selected to start planning efforts. Their work was to include detailed sectoral analyses, identification of major public and private sector projects, and the preparation of an integrated development master plan for the entire Valley. Owing to infrastructural bottlenecks, closed borders and territorial insecurity in the region, private investment and tourism have in the past been deterred. The aim of this cross-sector, cross-border development plan is to integrate the region and to provide critical infrastructure and services to underpin sustainable private sector growth. Initially a bilateral scheme, the idea is for it to evolve and expand into a broader multilateral framework. Specific plans for the area cover new and improved transport and telecommunications links, and joint promotion of tourist destinations on both sides of the Valley. Among the overall objectives of the consulting firm's study are the following:

- (i) To provide for regional integration of infrastructure networks;
- (ii) To carry out cross-border cooperation resulting in regional economies of scale and cost reduction in the provision of infrastructure.

The concept behind this is to provide development strategies based on a core package of projects. Because of its location at a crossroads, and its key position between Jordan and Israel, the JRV takes on a broader dimension. This particularly applies to infrastructure, where improvements and investments in the

JRV will have impacts and benefits on a wider scale. The consultant has, at the direction of the Governments of Jordan and Israel, identified fast track business opportunities. The United States of America has funded a feasibility study for the proposed airport for joint use in Aqaba. The European Union, through REDWG, is assisting in regional and transportation planning, which includes the JRV. The Government of Japan is working with Jordan on new bridge and terminal facilities which would facilitate the movement of goods across the frontier to markets east and west. Extension of border services and transportation facilities along the JRV area could have a major impact on tourism and international trade, assisting in the economic integration of the region. It would give Jordan and its neighbours the opportunity to export goods to Israel and through Israeli ports to the Mediterranean, and reaffirm Jordan's role as a transport hub in the region.

(b) *TEAM*

The TEAM area includes Egypt, Israel, Jordan and Saudi Arabia. Although Saudi Arabia has not shown any interest in participation until now owing to the presence of Israel, the other three countries agreed in December 1995 to start a new approach within the peace process, supported by the European Commission. The development of the TEAM area is one of the focal points of EU activity in the region, as coordinated by REDWG. The TEAM project aims to prepare the legislative and administrative setting of economic development, to organize the infrastructural and planning background, and to pave the way for local and foreign public and private investments. The regional concept consists of two components: the fast-track planning model meant to build the starting point of the cooperation, stimulating economic growth, while the overall approach focuses on strengthening links between the three national economies, exploiting economies of scale through regional cooperation, and attracting private sector investment to the area, thereby developing the region's advantages (transport infrastructure and services, and new trade activities). The development of tourism in the region is based on clear water, climate, corals, and the proximity of tourist sites such as St. Catherine's Monastery and the city of Petra. In addition, the development of the region as a maritime gateway to Jordan, Israel, the area under the Palestinian Authority, and also the Syrian Arab Republic and Iraq, will enhance not only trade, but also other economic activities, especially with the perspective of regional cooperation; the expected improvements in infrastructure, services, and trade activities will, according to REDWG, enhance economic development and provide direct benefits to the people of the region. The first joint project, which was started in 1995, is the Gulf of Aqaba oil spill contingency project, designed to strengthen the abilities of the regional authorities to deal with oil catastrophes. The European Union strongly supports TEAM regional economic development with a predominant role given to the private sector. New investments in the area, estimated at up to US\$ 5 billion over the next 15 years, will mainly benefit the tourism sector. Project ideas include a Red Sea Riviera, a free zone for tourists, a transnational underwater coral reef park, and so far undeveloped maritime activities in the Gulf such as sailing, cruises, and offshore fishing. The infrastructure required for tourism but also for other new economic activities will be of major interest to private investors. A project Steering Committee comprising Egypt, Israel and Jordan has been established under the Chairmanship of the European Commission for the monitoring and overall guidance of the development of the TEAM area. The views of the private sector, its advice and direct input will be secured. Through this dialogue, private sector interests and initiatives will be included in the development process.

(c) *SEMED*

An integrated plan is essential to respond to the changed political situation in the South-east Mediterranean. The size of Gaza and its position implies coordinated planning between Israel, the Palestinian Authority and Egypt to develop this heavily populated area. Regional parties are discussing an overall approach to the development of the area. Economic development will focus primarily on projects that have cross border benefits, and can be readily implemented. A focal point for tourism, the area is a gateway to many historical, cultural and religious sites, including Cairo, Jerusalem, Jericho and Petra. The development

of a Mediterranean Riviera from Alexandria to Ashdod is planned, along with the necessary tourism infrastructure. As a trading centre, the region can take advantage of its role as the crossroads between Africa and Asia. To maximize the potential gains from trade, it is planned to create:

- (i) A Mediterranean coastal highway from Alexandria to Ismailia;
- (ii) A shipping line between Alexandria and Ashdod;
- (iii) A rail link from Alexandria to Gaza and Ashdod.

This project is also receiving support from the European Union.

A. TRANSPORT INFRASTRUCTURE PROJECTS PRESENTED AT THE MIDDLE EAST/NORTH AFRICA ECONOMIC CONFERENCE

In a major public relations exercise in support of the Middle East peace process, annual Middle East/North Africa (MENA) Economic Conferences were held (in Casablanca, Amman, and Cairo) in the period 1994-1996, and a fourth conference is scheduled to be held in Doha in November 1997. Projects emphasized in Casablanca in 1994 (and to a lesser extent in Amman in 1995) included a major highway from Egypt to the Syrian Arab Republic via Israel, huge tourism and infrastructure schemes, including a canal linking the Red Sea and Dead Sea, and other multibillion dollar projects. However, circumstances have since changed, and realism tempered proposals at the latest conference, held in Cairo in 1996. Nevertheless, the Israeli transport sector wish list remains a long one. No fewer than 18 fast track projects were presented by Israel (under the headings of SEMED, JRV and TEAM) to the MENA Economic Conference held in Cairo. These projects have not generated much excitement nor are they currently on a true fast track. As such, Israeli proposals in the transport sector appear to be the product of a political agenda which has thus far proved to be unrealistic. This is not necessarily because these projects are not technically valid or, in a situation of prosperity and stability, economically viable. The main problem is that Israel wishes to pursue economic development while ignoring the major political and cultural issues that still have to be addressed. These political issues obviously include the achieving of a just, comprehensive and lasting peace with the rest of the Arab world, but also the satisfactory implementation of existing accords. For Israel to present transport projects at these conferences and other venues without regard to the overall situation in the Mashreq region is unrealistic. It is also unrealistic to expect outside donors and other financiers to support such projects in such an atmosphere. Though there are no reliable data on most of the ESCWA region's border zones with Israel, opportunities and problems will pose a significant challenge as and when borders open after peace treaties are signed. Dynamic national systems meet at national boundaries, and the resulting discontinuities produce problems affecting behaviour in the border zone. This factor does not seem to have been taken into account in the preparation by Israel of its fast track projects for the MENA Conferences.

However, for other countries, realism has overshadowed the initial optimism. For example, at the 1996 Cairo Conference, out of all the transport projects proposed by the Jordanian Government, only one was truly regional: Aqaba International Airport. If executed, this project would be a touristic gateway for the countries in this region. With funding from the United States Government, an American firm has already completed a study on the airport and submitted proposals to the Jordanian and Israeli Governments together with different scenarios and options. The various options would cost roughly between US\$ 115 million and US\$ 225 million. The authorities in Jordan and Israel are examining these options, and the financing is expected to be shared. In the past, Israel had given such a facility its unqualified approval. However, with a change of Government in 1996, Israel now says that the joint airport should not replace the one currently operating in Eilat. It is proposed that the joint airport have its airfield in Jordan and two terminals, one in each country, with the Israeli terminal serving international flights destined for Eilat. Local flights, however, would continue to land in Eilat.

Israel has since proposed that the airport be managed by an international firm to overcome the deadlock in the talks aimed at turning the airport into a major hub serving tourists of both countries. The two sides have different scenarios regarding the way the airport should be run, and have not reached a final decision except for accepting the principle of using the airport for the region. Talks on operating the airport also came to a deadlock following a new set of Israeli conditions which Jordan considered an infringement on its sovereignty. As a result, Jordan postponed a pilot Israeli flight to Aqaba following the submission of the Israeli conditions. Difficulties include what kind of fees will be implemented, what type of aeroplanes will be allowed to land, is the runway capable of taking jumbo jets, where will the terminals be located and who will handle the operations in terms of services. The latter issue in particular has become a sore point: Jordan feels that it can perform the necessary services and has rejected an Israeli proposal that Israel handle security. Israel had suggested that its officers supervise checking of passengers' travel documents and luggage headed for Eilat, the Israeli city which the airport would serve, but the proposal was rejected as an infringement on Jordan's sovereignty.

This debate is typical of the development of regional transport projects at the MENA Conferences. The grandiose visions of 1994 have been replaced by bickering and lack of implementation in the wake of the 1996 Conference, and the fate of the 1997 Conference hangs in the balance.

Political tension in the region and the stalemate in the peace process negatively affected the performance of the transport, trade, and tourism sectors in the Mashreq region in the second half of 1996 and the first half of 1997. In this atmosphere, many aspects of the regional transport infrastructures proposed under REDWG and presented at MENA are frozen or moving very slowly. REDWG fast track projects are not being implemented with any great speed. The original deadline for these projects—the year 2000—now appears to have been set back by up to five years.

B. THE IMPACT OF PEACE AND OTHER MAJOR DEVELOPMENTS ON ESCWA REGION TRANSPORT

1. *Background*

The peace process will redraw the transport map of the Middle East. The opening up of trade, increased tourism and the generation of further local and international traffic will place additional strains on the transport system. However, the peace process is simply part of the overall trend of integration within the region and internationally. On a broader level, the EU Euro-Med partnership process has started operating to help regional integration as well as integration with Europe; and on a worldwide scale, adherence by more ESCWA member countries to the WTO will lead to further integration interregionally and intraregionally. A just, comprehensive and lasting Middle East peace will have a major impact on the ESCWA region. This is especially true if such a peace is accompanied by the adherence of ESCWA members to the WTO and by the signing of EU-Mediterranean partnership accords between the EU and the ESCWA members in the Mashreq region. A particularly important development which could also go along with all of the above would be the liberalization of the individual economies and attendant intraregional integration. For the time being, recent developments including the peace process have not had a major positive short-run impact on traffic flows in the region. In addition, there has so far been little impact as a result of the WTO or EU-Mediterranean accords on trade volumes and patterns within the ESCWA member countries and between ESCWA member countries and other regions.

2. *Economic impact of peace*

For the purposes of this study, no prediction regarding the timing of the peace can be made. The pace of the peace process has been and may continue to be subject to wide variations. Two scenarios related to the peace process could be:

(a) A continuation of the present situation of minimal cooperation between the three Arab REDWG core parties on the one hand and Israel on the other hand, and no cooperation between Israel and other ESCWA member countries;

(b) A just, comprehensive, and lasting "warm" peace involving close cooperation between the four core parties and major contacts between Israel and other countries.

An Arab-Israeli peace that is just, lasting and comprehensive could provide direct economic benefits. Peace will permit reductions in military spending in the ESCWA region, which is among the highest in the world as a share of GDP for the countries of the region. It should also increase the returns on investments by reducing individual country risk and by opening up regional projects in such areas as transport. However, overcoming the legacy of recent history will take time, depending on the perceived nature and dividends of the peace and their institutional support. Keeping this in mind and given the above two scenarios, economic forecasts may be made as follows.

(a) *GDP growth*

The main impact of full peace will be to foster the economic growth of the Arab core parties by enhancing both domestic and foreign investments. Under these circumstances, GDP growth could reach its maximum of up to double current rates during the first decade of full regional peace.

(b) *Foreign trade*

As a result of the Arab-Israeli conflict, there has been virtually no trade between Israel and its neighbours; even after 1979, there was and still is only limited trade between Egypt and Israel. (The only exception to this has been the extensive export of Israeli products to captive Palestinian markets, hardly an example of the benefits of trade.) Peace will act as a stimulus to total foreign trade (imports plus exports); foreign trade will increase with respect to its percentage in GDP in all the Arab core parties. In other words, the rate of growth of imports and exports combined will outstrip the rate of growth of GDP as the regional economy opens up under the impact of peace.

3. *Economic liberalization and intraregional integration*

Resolving the Arab-Israeli conflict by peaceful means is only one, although the most important, of the challenges facing ESCWA member countries. The ESCWA region is remarkably unintegrated in terms of the extent of economic interactions within the region and the absence of an effective framework for formulating and implementing rules and policies to influence, regulate, and supervise economic relations. There has been little in the way of regional economic policy coordination, with the exception of the GCC. The scale of intraregional merchandise trade is limited. With the exception of mineral fuels, there is no category of commodities for which intra-ESCWA trade is very important. Tourism and other non-factor service flow patterns with direct implications for transport have also been segmented. (Some countries—primarily Egypt, Jordan and Lebanon—have received substantial tourist flows from within the ESCWA region.) None the less, this means that there is potential for far greater intra-ESCWA region

economic interaction. For example, high initial trade barriers suggest there is scope for trade-creating gains from regional integration.

While ESCWA member countries will continue to trade mostly with non-regional partners, the current levels of trade within the region are below those that would be attained if intraregional economic relations were freer. In addition, most types of economic interaction between ESCWA members—with the exception of labour flows—remain limited. The rationale and means for achieving the potential gains from greater regional interaction are substantial. The region requires economic policy changes, most of which are also needed to benefit from the globalization and integration of the international economic system. Pursuit of ESCWA regional integration within the overall context of multilateral externally-oriented policies would further growth. Political factors, however, may continue to constrain the pace of integration over the next few years, and most countries in the ESCWA region will continue to trade mainly with the European Union, the United States, and East and South Asia. However, the volume and the share of regional trade can rise significantly. Beyond its effects on merchandise trade, regional integration would boost service flows and intraregional investments. Over time, and as more countries in the ESCWA region progress in deregulating and liberalizing their economies, linkages between them would strengthen regional economic ties.

4. Impact of the World Trade Organization

The international economy in which ESCWA member countries operate is undergoing a fundamental process of change. Within this context, it is likely that ESCWA will attain a higher level of intraregional economic interaction simply by implementing policies needed to benefit from the changes in the world economy, such as adherence to the WTO regime. Five ESCWA member States are currently WTO members: Bahrain, Egypt, Kuwait, Qatar and the United Arab Emirates. Other ESCWA members are in various stages of negotiation to join; they include Jordan, Oman and Saudi Arabia. Multilateral trade liberalization under the WTO provides for reductions in tariff and non-tariff barriers to trade and the extension of multilateral rules to trade in services.

Reducing commercial barriers in a credible manner and strengthening the underlying structure of multilateral trade can provide the ESCWA region economy with significant scope for greater trade. The importance of these factors for ESCWA member States varies. Most ESCWA member countries have enjoyed various trade preferences from their major industrial trading partners; the exceptions are members of the GCC. Existing trade preferences for the region include specific agreements with the European Union, Generalized System of Preferences treatment by Japan and the United States, and, for a smaller set of countries, least developed country treatment by the European Union, Japan and the United States. As a result of such agreements, the region has a high incidence of zero-duty lines for a range of its non-oil product exports. Consequently, the region's position in this respect will be eroded as the overall level of protection is reduced. The ability of ESCWA member countries to offset this depends on their exploitation of the dynamic advantages of multilateral trade liberalization. The latter relates essentially to the potential for faster and more sustained trade-led economic growth. Several ESCWA economies' potential in this regard is constrained by a key factor: the lack of dynamism of the external sector at the individual country level. Looking at the circumstances of the individual economies in the region, two aspects stand out: first, the lack of product diversification at the individual economy level; and secondly, the nature of trade openness. The export performance of several countries in the region is dependent on one or two sectors. This is particularly the case for most of the oil-exporting States. Indeed, diversification of the manufacturing sector has been significant in only a few countries. These narrow export sectors have less need of greater and more sophisticated transport facilities. With the growing impact of the WTO on trade volume and diversity, transport will have to develop. In turn, a dynamic transport sector will help trade to thrive. The impact of this process on the economies of ESCWA member countries is likely to be relatively small initially. The medium-term effect will be to enhance intraregional and interregional trade at a rate of double or triple that

of overall economic growth. In the longer-term, trade should expand steadily at the rate of overall growth. The General Agreement on Trade in Services (GATS) is also to be implemented under the WTO, establishing a multilateral framework for rules governing cross-border trade in services. For developing countries such as those in the ESCWA region, GATS contains concessions. The general obligations of members are to liberalize trade and to abide by rules governing trade in services. The main obligation of each member of the GATS is to provide most favoured nation (MFN) treatment by offering member countries treatment that is no less favourable than that given to any other member. But GATS allows members to avoid temporarily MFN treatment on specific measures affecting particular service sectors. The application of these exemptions is automatically granted for up to five years, and subject to a review thereafter. Domestic regulations affecting qualification requirements and procedures, technical standards, and licensing requirements are permitted under GATS, to the extent that they are applied in a reasonable, objective, transparent, and impartial manner. In addition to MFN treatment and domestic regulation, some of the other important general obligations for GATS members relate to transparency, business practice and subsidies. Specific commitments are made in market access, national treatment and other commitments related to qualifications, standards and licensing. In particular, concerning air transport services, specific market access and national treatment are to be negotiated in the areas of aircraft repair and maintenance, selling and marketing of air transport services, and computer reservation system services in both scheduled and non-scheduled services. GATS specifically excludes measures affecting traffic rights and services directly related to the exercise of traffic rights, and it acknowledges the precedence of existing bilateral aviation agreements. The impact of the GATS on ESCWA member countries' air transport sectors is thus expected to be small. In the area of tourism, those ESCWA member countries with a fairly liberal policy in tourism-related services should not have much difficulty with GATS. For those with restrictive policies, GATS could provide for freer market access for tourists into and out of a country, an agreement to not limit the amount of funds international travellers can take abroad, and obligations not to impose new restrictions on foreign ownership or operation of tourism-related businesses. The impact of these specific commitments on the economies of ESCWA member countries is likely to be relatively small initially, though there is uncertainty surrounding their longer-term effect.

5. The European Union Mediterranean initiative

Guided by the fear that poor economic development in the Mediterranean region (including some ESCWA members) would cause instability on Europe's flank, the European Union has proposed a free trade area with the countries of the Mediterranean. The basic objective is to conclude agreements with the individual Mediterranean countries, with the ultimate goal of creating a free trade zone in the region by 2010. These objectives are to be achieved gradually, and the EU has committed to assist in financing the adjustment cost associated with free trade. The budget for such assistance amounts to about ECU 9.4 billion (US\$ 12 billion) for the period 1995-1999, divided about evenly between funds from the EU and loans from the European Investment Bank. About half the funds are earmarked to prepare for free trade through developing the private sector and the trading infrastructure, including transport. By the end of the century, this Mediterranean initiative could increase official resource flows to the region by more than half. The Mediterranean initiative is strategically important for both the EU and the Mediterranean ESCWA (Mashreq) members (Egypt, Jordan, Lebanon, the Syrian Arab Republic and Palestine). The Mediterranean initiative implies a major shift in the development paradigm and a commitment to realign policies, institutions, and companies in the direction of Europe. Joining the EU bloc gives these ESCWA members preferences comparable with other Asian countries and levels the playing field with regard to Eastern Europe and Turkey. Moreover, deeper links with the EU imply financial support for economic adjustment, greater credibility of policy commitments, and the possibility of attracting more investment as part of a larger market. Wages in Mediterranean ESCWA members are a fraction of those in most European States, implying substantial potential for competitiveness. Improved market access is a main benefit of the EU agreement over the long run. However, the key to this initiative is that the agreements provide ESCWA member countries the

opportunity to lock in policy commitments and begin to harmonize domestic laws and standards with international norms, making it easier for domestic producers to penetrate foreign markets. The export benefit of such harmonization can be large. Using the next decade to improve productivity and move to higher value-added activities in the European market is a way to ensure that the Mediterranean ESCWA members participate in the prosperity brought by the growth in world trade. Moreover, because the EU agreements will create strong incentives for Mediterranean economies to open up to each other, greater intraregional trade among all ESCWA member countries is a likely by-product of the process. This will have important implications for transport infrastructure within the region and extra-regionally. The EU's Mediterranean initiative contains incentives not only for closer economic ties between EU member countries and those in the southern and eastern Mediterranean, but also for closer ties between the latter group of countries.

Israel has already reached association agreements with the EU, and Egypt, Jordan and Lebanon are at more or less advanced stages of negotiations. While the liberalization schedule under these agreements is spread over 12 years, and while full liberalization does not apply to agriculture, their encouragement of regional integration may be important.

As a tangible example of the direction in which this process is heading, the Declaration of the Mediterranean Transport Conference of January 1997 was in effect part of the articulation of the European Union's Euro-Med policy. In the Conference Declaration, the Ministers of Transport of the countries of the Mediterranean region and of the EU, as well as members of the Parliaments of these countries, members of the European Parliament, representatives of the organizations representing transport operators and users in the Mediterranean region, and the other participants in the Conference, welcomed the development of a Euro-Med partnership, the first manifestation of which was the Euro-Med Conference in Barcelona (November 1995), as a way to promote regional integration between the Euro-Med partners; they also welcomed the accompanying financial and technical measures for reform of economic and social structures. They stressed the importance of an efficient transport system for the success of the Euro-Med partnership as well as for the balanced economic and social development of the region, taking note of the Barcelona Declaration, which emphasized the importance of developing and improving infrastructure. They expressed the desire to take concrete steps for the implementation of the work programme which accompanied the Barcelona Declaration, and which stressed the need to cooperate in the development of multimodal transport networks for the region, integrated with the trans-European network, as well as the need to improve transport services. They took note that cooperation on a number of transport themes had already begun in more restricted regional contexts such as that currently taking place in the Middle East in the framework of REDWG, wishing not only to integrate that cooperation into a larger Mediterranean context but also to pursue and to develop that cooperation. They observed that cooperation, although limited, was not new in the Mediterranean, and that centres dedicated to research and cooperation in the transport sector between the northern and southern shores of the Mediterranean had existed for years. In conclusion, they agreed to begin cooperation on a number of transport themes, and in particular on the promotion of integrated, multimodal transport networks as well as of efficient transport services. That cooperation should support especially the development of those countries whose transport systems had the greatest deficiencies.

The participants in the Mediterranean Transport Conference felt that cooperation in the development of integrated, multimodal transport networks should aim to promote the interconnection of a national network of transport infrastructures of the countries of the region in order to create multimodal and interoperable networks. The participants should thus cooperate to plan a multimodal trans-Mediterranean transport network which reflects real and anticipated flows of goods and passengers, taking into account an evaluation of the environmental impact of the balance between transport modes in the Mediterranean partner countries. This planning exercise should involve all the countries in the region to ensure that the realization of transport networks takes place in a coherent and coordinated fashion, and promotes connections between Mediterranean infrastructure networks and the trans-European transport networks (including the trans-Maghreb transport

corridors as defined by the Western Mediterranean Transport Group), as well as with the transport networks in the Black Sea region. Once transport networks have been defined, the participants should concentrate on the identification of bottlenecks and impediments to smooth traffic flows on the networks as well as missing links in the networks. It will then be possible to focus attention on the definition of projects to remove these bottlenecks and to fill in the missing links. A network of multimodal port and airport platforms, and their connection to present or planned land transport networks is a key factor in inter-Mediterranean relations and for peripheral countries in the future context of an enlarged EU. Planning efforts should be concentrated on projects of international importance, taking into account transport flows and links between the community and its Mediterranean partners, as well as regional integration and cooperation between the Mediterranean partner countries themselves and their links with neighbouring regions.

The participants in the Mediterranean Transport Conference agreed that they should give careful consideration to the balance between different transport modes in the Mediterranean partner countries, and therefore promote projects that are the most efficient, from both an economic and an environmental point of view. In particular, projects connected with the improvement of short-sea shipping services should be given priority, as well as those that promote Mediterranean east-west maritime traffic, as an alternative to land traffic moving in the same directions further north. The participants agreed that to facilitate private participation and public-private partnerships in transport systems, attention should be paid to the establishment of consistent, permanent and transparent legal, judicial, fiscal and regulatory frameworks to reduce the risks likely to be perceived by potential investors and operators. Software solutions to bottlenecks (such as improvement and rationalization of logistical and administrative procedures) should be given priority over new infrastructure construction. Priority should also be given to the rehabilitation and reconstruction of existing infrastructure, the removal of bottlenecks, or filling in missing links rather than the construction of new infrastructure. Emphasis should be on the means to improve the efficiency and competitiveness of maritime transport in the region, in the light of the high proportion of goods transported by sea. A weak link in multimodal transport chains is often the link between ports and their hinterland; the improvement of such links should be given priority. The modernization of the air transport system, including aviation and airport infrastructures and ancillary systems (air traffic control), should be encouraged in order to increase its overall capacity while enhancing the level of safety. Harmonization and integration between systems should be an objective. Satellite-based positioning and navigation systems may contribute to improving the efficiency of the transport system, safety conditions and, in particular, search and rescue operations. A positioning and navigation network is now under development for the European region which will make available a single navigation signal to the whole Mediterranean area. The participants agreed to develop the network and to cooperate in elaborating jointly a master plan for implementation.

The Mediterranean Transport Conference recommended that cooperative efforts to improve transport services should be undertaken according to the following principles:

(a) Obstacles to the free provision of transport need to be removed through discussions with all the Euro-Mediterranean partner countries, taking account of the legal obligations of most of the WTO members, where appropriate; transport facilitation is therefore an integral component of trade facilitation and hence of economic development.

(b) A harmonious enforcement of safety, environmental and social standards, as defined by international conventions or accepted norms and including those developed by the Economic Commission for Europe, should be promoted, since the unequal application of such standards can often be a technical barrier to transport flows.

(c) The objective of sustainable transport development must be pursued by helping to reduce the negative impact on the environment and promote the most environmentally-friendly modes of transport.

(d) As far as the transport of goods is concerned, the means to improve services in maritime transport within a multimodal transport chain should be given priority, especially the combination of short-sea shipping services and rail transport where applicable.

(e) An efficient and competitive system for air services must be a target for the Euro-Mediterranean region as a whole. In order to achieve this, close cooperation between aviation authorities should be promoted. In this sector, intermodality should take into account key concepts such as freedom of choice for the customer and freedom of competition on a fair and equitable basis. Airport capacity should be considered a major issue and the provision of additional capacity must be matched by improvements in surface access capacity, so that growth in demand can be met within accepted standards of safety, security and environmental compatibility. The use of airspace should be improved by extending to all Mediterranean countries common procedures and adequate system support.

(f) A regional data transmission system, combining communications networks (including satellite navigation) and vessel traffic management systems will help to promote regional trade and traffic. The participants have an interest in promoting activities in this domain (linked to trade facilitation), which will also improve the efficiency of transport and trade.

(g) An effective stimulus to the improvement of the management of transport and trade in the Mediterranean could be achieved by the following:

- (i) Priority given to the facilitation and simplification of administrative and customs procedures in accordance with international norms and conventions in force, especially by using telematics and real-time information networks in transport, and new logistical practices;
- (ii) Harmonization of the norms and technical characteristics (of both vehicles and infrastructure) and legislation affecting transport.

The participants in the Mediterranean Transport Conference felt that cooperation on transport issues on a subregional, non-discriminatory basis should be furthered and articulated with cooperation between all Mediterranean countries. As such, the participants called upon the countries concerned to initiate cooperation in the Eastern Mediterranean. The participation and coordination in the cooperation programmes of those Mediterranean sectoral organizations that are already established should be encouraged. Through REDWG, the European Union is trying to help to translate these ideas in parts of the ESCWA region into tangible projects. Unfortunately, these efforts have not led to great progress, given the present state of relations among the core parties.

6. Change and its impact on regional transport

The above changes—the efforts for peace and adherence to WTO and EU-Mediterranean agreements—are part of the process of the region's opening up economically. Meanwhile, the short-term outlook for the transport, trade and tourism sectors in the Mashreq region is still poor. A combination of low oil prices and regional tensions will mean generally weak economies. This will have a negative impact on any large-scale attempts to develop transport infrastructure projects.

After this, and with possibly higher oil prices, the situation may improve. In particular, the movement towards just, comprehensive and lasting peace treaties between Israel and the Arab countries will in turn speed up the implementation of transport infrastructure projects, especially fast track projects. If such a scenario is realized, the longer-run period could be one of "warm" peace with major economic progress and concomitant expansion in the intraregional and interregional transport infrastructure. Under a situation of just, lasting and comprehensive regional peace, various new transport infrastructure projects should become feasible. Taking as a benchmark the costs of the above-mentioned 18 fast track projects presented by the

Israelis in Cairo in 1996, the direct and indirect benefits of higher volume transport should simplify the question of financing. The four corridors described above (see introduction to the present chapter) would then start to open up, which would lead to major changes including:

(a) The redirection of the existing import, export and transit flows towards more economical routes that are currently barred. The geographical location of the ESCWA region is central to three land masses: Africa, Asia and Europe. This location can provide an international traffic access point for the three areas to link with the ESCWA region and through it with each other. Potential transit route changes will be particularly important as new routes develop through the ESCWA member States into North Africa. Major potential international trade route changes will occur from Egypt to all ESCWA member countries plus Turkey, as land transport replaces sea and/or air where appropriate. Jordan and the area under the Palestinian Authority will be in a similar position *vis-à-vis* Africa. In addition, Jordan will benefit from shorter sea and air transport routes to North Africa, Europe and the western hemisphere. However, it should be noted that the new routes simply offer a potential that did not previously exist: to make this a reality will involve much more. This will include the implementation of the REDWG fast track projects as well as other infrastructure schemes. The other point to note is that some regional routes will suffer, including, for example, the ferry line from Egypt to Aqaba. However, these losses will be minor compared with the major gains offered by more economical new routes.

(b) The generation of additional local and international freight and passenger traffic due to new trade opportunities, reduced transport costs, and other positive effects on the economic development in the region. The Arab core area has well-established trade links and relatively accessible intraregional trading routes. These will quickly begin to handle considerably larger volumes of goods and passengers, reaching double the present volumes after the consolidation of regional peace. Future movements of labour among the countries involved in the peace process are also projected to be substantial, particularly in the context of Palestinian Authority-Jordan-Israel relations. This will promote demand for more and better transport infrastructure and services.

(c) The attraction of tourism to the region. With the achievement of a just, comprehensive and lasting peace and a new atmosphere of security, the tourism industry is poised for a future of strong growth. This could mean that tourist arrivals will almost double within a year of the conclusion of a peace settlement, and the number of arrivals could rise again by the same level after another few years as the peace is consolidated. Such an inflow will in particular involve tourists coming from the EU States. The ensuing boom will improve the overall economy, creating opportunities for many other industries and lifting income levels. However, this will only be possible in the context of regional tourism. Among the ESCWA member countries, an atmosphere of collaboration rather than competition will be required. Intergovernmental cooperation is especially important for developing infrastructure such as roads and ports of entry. Policies of open borders and deregulation are necessary for building an environment suitable for long-term investment. The question is how to achieve this among the ESCWA member States themselves.

A normal future situation is thus one with border-crossing restrictions eased. For passengers and freight, it will be possible to cross all borders by road, rail, sea or air with relatively little delay and presumably at lower cost. As a partial cause and consequence of this and other factors, trade liberalization will follow. This will open new market opportunities within the core area which will foster economic growth through enhanced domestic and foreign investments. The perceived reductions in both border-crossing restrictions and transport costs are projected in turn to lead to a redistribution of transport demands along natural lines. However, for this to happen, conditions must be met which are not directly related to either the peace process or the transport sector as such. Import substitution, which still characterizes the majority of the ESCWA members' economies, must be quickly discarded in favour of outward-oriented trade policies. It is only with such an export-oriented strategy that it will be possible for development and the necessary intensification of transport activities to proceed.

III. CASE-STUDY OF EGYPT

INTRODUCTION

This chapter will deal specifically with one important transport infrastructure—namely roads—in Egypt, the strategic connection between Asia and Africa. The expected increases in trade between Egypt and other countries, and especially core parties of the other REDWG (Israel, Jordan, and the Palestinian Authority), are identified below. Such increases are typically followed by a need for improving the transport system to accommodate the new trade. Since the Egyptian Sinai Peninsula will be the region most affected by those changes and should be prepared for that, this chapter focuses on this region in terms of current general development plans, current road infrastructure, proposed improvement projects related to road transport and finally the identification of factors to be positively considered to ensure stable and accepted levels of performance of the road network. These factors include the specific nature of the Sinai Peninsula, technical factors including truck axle loading and highway maintenance management systems, and new trends in road transport policy represented by the privately financed roads.

A. IMPACT OF THE PEACE PROCESS ON REGIONAL TRADE

One of the expected outcomes of the peace process will be a substantial increase in trade volumes in the Middle East, in general, and in particular in the core area of Egypt, Jordan, Israel and the area under the Palestinian Authority. A considerable increase is expected in all forms of trade flows including international, regional, transit and local trade. This is reflected in the assumption that total foreign trade (imports plus exports) will increase its share with respect to GDP in all the core areas, and that the total foreign trade share of GDP will increase within the period 1994-2020. Taking Egypt as an example of the core area countries, some specific examples of the expected changes in the trade flows are outlined below, including an increase in Egyptian exports to the core countries/areas, as shown in table 7. It is also expected that the total exports from Egypt to Israel, Jordan and the area under the Palestinian Authority will increase by between 6 and 700 times that of the current level. The expected increase in the Egyptian imports from the core countries/areas is shown in table 8. It is estimated that by the year 2020, the total imports from Israel, Jordan and the area under the Palestinian Authority will increase respectively by approximately 390, 21, and 13 times the current levels. Another example of the expected change in trade flows can be seen in figure IV, which shows Egyptian exports and imports classified by trade sector. The values shown in the figure are percentages of GDP. In figure IV, the results are expressed in terms of the ratio between the GDP value in the years considered and that of the base year, 1994. The figure indicates, for example, that agricultural imports from core countries/areas will increase by about 10 times by the year 2020.

TABLE 7. EGYPTIAN EXPORTS TO CORE COUNTRIES/AREAS
(Total freight flow in tons)

	Year			
	1994	2000	2010	2020
Egypt (free zone)	11 881	74 411	251 105	761 522
Israel	1 582 932	2 229 947	3 646 851	7 711 815
Jordan	44 244	661 364	1 607 182	2 390 581
Palestinian Authority area	2 414	206 460	624 055	1 683 449

Source: REDWG (Regional Economic Development Working Group) Monitoring Committee Secretariat, Annual Report, December 1994 - May 1996.

The above results indicate that there will be a considerable increase in all sectors of trade with the core countries/areas. It seems that this increase will be at the expense of trade with the countries identified as "the rest of the world, including the United States".

Figure IV. Changes in Egyptian exports and imports with regard to the other core countries
(By trade sector, as percentage of GDP, with base year of 1994)

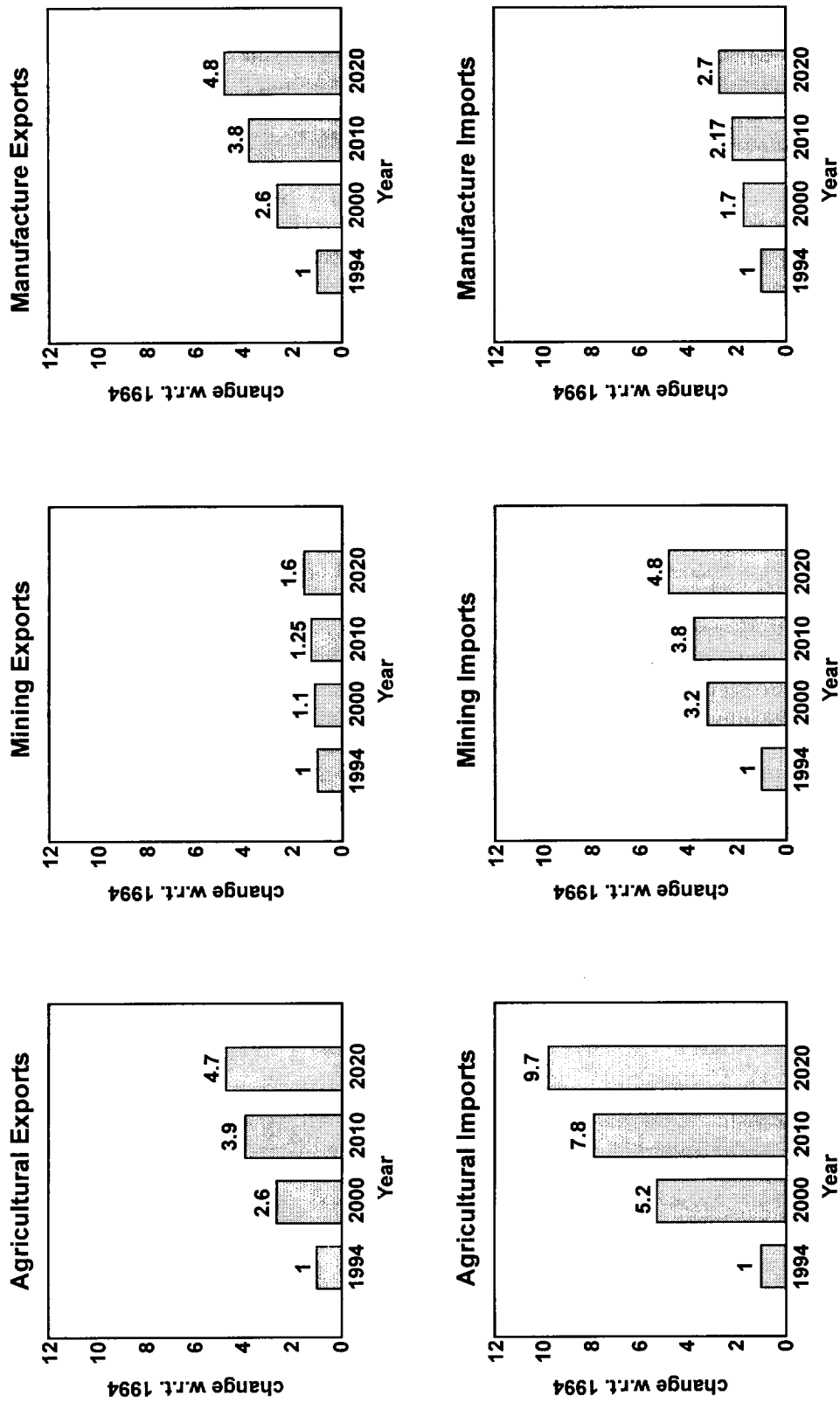


TABLE 8. EGYPTIAN IMPORTS FROM CORE COUNTRIES/AREAS
(Total freight flow in tons)

	Year			
	1994	2000	2010	2020
Egypt (free zone)	249 752	736 117	2 863 129	5 845 038
Israel	12 699	581 543	2 423 935	4 928 496
Jordan	13 812	59 137	157 457	284 620
Palestinian Authority area	2 000	2 546	9 051	26 493

Source: REDWG (Regional Economic Development Working Group) Monitoring Committee Secretariat, Annual Report, December 1994 May - 1996.

Normalization by the year 2000, for example, will affect major facilities at border crossings. For passengers, it will be possible to cross all borders by road, rail, sea or air with relatively little delay. For freight, it will be possible for all freight to cross borders with relatively little delay. As a consequence of the reduction in border-crossing restrictions, it is predicted that trade liberalization will follow to reduce transport costs. The projected reductions in both border-crossing restrictions and transport costs are expected in turn to lead to a redistribution of transport demand according to demand and will act as a stimulus to regional integration of all the core parties.

On the Egyptian level, massive efforts are being made to face the expected challenge. The Sinai Peninsula has been identified as the most important region in that regard. The Sinai is one of the most important regions in Egypt owing to its strategic location for national security at the eastern border. The political and economic importance of the Sinai Peninsula increased rapidly after the historic Middle East peace initiatives in 1994. These initiatives were translated by the Egyptian Government into a national project for the development of the Sinai.

B. SINAI DEVELOPMENT PLANS

The national project for the development of the Sinai is a long-term scheme covering development requirements for the period 1994-2017.¹ It takes into account both the national and regional dimensions. With regard to the national dimension, the Sinai is an important part of the Suez Canal region which includes, in addition to the governments of north Sinai and south Sinai, the governorates of Port Said, Suez, Ismailia and the governorate Sharqia. Therefore, the Sinai is important for economic and social development, particularly with regard to industrialization and links with the outside world. The Sinai also has a prominent place in the process of Egyptian national development, as part of the comprehensive development framework of the country's sectors and regions in the period 1994-2017. With respect to the regional dimension, the Sinai constitutes a link with the development framework of the Middle East region, particularly since the peace process initiatives. The Sinai is considered a pivotal point in the development of the region.

The major role of the transport sector in the development of the Sinai has been associated with the provision of fixed links between the Sinai and the rest of the country across the Suez Canal. It is essential to establish links with Western Asia in general and the Arab East in particular to meet the increase in traffic of both goods and passengers, which is expected to occur once the peace process is fully implemented. To provide internal connections within the Sinai to meet the needs of its various areas, a total amount of 74.6

¹ Ministry of Planning, the Arab Republic of Egypt, "The national project for the development of Sinai," September, 1994.

billion Egyptian pounds (LE) is proposed for the implementation of development of the Sinai until 2017. This amount is estimated to be around 10 per cent of the total national investment expenditure in the country's fourth five-year plan (1997/98-2001/02).

The investment schedule of the Egyptian transport plan is shown in table 9. More than 50 per cent of transport development investment is allocated to roads and railway. It can be noted from the table that there is rather high investment in railways. This indicates that the Egyptian Government intends to stress railways in the Sinai, though there is no railway there at present.

TABLE 9. INVESTMENT SCHEDULE OF THE EGYPTIAN TRANSPORT PLAN

Sector division	Investment ^{a/} (millions of Egyptian pounds)	Share (percentage)
Roads	1500	24.2
Bridges, tunnels and canal transport	850 ^{b/}	13.7
Seaports	600	9.7
Airports	300	4.8
Railways	1850	29.8
Storage	100	1.6
Communications	1000	16.1
Total	6200	100.0

a/ Including investment of the third plan (1992/93-1996/97) and fourth plan (1997/98-2001/02) and after (to the year 2107), at 1991/92 prices.

b/ Excluding the cost of the new Suez Canal bridge.

C. EXISTING SINAI ROAD SYSTEM

Two main infrastructure are reviewed below: Suez Canal crossings and the Sinai road network.

1. *Suez Canal crossings*

Currently, there are six crossing points. All crossing points are operated using ferry boats, except for the Ahmed Hamdy tunnel. The current crossing traffic is considered to be low. The current total traffic volume crossing the canal reached 6,372 vehicles on a working day and 5,111 vehicles on a Friday, which is not a working day. A detailed vehicle count is shown in table 10, while the number of passengers crossing the six points is shown in table 11. Except for the Ahmed Hamdy tunnel, the level of service at the other five crossing points is considered to be low, particularly at the Qantara crossing point where the largest numbers of vehicles and passengers are concentrated. This is due to the excessive delays at these points.

2. *Sinai road network*

According to the National Project for the Development of the Sinai, there was a total of 4,074 km of paved roads and 1,140 km of unpaved roads in the northern and southern parts of the Sinai. The paved roads making up the national road network, are under the jurisdiction of the General Authority for Roads, Bridges and Land Transport, Ministry of Transport. This network comprises 3,616 km, of which 1,545 km are in the North Sinai governorate, and 2,071 km in the South Sinai governorate. The rest of the paved roads and all earth and agricultural roads are administered by the municipalities of the respective governorates.

TABLE 10. VEHICLE COUNT ON SUEZ CANAL CROSSINGS

Station	Workday			Friday			Trucks (percentage)
	East West	West East	Total	East West	West East	Total	
Qantara	1 275	1 238	2 513	982	952	1 934	50
Ferdan	373	355	728	227	213	440	87
No. 6	249	223	472	238	265	503	40
Srabuiom	386	320	706	325	285	610	80
Ahmed Hamdy tunnel	778	913	1 691	729	712	1 441	45
Shatt	105	157	262	96	87	183	60
Total	3 166	3 206	6 372	2 597	2 514	5 111	

Source: Ministry of Planning of the Hashemite Kingdom of Jordan, Middle East Regional Transport Study, interim report, March 1997.

TABLE 11. PASSENGER COUNTS ON SUEZ CANAL CROSSINGS

Station	Number of passengers
Qantara	
Ferry for vehicles	7 130
Ferry for passengers	4 041
Total	11 171
Ferdan	1 251
No. 6	2 089
Srabuiom	1 366
Ahmed Hamdy tunnel	9 534
Shatt	89
Total	25 500

Source: Ministry of Planning of the Hashemite Kingdom of Jordan, Middle East Regional Transport Study, interim report, March 1997.

The Sinai road network can be divided into two main groups: three major corridors, connecting the Sinai peninsula with the rest of Egypt, and a set of crossroads used for collection and distribution of traffic from and to main roads. Owing to their regional importance, more details on the three main roads are presented below.

The first corridor is the coastal road along the Mediterranean comprising part of the east-west pan-Arab road with a total length of 1,200 km. Located on the eastern coast of the Mediterranean, the corridor is an important artery which connects the Middle East and North Africa with Europe through Turkey. This highway is of significant regional value. Historically, it played an important role in trade and cultural exchange. Owing to the hostilities in the region, access from Europe and the Middle East and North Africa along this corridor has been cut for the last 49 years. With the hope of achieving peace in the region, the opening of traffic along this corridor acts as a confidence builder among the various countries it serves. The road starts from Cairo via Ismailia, crossing the Suez Canal to Qantara/Al Arish/Rafah (inside Egypt). It is a dual carriageway 10.5 metres (m) in each direction from Cairo to Ismailia and then a single two-lane carriageway after Ismailia. The total length of this road is 1,200 km till the Turkish borders. This road is

connected to the Beirut/Damascus/Amman/Baghdad route. Current traffic volumes on this corridor, according to a traffic count by the General Authority for Roads, Bridges and Land Transport for spring 1997, totalled 825 vehicles per day. The current pavement condition of the highway is considered good according to a pavement surface evaluation using the pavement condition index (PCI) procedure. The detailed assessment is shown in table 12.

The second corridor is the central road, which connects Ismailia to Auga (Nizzana) on the Egyptian-Israeli border, with an approximate length of 230 km and width of 7.5 m. Traffic volumes using this corridor, according to the above-mentioned traffic count for the spring of 1997, totalled 1,192 vehicles per day. The current pavement condition of the highway is considered good according to a pavement surface evaluation using the PCI procedure. The detailed assessment is also given in table 12.

The third corridor is the southern road, which starts from the Ahmed Hamdy Tunnel to El Shatt/Nakhl/El Temd/Ras El Naqab with a total length of approximately 260 km. The road starts from Cairo via Suez/Ahmed Hamdy tunnel to El Shatt/Nakhl/El Temd/Ras El Naqab with a total length of 400 km. This route is a dual carriageway 10.5 m in each direction from Cairo to Suez with a length of 140 km. There is also a main single road (two-lane) from Suez to Ras El Naqab with a length of 260 km. and width of 11.5 m (7.5 m carriageway + 2 m paved shoulder on each side). The road is considered the main connection between North Africa and the Aqaba ring road and beyond. The current traffic volume using this corridor, according to the above-mentioned traffic count for the spring of 1997, was 1,192 vehicles per day, the same total as that for the central road. The current pavement condition of the highway is considered excellent according to a pavement surface evaluation using the PCI procedure.

Regarding the current condition of other road links in Sinai, a recent pavement condition evaluation using the PCI procedure indicated that the general condition is satisfactory, as shown in table 13. The results indicate that about 65 per cent of the network is in very good to excellent condition and only 8 per cent in poor condition.

D. PROPOSED IMPROVEMENTS TO SINAI ROAD SYSTEMS

Although the general condition and performance of the current road system in Sinai is considered satisfactory, the expected increase in traffic demand both on the local and regional levels mandates several improvement and upgrading projects to permit the road system to cope with the anticipated high usage level. The main improvement projects include a new bridge on the Suez Canal to improve crossing movements; a set of improvement projects to enhance the level of service of the three main road corridors; and a new ring road to connect Egypt, Jordan and Israel.

1. *Suez Canal road bridge*

For the crossing system over the Suez Canal, it was considered important to provide an efficient transport facility which would reduce the waiting time to cross the Canal by ferry, enhance economic activities, and aid in promoting development of the Sinai. The limitations of the current ferry transport would make it difficult to meet the future traffic demand. Since increasing the number of the ferry crossings would create more safety hazards for ships crossing the Canal, which would be reflected in increasing insurance costs, the primary objective is to alleviate any increase in shipping costs for transport through the Suez Canal.

TABLE 12. STRUCTURAL ASSESSMENT OF SINAI MAIN ROADS

Structural assessment of main links of the coastal road

Link Name	Length km	Shape (1-3)	Texture (1-3)	Edge km	shldr km	L/C km	R/C km	A/C km	PII sq.m	Rutting km	Patch %	P.F. km
Balouza - Bir Al-Abd	48	3	3	1	0	9	0	0	0	0	3	9
Bir Al-Abd - Al Arish	78	3	2	8	0	9	0	0	0	24	35	47
Al Arish - Rafah	45	1	2	0	0	0	0	0	0	0	0	0
Al Arish - El-Kharoba	15	1	1	0	0	0	0	0	0	0	0	0

Structural assessment of main links of the central road

Abu Awgela - El-Auja	30	1	1	0	0	0	0	0	0	0	0	0
Tasa - El-Gefgafa	50	1	2	0	0	0	0	0	0	0	0	0
Abu Awgela - km 161 Ism crossing	40	1	1	0	0	0	0	0	0	0	0	0
El-Hasna - Nakhel cross Road	63	3	3	0.45	0.38	45	21	21	0	0	1	21

Structural assessment of main links of the southern road

Seder Elhitan - Nakhel	60	1	2	0	0	0	0	0	0	0	0	0
Nakhel - El-Temd	68	2	3	0	0	0	0	0	0	0	0	0
El-Temd - Ras Naqab	50	1	3	0	0	0	0	0	0	0	0	0

Source: Egyptian Highway Maintenance Management System Output, General Authority for Roads, Bridges and Land Transport.

Shldr --- Shoulder
A/C --- Alligator Cracks

L/C --- Longitudinal Cracks
PH --- Potholes

R/C --- Reflective Cracks
PF --- Plastic Failure

TABLE 13. PAVEMENT CONDITION SURVEY FOR ROAD LINKS IN SINAI

PCI range	90-100	80-90	70-80	60-70	50-60	40-50	30-40
Percentage of road lengths	5	59	18	7	3	8	0

It has been forecast that, by the year 2017, the daily traffic over the Suez Canal will reach about 60,000 vehicles, and will exceed the present 22,000 vehicles/day capacity of the Ahmed Hamdy tunnel and of all the ferry crossings to cope with this increase in traffic; it is therefore obvious that some new crossing facility is required. Work on a feasibility study was begun in early 1996, and the study recommended that the most suitable crossing structure would be a four lane road bridge of 3,901 m in length. A cable-stayed bridge with steel box girders was selected at a cost of about LE 200 million. The construction of the bridge is expected to take about four years. This bridge will be approximately four km in length, with a width of about 21m. The clearance of the bottom of the bridge above the highest water level is about 70 m, which provides enough clearance for large ships to pass under. The bridge has four lanes and will allow vehicle speeds of up to 80 km/hour.

The location of the bridge was selected after an extensive evaluation process of several candidate locations. Qantara has been selected as the most feasible location, which means that it will provide access from the northern part of the Suez Canal, while the Ahmed Hamdy tunnel will provides access for the southern part. The bridge will become a vital part of the Sinai coastal road and will contribute to the development plan of the Sinai peninsula and the development of the east Mediterranean coastal area. The main importance of the bridge is to link the two continents of Africa and Asia with an easy land access between them.

2. *Improvement of main road corridors*

(a) *The coastal road*

A project is suggested that involves widening the road along the eastern Mediterranean coast from Qantara/Bir Al-Abd/Al Arish/Rafah at the border with the area under the Palestinian Authority. This road has a total length of 220 km. It is to become a four-lane highway with a width of 10.5 m in each direction (including a 7.5 m two-lane highway and a 3 m hard shoulder). The road will serve as part of the eastern Mediterranean highway extending to Gaza/Jaffa/Haifa/Beirut/Lattakia and further to Turkey. The upgrading is envisaged to take place in two phases. The first phase, from Qantara to Bir Al-Abd involves a road length of 110 km at an estimated cost of US\$ 20 million in 1996 prices. The second phase will be from Bir Al-Abd to Al Arish and further to Rafah, the road length is 110 km and the estimated cost is also US\$ 20 million. The proposed study and construction period is expected to be two years for each phase.

This corridor will require major rehabilitation in order to meet the challenge of strengthening regional cooperation in the Middle East and re-establishing traffic on an important international corridor. It will connect North Africa with the Middle East, thus assisting the economic development of the Middle East. This fast track project will form part of the proposed coastal corridor, running along the Mediterranean coast from the Nile Delta, through the area under the Palestinian Authority and Israel to Lebanon and beyond. The implementation of this project is of particular importance in integrating the Palestinian Authority within the regional transport network.

(b) *The central road*

The proposed project involves the upgrading of the road from Ismailia to Auga at the border with Israel, with a total length of 230 km. This upgrading will be done in two phases. The first section is from Ismailia to El-Gefgafa with a length of 115 km; in addition, the existing intersections along this section will be improved. The estimated construction cost of this phase is about US\$ 20 million in 1996 prices. The second section is from El-Gefgafa through Abu Aweigila to Auga is another 115 km, with a cost of approximately US\$ 20 million. The estimated construction period is about two years for each phase. The following are some of the key justifications for improving this corridor:

(a) The central road would run from Ismailia across the Sinai and the Negev desert to the southern end of the Dead Sea, where it would link with the existing roads on both sides of the sea, the Jordan River to the north and Wadi Araba to the south through Karak; there would be a direct connection to the Jordanian network;

(b) The road would be the shortest link from Cairo to Amman and would provide direct access from the south to the West Bank highlands and their centres;

(c) The implementation of the project will enhance regional economic development by facilitating the flow of people and goods between neighbouring countries.

(c) *The southern road*

The proposed project will involve improvement, upgrading and doubling of the road from Suez to Ras Al-Naqab, with a length of 260 km. The project will involve two construction phases of 130 km each. The first phase will involve upgrading the section from Suez to Nakhl through El-Shatt. The second section will go from Nakhl via El-Temed to Ras Al-Naqab. The estimated cost for each phase is expected to be US\$ 30 million at 1996 prices, with an implementation period expected to be 48 months for both phases.

The project would realize the demands of the Arab League and the Organization of African Unity for creating a link between Africa and Asia through this link. This highway, after upgrading as an international link, will provide improved link connections through Egypt between North Africa and the Middle East region and the Arabian Peninsula

(d) *A new ring road*

It has been proposed to construct a ring road to connect Egypt, Israel and Jordan to serve the transportation needs of the area of Taba, Ras El-Naqb, Eilat and Aqaba. This road is to bypass the three areas; it would contribute significantly to the development of the area as a free zone, and would serve the transportation activities generated as a result of the free zone. Construction of such a ring road would involve the construction of about 25 km of road to link Egypt, Israel and Jordan. The road will function as an international transit link with access to the three countries. The project will provide a regional road that would join, in addition to the core parties, the North African countries and the Arabian Peninsula and the Gulf countries. Gaza will also benefit from using the road along the Egyptian/Israeli border from Rafah to Taba, which will be directly linked with the ring road. The cost has been estimated at US\$ 1.5 million for the necessary studies and at some US\$ 30 million for implementing that part of the project within Egypt. The study period needed for planning, traffic and other engineering issues is about six months. However, the implementation of this project at this stage depends entirely upon the political situation in the region. The regional importance of this project can be stated as follows: the link is located in an area connecting three countries where port activities are important issues. The implementation of the project will enhance regional economic development by facilitating the flow of people and goods among the three core countries.

E. FUTURE PERFORMANCE OF THE SINAI ROAD NETWORK

To ensure the satisfactory performance level of the Sinai road network, several key issues should be carefully considered. This will secure acceptable design, maintenance and operation levels for the network. There are three key considerations that are vital to the success of the road system: consideration of the special nature of the Sinai region; technical considerations; and new trends in transport policies.

1. *Special features of the Sinai region*

Egypt is mainly divided into four different regions: the Western Desert, the Eastern Desert, the Nile Valley, and the Sinai peninsula. The Sinai might be the most distinct region with respect to its geological formation, topography and extreme climatic conditions. Understanding of such physical characteristics would help a great deal not only in roadway planning, but also in physical planning in the whole region.

The Sinai's geological history has greatly affected the peninsula's physical appearance and geography, its flora and fauna, and the people who have lived and settled there over the years. In the Sinai, it is possible to distinguish three regions that differ radically from one another. The first lies to the north and consists of sand dunes and Quaternary deposits. These deposits correspond to the sites of ancient river beds which tend to be fossil streams and may, from time to time, be active and fossil beaches that were formed by the changing level of the Mediterranean Sea during the glacial and interglacial periods that so typified the Quaternary period 2 million years ago. This region is fairly homogenous, and consists of a rather flat and uniform landscape that is broken up towards the south by a series of vast rock islets; these correspond to the limestone of the Cretaceous period (60 million years ago). The desert is also broken by the vast bulk of Gebel (Mount) Maghara, made up of more ancient limestone and sandstone of the Jurassic period. To the south of the mountainous system of Gebel Maghara the second region begins, occupying the central part of Sinai; here the landscape is marked by the numerous and extensive outcroppings of limestone dated to the Tertiary period, which also make up the immense highland of el Tih, the true geographic centre of the Sinai peninsula. This highland extends toward the south and is surrounded by a constellation of other limestone outcroppings from the Cretaceous period; these separate the highland from granitic and volcanic rocks. This is the third region into which the Sinai peninsula is divided. Here the landscape changes radically and abruptly; the variegated sandstone and limestone are replaced by two types of rock: granite and basalt, both magnetic in contrast with two other types, limestone and sandstone, which are sedimentary in nature. Granite and basalt are both effusive rocks produced by volcanic activity on the bottom of the ocean. The volcanic zone is bounded, especially to the west, by extensive outcroppings of Quaternary rock.

The Sinai has harsh weather conditions, an extremely hot summer, and a winter that is moderate by day and extremely cold at night. Heavy rains frequently hit the Sinai, usually in December and January, causing considerable damage to roads and buildings. The Sinai region, especially the southern part and the coastal line of the Eastern Desert, have some distinguished topographic characteristics which form a network of wadis (valleys) collecting water from all over the region into main streams (bigger valleys). These give the running water higher momentum, forming what are known as flash floods, which usually have a destructive effect till they reach the sea.

Most of the towns and villages in the Sinai lie in the course of, or close to, these flooding streams. These streams can be divided into the following basins:

(a) The Suez Gulf basins to the west of the Sinai, with an area of approximately 14,900 sq km. Along the coastal road, there are several points where the floods, running from east to west, intersect the road, causing severe damage to the roads and the surroundings. These points are mainly the following: Wadi Seder to the north of Seder city, Wadi Gharandal to the north of Ras Mal'ab, Wadi Wasit to the south of

Hamam Pharaon, and Wadi Feiran to the south of Blaaiem. As for the road between Saint Catherine road and the coastal road, it is also exposed to frequent floods, which are very dangerous owing to the steep slopes of the valley of Feiran, which also connects to many tributaries, increasing the flood discharges into the Gulf of Suez.

(b) The Gulf of Aqaba basin to the east of the Sinai covers an area of 12,500 sq km; along the coast of the Gulf, there are several crossing points. The flash floods in this region are extremely dangerous because of the short distance between these valleys and the coastal road, and the very steep slopes of the course of these floods, which leads to a substantial high speed flow of water sweeping construction in front of it. From these wadis (valleys), crossing or leading to the coastal road are the following: wadi Umm Adwa which runs till Nab, Wadi Dahab which flows till Dahab town, Wadi Watir, one of the most dangerous flood locations in the region, which runs till the city of Nuweiba, and to the north of the city some small wadis, though very important with respect to flood discharges, among which are: El-Malha, Umm Maghara and El-Mahash. The danger of these floods affects not only the crossing points of the flood course, but extends to the stretches of road which were built as part of the flood valley to avoid the rough topography of the region. Examples of these portions of road are that part between Nuweiba and Taba which was severely damaged by the flash floods in 1987, and the road between Dahab and the city of Nuweiba, which is divided into two parts—one of which is aligned at the bed of one of the tributaries of Wadi Kid and the other part in the bed of a tributary of Wadi Dahab.

(c) The third region of catchment basins in the Sinai is the Valley of Arish basins, with an area of about 19,500 sq km; these could be considered the largest catchment area in the Sinai. It is estimated that the yearly average flood discharge in these basins is about 60 million cubic metres.

A field survey carried out at the sites hit by the flash floods in the Sinai, produced the following observations:

(a) In many locations, such as Dahab city, on the delta of wadi Dahab and Nuweiba city on the delta of Wadi Watir, no works have been installed, such as culverts or pipes, to protect the road from such destructive floods.

(b) There are almost no earth dams in the whole region, except for the one constructed at Wadi Gharandal.

(c) Almost all urban and touristic developments have grown up spontaneously, and the effect of flash floods has not been taken into consideration in the planning process of such developmental activities.

(d) Roadside drainage systems have not been taken into account in the design of most of the roads in the Sinai region, which caused more deterioration of the road sections affected by such floods.

(e) The continuous cleaning of the culverts and pipe system under the road is not well maintained, as some of the bedoins intend to block these culverts and use them in retaining the water behind, in order to store flood water for later use.

As an economic geometrical solution, the road surface at the intersection points of the road with the flooding course could be lowered to reach the same level as the natural level of the wadi. The survey also recommended some pre-alarm system to predict flood behaviour in the dangerous flooding areas; however, the nature of such a system was not reviewed in detail in the survey.

2. *Technical considerations*

(a) *Traffic*

The traffic projections for the coming 10 and 20 years mandate the widening of the corridor to a four-lane highway, which is necessary in order to avoid reaching unacceptably high volume/capacity ratios which will reduce significantly the level of service. The proposed geometric improvements in terms of upgrading and adding lanes to the existing sections of the main roads will be sufficient from the geometrical and safety points of view.

Regarding the current composition of traffic crossing the Suez Canal, as given in table 10, it is evident that trucks constitute a very high percentage of the traffic, up to 87 per cent in one section. This is much higher than the typical values of 10 to 35 per cent on other Egyptian roads. However, despite these high percentages of heavy vehicles, the current actual number of trucks is still relatively small and therefore the resulting pavement damage would be limited, as evidenced by the good performance of Sinai roads in terms of pavement.

The projected future number of trucks, however, is expected to reach high levels. Future traffic crossing the Canal is expected to be in the range of between 15 and 45 times the current traffic level. There are several reasons for this increase.² The most important is associated with the projected substantial increase in regional trade volume. As noted above, this is expected to increase exponentially in the coming years to reach levels as high as 700 times the current levels of some trade sectors. The expected increase in the number of trucks and consequently the number of axle loads would naturally produce much higher levels of damage to the existing pavement structures.

(b) *Maintenance*

The increasing numbers of trucks and the increasing demand to transport trade commodities will impose additional strains on the existing road network. Therefore, it is of utmost importance to plan for appropriate maintenance strategies under these new circumstances. Relying on conventional techniques for maintenance without planning is not possible. It is now well established worldwide that an ad hoc approach to pavement maintenance will not provide value for money or adequate service levels. A responsive pavement maintenance management system (PMMS) is therefore needed to provide a reliable system for keeping the road network at a level of service acceptable to the users and to ensure that the road network functions properly throughout its design life. The following includes a brief description of a PMMS framework developed for the General Authority for Roads, Bridges and Land Transport in Egypt.

A pavement maintenance management system provides the framework for decision-making in pavement maintenance based upon an objective approach. Although the complexity of highway maintenance cannot be reduced to a series of mathematical expressions, its management should be subjected to a rigorous systems approach to ensure that policies are developed on a basis of need, that performance is monitored, and proper financial control is exercised. There is a logical sequence of steps in the preparation of a pavement maintenance programme.

For a pavement maintenance management system to be effective, it is important that adequate attention be given to each step in the process. If the policies are wrong, the standards inappropriate, or the resources not allocated in accordance with priorities, the money will be wasted no matter how efficient the implementation of the work.

² Japan International Cooperation Agency (JICA) and Transport and Communications, the Arab Republic of Egypt, "The Detailed Design Study on the Project for Construction of the Suez Canal Bridge in Egypt," Final Report, Executive Summary, January 1997.

The overall concept of a maintenance management system is to maintain the road network, a major capital investment which should show an adequate return on expenditure. Any failure to maintain a road network properly leads to rapid deterioration, with consequent increases in vehicle operating costs and accidents. Failure to carry out maintenance activities in due time can result in the need for expensive reconstruction.

In order to plan and implement cost-effective highway maintenance, it is necessary to translate the broad requirements and needs of the highway authority into detailed standards which will control maintenance procedures. The mechanics of meeting the objectives should be described in detail as codes of practice, standards and specifications. These provide the prescription governing working practices through the maintenance organization.

Establishing real maintenance needs and priorities should be accomplished by comparing standards against recorded conditions. The intermittent needs for emergency repairs to road items will be detected through inspections. It is always necessary to develop criteria for determining objective maintenance priorities based on the importance of the maintenance activity and the importance of the road being maintained.

In general terms, the rate at which road pavement surfaces deteriorate and the consequent frequency of maintenance are closely related to the nature and volume of traffic on the road. Traffic level is also a numerical measure of the economic importance of a road. It is therefore appropriate to rank roads in order of traffic levels to assist in setting maintenance priorities. There is a case for awarding roads of strategic importance a higher priority than those indicated by traffic levels.

One of the major elements in the success of the pavement maintenance management system is the available budget for maintenance programmes. The total financial requirement for road maintenance based upon measured need should be produced for comparison with demands for funds. The initial budget preparation should compare the application of costs with the master list produced by a prioritizing process. Allowance must also be made for emergency work.

Road inventory data are required to construct budget estimates for maintenance tasks and activities. Since each local unit produces budget estimates for each task and maintenance activity, these estimates should be summarized and submitted for approval. The production of budget estimates is directly related to the measurement of the total physical resources required (equipment, labour and materials). If the total budget allocation for maintenance to be provided is less than the estimated need, then a reduction in the proposed maintenance programme will be required. The maintenance programme may be reduced by referring to the costed, prioritized master list of tasks incorporated in the budget estimate.

Given the necessary resourcing data and road inventory information, work programmes can be produced incorporating the resources required to complete tasks, including labour, equipment and materials. This will enable the work and the requisite resources to be predetermined, allocated and efficiently organized. Detailed work schedules providing quantities of work to be achieved in programme periods should accompany the implementation of individual maintenance tasks.

As maintenance is implemented, it is clearly desirable that expenditure should be controlled and overexpenditure in any area identified so that corrective measures can be taken.

The budget allocation for maintenance tasks can be converted into physical resources and expressed in work programmes and detailed work schedules. By controlling the consumption of resources as work progresses, compliance with the budget allocation can be achieved. Productivity control and quality control

should also be exercised on a continuous basis to ensure the efficient and cost-effective execution of maintenance tasks.

Finally, an essential element of a systematic approach to maintenance management is that performance should be monitored. To be effective, maintenance management must be dynamic, reflecting changes in need and indicating the provisions required to meet demand and allowing for measurement of both the effectiveness and performance of policies. In order to monitor and review the maintenance operation, a series of performance indicators must be defined against which the effectiveness of the maintenance can be measured. Clearly, such indicators need careful interpretation. They should be capable of providing a general and broad impression of performance. They can also provide, however, a means of supporting policy change.

Considerable effort is required to devise performance measures, but when data are available on an annual basis from operation of the maintenance management system, it will be possible to establish trends and promote changes in policy and standards, and to identify key issues for future attention.

IV. THE ROLE OF THE PRIVATE SECTOR IN FINANCING TRANSPORT INFRASTRUCTURES

A. BACKGROUND

The recent sharp drop in the amount of donor funds for the developing world has compelled Governments to seek alternate financial resources in order to complete the construction of their infrastructures. New approaches have developed worldwide which call for greater participation of the private sector in the endeavour to build or maintain major infrastructures. In this respect, a country should be viewed as a corporate entity, with Government providing the policy parameters and support, and the private sector providing commercial expertise and ingenuity. This calls for a clear definition of their respective roles.

Privatization has been defined as private enterprise involvement in sectors and activities traditionally owned and operated by government entities. The objectives of privatization are varied and are aimed at relieving the financial and administrative burdens of the government; at promoting competition and thus improving efficiency; at increasing the productivity of enterprises; at stimulating private entrepreneurship and investment to accelerate the growth of the economy; and at reducing the size of the public sector and its monopolistic and bureaucratic tendencies.

There are many forms of private provision of public sector activities. These include build-own-operate (BOO); build-operate-transfer (BOT); build-rent-operate-transfer (BROT); rehabilitate-operate-transfer (ROT); and many others. Other more traditional forms that have been established for many years include concession schemes, leasing and management contracts.

To date, private funding of transport infrastructure has been limited and the problem of attracting private capital should not be underestimated. In Central Europe, it has been difficult to attract foreign financing for the most attractive road projects without a generous State contribution. The situation can be worse in some places in the Middle East, as in the area under consideration in the Sinai peninsula, especially with a very limited traffic demand that is not expected to increase dramatically, at least in the short run. Private sector financing of transport road infrastructure must be a partnership between the public and private sectors. The facility, the road itself, must not be considered a separate entity, but has to be viewed as an element in an overall development scheme of an area or a region.

There are a number of complex social, economic and national goals involved in the privatization of road infrastructure, but in general these goals are:

1. To relieve the financial burden on the Government of undertaking capital expenditure;
2. To assist in reducing the size of the public sector, particularly the debt attached to costs;
3. To relieve the Government of the administrative burden of maintenance services;
4. To improve efficiency and productivity of services rendered;
5. To stimulate private entrepreneurship and investment in the economy;
6. To transfer technology (equipment and systems);
7. To improve the quality of the staff through training and motivation;

8. To contribute to national economy policy targets.

Private participation in highway construction, paid for by revenues generated, has been growing dramatically in many countries worldwide. Indonesia, Malaysia and the Philippines have been pioneers in this respect.

The worldwide increase in private financing of transport infrastructure began in the mid-1980s, particularly for assets for which:

- (a) Access can be limited (tunnels, bridges, and major highways);
- (b) Projected traffic volumes are high;
- (c) Reliable cash generation, and foreign exchange earnings are expected.

The contractual arrangement is an important element to the success of the privatization process. Therefore, the contract should clearly ensure the following:

- (a) Provide the concessionaire with sufficient time to recover his/her investment and to motivate him/her to maintain the infrastructure facility at the appropriate level;
- (b) Ensure that the road authority, in setting the tariffs and road users charges, would provide sufficient scope for the concessionaire to make a fair commercial return on the investment;
- (c) Provide sufficient flexibility in the tariff policy to allow for introducing innovative pricing arrangements and adjustments of tariffs;
- (d) Ensure that the road and its associated infrastructure facilities are utilized as a common-user road on a commercial basis;
- (e) Recognize that the new road concessions will initially involve institutional uncertainties, and that arrangements must include a mechanism for easy adaptation;
- (f) Identify clear separation of commercial functions and responsibility (concessionaire) from regulatory functions and responsibilities (road authority);
- (g) Recognize that concessions could involve some changes in the legislative structure and that amendments to existing laws would be required.

Private financing of infrastructure as a policy, though implemented in many parts of the world, is virtually non-existent in the ESCWA region, apart from Egypt's recent initiative. The new Egyptian trend towards privately financed roads has evolved from the previously established toll road system in that country. The following sections briefly review the Egyptian experience with both the toll road system and the privately financed roads using a BOOT approach.

In order for a highway to be classified as a successful toll project, it should be a special high-traffic, high-income generator with significant potential for growth. It should be the only limited access road in the corridor and its potential users should be familiar with the toll system. This latter point raises questions about the potential for success for such BOT highway projects in the ESCWA region.

Before a private sector firm participates in infrastructure investment, it should conduct a thorough financial analysis of the project under consideration to prove that it will provide a reasonable rate of return. For highway projects, the inputs are varied and include project cost and financing, inflation rates and toll escalation schemes and revenues, construction periods, traffic projections, operation costs and taxes.

B. PRIVATELY FINANCED TRANSPORT SYSTEMS

1. *Egyptian systems*

(a) *Toll roads*

Toll roads in Egypt were introduced in 1984, when the Government passed Law No. 146 of 1984, directly after making the Cairo-Alexandria desert road a two-lane road and before opening it to traffic. The law was aimed at improving the level of service of the road, ensuring the highest safety measures for road users, and providing better riding quality. These improvements were to be financed through the levying of toll fees for different types of vehicles. Law 146 added a new provision to Law 84 of 1968 for public roads, which states that, with respect to express roads—which have to be specified by a ministerial decree issued by the Cabinet and for which there are alternative free routes—it is possible to impose toll fees for their use. However, the military, the police and ambulances are to be exempted from paying any fees.

Since the issuance of Law 146, some roads in Egypt have been converted to toll roads after being upgraded and raising their level of service. The current rates do not reflect the vehicle mileage of the vehicles. Unfortunately, the system has proved unable to fulfill its intended function of providing the necessary financing for maintenance and operation. This may be due to several key factors, including but not limited to the following:

(a) The toll/ride rate is relatively low if compared with any other system in the world. In addition, these low rates have been in effect since 1984.

(b) A good portion of the collected toll is directed to administrative activities, leaving a relatively smaller portion for maintenance and operation.

(c) The current toll rates are not proportional to the damaging effects caused by different vehicle types.

Recognizing the above fact, the General Authority for Roads, Bridges and Land Transport in Egypt decided to introduce some other forms of private participation in the road system. Specifically, the Authority defined a series of road projects in the Western Desert of Egypt; these form the basis of a network of investment freeways, dual carriageways and main roads which will be financed, constructed, maintained and operated entirely by developers, through the BOOT system.

(b) *Investment road projects in western Egypt*

The present policy of the Government of Egypt is aimed at encouraging the flow of investment and improving the quality of infrastructure services by introducing new and innovative horizons for investment. In an effort to lift some of the burdens of financing infrastructure development projects by shifting these burdens to the private sector, the Government has initiated a number of BOOT projects. The power generation sector has allowed the private sector to participate in this strategically sensitive sector and, for the first time, to build, own, operate and transfer a thermal power station in the Delta area, at an approximate cost of US\$ 450 million, supported by the World Bank. A legal amendment was introduced in 1996 enabling the Egyptian Electricity Authority to purchase power from the private sector to resell it to State distribution companies. Two further BOOT powerplants are planned: a US\$ 600 million pumped storage scheme in the Ataqa plateau close to Suez and a US\$ 350 million wind farm at Zafarana on the Gulf of Suez. In the transportation sector, a tender document for a new airport in the area of Marsa Alam, in the Red Sea governorate some 270 km south of Hurgada, was recently issued by the Civil Aviation Authority. The telecommunications sector is expected to be opened to BOT projects in 1997.

Given that the existing road network in the Western Desert is built to low design standards, simply to link the various oasis towns and mineral extraction areas to Cairo and the Nile Valley, the General Authority for Roads, Bridges and Land Transport therefore defined a series of road projects in the Western Desert of Egypt which will form the basis of a new network of investment freeways, dual carriageways and main roads, financed, constructed, maintained and operated entirely by developers.

Because of the complexity and the diversity of the project, the Authority decided to have the feasibility studies for the projects done by an international consultant with the required capability and experience in such projects, not only in technical terms, but more important, in legal and economic terms. This choice reflects the importance and the sensitivity of the project.

The project concessionaire will be allowed to charge reasonable tolls, and also will be provided with land adjacent to and at either end of the new roads to develop agricultural, industrial, housing or touristic developments. The road corridors selected are as follows:

Alexandria - El-Fayoum	199 km
El-Fayoum - Dayrout	210 km
Dayrout - El-Frafra	263 km
Dayrout - Aswan	433 km
El-Kharga - east of El-Owinat	520 km
Al-Saloum - Wadi Al-Natroon	508 km

A brief description of each of the above corridors is presented below.

1. *Alexandria - El-Fayoum*: this project is expected to be, in its final stage, a high-speed, grade-separated freeway. However, at the outset of the project, it will be constructed as a dual two-lane carriageway with an approximate length of 199 km, to link the existing coastal road, Alexandria - Matruh, on the outskirts of Alexandria to a point some 50 km directly west of El-Fayoum. Two link roads are expected to be needed to connect the existing Cairo - Alexandria desert road at about midway and to the outskirts of El-Fayoum town.

2. *El-Fayoum - Dayrout*: this project is to be constructed finally as a dual two-lane expressway. It is envisaged that the project will be phased; the first phase will be a single carriageway, two-way road of approximately 210 km, linking the Alexandria - El-Fayoum road and the Dayrout - El-Frafra road. Two link roads are expected to connect the main road to the town of Beni Mazhar and the other to El Minya city, with a total length of some 75 km. Conversion to a dual carriageway will be proposed by developers and be duly allowed for within the bid. The timing of such upgrading will be taken into consideration in the evaluation process of the proposal.

3. *Dayrout - El-Frafra*: this is a high-standard regional single carriageway, two-way road, consisting of 263 km running east-west. The road links Dayrout town, on the west bank of the Nile, to the oasis town of El-Frafra. Developmental activities, which are expected to take place along with this project, are mainly agriculture and land reclamation.

4. *Dayrout - Aswan*: this is expected to be, at the outset of the project, a single carriageway two-way road with a length of approximately 433 km, linking the junction of the Dayrout - El-Frafra road with the El-Fayoum - Dayrout road southward to Aswan. The main alignment should be planned to extend further south to the border as a part of the pan-African road. However, the road ends at Aswan. Included in this project are some 246 km of link roads connecting this road with the existing regional Cairo - Aswan road west the Nile.

5. *El-Kharga - East of El-Owinat*: this is a single carriageway, two-way road, of approximately 520 km. It is to be constructed to connect the El-Kharga, Baghdad and Paris oases and then further link directly south and then westwards to east of El-Owinat. No formal link roads are expected to be built in this project.

6. *Al-Saloum - Wadi Al-Natroon*: in its initial stage, this road will consist of a single carriageway, two-way road of about 508 km. This road would ultimately connect the Libyan Arab Jamahiriya with the proposed BOOT road network, covering western Egypt down to Aswan and further to El-Owinat.

Several link roads are expected to be constructed to connect the Mediterranean coastal towns of Sidi Baranni, Matrouh, Fuka and El-Alamein, with the proposed road estimated at some 245 km.

To enable investors to participate in such BOOT road projects, some legal amendments have been made recently. Law No. 84/1968 concerning public roads has been amended to authorize the General Authority for Roads, Bridges and Land Transport in Egypt to negotiate concession agreements with potential investors, and to give the concessionaire more rights concerning resources exploitation and toll collection.

Successful completion of this road network is expected to benefit Egypt in several areas, mostly by the creation of a development axis and new investment fields along the roads, increasing job opportunities, and encouraging migration from Cairo. This latter social issue is of crucial importance in view of the ever-increasing population in the Nile Valley and major cities. The road infrastructure would provide safe, high quality, high speed transport corridors for long distance trips and could serve as the backbone of the Egyptian section of the north-south trans-African highway network.

A major drawback of this scheme proposed by the Authority is that there is no specific goal or policy for either the individual roads or the network as a whole, other than an idealized developmental benefit. These roads do not solve congestion problems in the project area or region. In some corridors, there is no traffic demand at present nor for the near future. The issue of traffic demand in such a developmental road network has not been given first priority by the Authority, which concentrates on the supporting investment activities as main sources of income generation for the developers. The integration of different State organs in terms of development plans has not been accomplished. In other words, each ministry has its own plans and views concerning the development of the Western Desert, even if these plans and views contradict other plans in other ministries.

2. *Transport privatization in Jordan*

The Jordanian Government is restructuring the public institutions that deal with transportation with a view to improving their efficiency and gradually eliminating subsidies, recovering costs and adopting commercial performance criteria. Improvement-oriented investment will continue to be crucial to the process of upgrading efficiency and quality of service. Since transport and distribution account for a substantial share of the cost of delivered goods, the transport sector itself has to be competitive to economize on the use of scarce resources and to increase market-oriented activities with a view to encouraging regional and rural development and enhancing competition. In short, investments in the upgrading of the transport sector are necessary to promote this sector's supporting role in the development of the economy.

However, not all this investment will be coming from the public sector. Removing obstacles to a more prominent role for the private sector is a key feature of Jordan's current economic policy. Supporting rather than pre-empting private sector initiatives, by allowing private businesses to assume a role in transport infrastructure development, ownership, and management, is now the official position of the Government.

In particular, the Jordanian Government recognizes the need for major upgrading of the road transport system and the addition of new links to serve the evolving regional market. A number of vitally important

projects are planned, and in view of their high overall costs, the Government plans to seek a mix of private and donor financing to supplement its own contribution.

Although effective cooperation is essential between the public and private sectors, it is recognized that private sector financing will need to grow substantially to meet projected demand for infrastructure investment. One way in which this could be done is through the proposed road maintenance fund (RMF). While repairs and construction of most new links in the road system would be the public sector's responsibility, the Jordanian Government plans to shift funding for the maintenance of the road system to road users through road-user charges that are channelled through a dedicated RMF. These resources could be managed on a more commercial basis with the involvement of the private sector and the road users.

The Jordanian Government is therefore considering the establishment of a 20 million Jordanian dinar (JD) fund to finance renovation works on the Kingdom's roads. The proposal to establish the RMF, which was first announced in June 1997, was the outcome of a workshop held in Amman. This included representatives of six countries and a World Bank team who together discussed how to allocate resources to this fund. The question is now whether to continue spending from the Kingdom's annual budget on road maintenance or to have a dedicated fund for this purpose. Workshop participants suggested that the annual amount budgeted be channelled to the fund and that additions be made by collecting fees from driving licenses, road tolls, transit fees and traffic violation fines. The introduction of new resources such as advertisements and taxes to help to raise money for the RMF is also being suggested.

The Ministry of Public Works is allocating about JD 14 million from the budget for road renovations. The proposed fund will have an independent decision-making mechanism through its board of directors that would represent the public and private sectors. However, the implementation of road repair and maintenance would remain in the hands of the ministry. It is now proposed that the official Council for Development would discuss whether to approve the proposal in the form of a temporary bylaw. The World Bank is strongly supporting the scheme but would not extend any loan for the RMF. Instead, the Bank's role will focus on sponsoring some parts of the project such as a feasibility study and experts to work on setting up the fund. The Jordanian Government hopes to raise JD 20 million for the first year of the project and to increase this sum in the years ahead.

Other priority projects in the transportation sector include a restructuring of public transport and the development of a light-rail system. The planned expansion and development of Aqaba port, vital to Jordan's export-led development strategy, includes the construction of new jetties for passengers, industry, and special cargo handling. Planned expansion and upgrading of the system at Queen Alia Airport should also play a vital role in facilitating the arrival of tourists. The Jordanian Government envisions that a substantial part of this planned development will be financed by the domestic and foreign private sectors. The Aqaba international airport is under active consideration for development with private sector participation. The rapid construction of the Shidiya rail line is critical to the future of the railway sector. The Jordanian Government is considering private financing as part of a concession agreement for private operation and maintenance of rail services on this line. The Aqaba Railway Corporation will retain ownership of rail infrastructure and equipment to be leased to the private operating company.

In particular, the EU partnership agreement with could act as a major instrument for spurring change in Jordan. One way that the EU partnership will promote regional economic cooperation will be through European financing of regional projects. Just as important for business is the role an outside force such as the EU can play to help indirectly to alter the public-private sector balance in Jordan's economy.

V. CONCLUSIONS

A. THE SERIOUS CHALLENGE OF PEACE

It has been stressed throughout this study that the ability of the road transport system in the region to cope with the increased demand due to the Middle East Peace process is being challenged. It has been estimated that the level of regional trade of some trade sectors is expected to be as much as 700 times the current level within the next 20 years. Although Egypt has been emphasized here as a case-study, most of the impact levels reviewed would also be applicable to other core countries and areas (Israel, Jordan and the area under the Palestinian Authority). Several projects have already been launched to improve the performance of the road infrastructure system in the region. However, in view of the challenges facing the region as a whole, it is felt that further improvement projects should be planned and executed on a unified regional basis. This requires that special studies and in-depth analysis must be carried out to provide guidance on how the transport system in the region can face these new challenges. A brief description of those challenges is presented below.

B. THE NEED FOR INTEGRATED TRANSPORT SYSTEMS

The regional road network must be considered as an element in the complete chain of a transport system, serving not only national interests, but the development of trade between countries of the region as well as the social integration of different communities.

There are significant opportunities for regional projects with high pay-offs in such fields as tourism. Such direct regional cooperation efforts would be enhanced by the creation of an appropriate transport framework.

Currently segregated transport networks cannot stand in a competitive market against giant international transport consortia. The new plan for an efficient system envisages the creation of a link consisting of an interrelated and completely joined network made up of several cross-border networks. For the ESCWA region, this is still far in the future, and proposals made for cooperation in this field have not materialized into a plan of action for implementation.

Improved transport between the countries of the region is a prerequisite to taking advantage of their geographic locations. A coordinated transport network will prove more efficient and will obviate such redundancies as the several airports currently operational in the Arab core area. The work of the Regional Economic Development Working Group has served to clarify such matters, and to define more precisely the concept and details of multimodal transport for the region. Containerization is a main requirement in multimodal transport in particular. However, integrating container transport into the regional network does not involve easy choices: the establishment of an inland container depot is a costly investment and cannot be justified under the conditions of the current low density traffic. This, and other developments in the region's transport infrastructure, will have to await a new and more promising economic situation resulting from the completion of the peace process.

C. THE REQUIREMENT FOR NEW FACILITIES AND TECHNOLOGIES

The road network, in addition to connecting production and distribution centres in the region, should have major facilities for storage along the route as well as outside densely populated areas. Harmonized documentation arrangements and the adaptation of a unified approach to border-crossing formalities would add to the smooth and speedy flow of freight and passengers between the different countries of the region.

Advanced information technology has opened a new era in the control of a large number of operations in the shortest possible time.

D. THE IMPACT OF REGIONAL LIBERALIZATION

Even though domestic reforms and multilateral liberalization will be the main engines of greater transport integration in the ESCWA region, there is also a clear need for measures aimed directly at regional interaction. These include reducing divergences in the regulatory framework (including customs nomenclatures), improving road and rail transportation and the ability to move goods between countries, and developing facilities for regional export financing. To the extent possible, these measures should be harmonized with the best prevailing international standards and practices.

The EU-Mediterranean agreements provide a possible basis for regional customs cooperation because they contain protocols on this topic. However, efforts should be made to adapt these agreements to regional patterns.

Both in the EU and the ESCWA region, interregional and intraregional transport networks are now under consideration at a conceptual stage. The railway is being considered as a case for possible transport development to serve both EU and ESCWA region interests. Recent developments in regional projects include joint efforts to consider the possibilities for the establishment of a regional network in the northern part of the ESCWA region through which a rail line is envisaged to link Iraq, Jordan, the Syrian Arab Republic and Israel. How far this would develop in the form of identified projects will depend on the final outcome of the peace process and how the ESCWA member countries are going to plan for regional cooperation.

E. INTERNATIONAL TRADE LIBERALIZATION

In any case, regional integration must proceed in well-formulated stages within the globalization process triggered by the WTO. However, at present, integration among the Mashreq countries is limited. In fact, the conclusion of bilateral agreements between the EU and individual Mediterranean countries may constitute a challenge inasmuch as it could lead to the emergence of a "hub and spokes" system in the Mediterranean region, in which the EU would be the hub and the individual Mediterranean countries would represent spokes. Thus, the EU-Mediterranean agreements may be unable to bring about the desired revitalization of imports from the Middle East and may paradoxically draw investments towards the EU. At the same time, the engagements taken at the multilateral and regional level may represent an opportunity, inasmuch as they lead the countries and territories of the region—albeit indirectly—into the adoption of a common framework of shared rules in a number of areas, in particular to the extent that the provisions contained in the Euro-Mediterranean agreements regarding the enhancement of regional cooperation and the harmonization of laws and standards are fully implemented. Within this broad setting, preliminary attention should be given to customs cooperation.

Changing the mode and pattern of demand associated with economic reform or emerging free trade agreements (GATT and/or GATS) will also reorient trade flows and require both investment in new links and increasing attention to the harmonization of trade and transport regulations. These agreements would raise the level of competition not only within the local markets but also with international competitors. A careful analysis of the impact of these agreements on the transport sector needs to be conducted to identify the necessary protection actions to be taken on the one hand, and the international commitments to be made on the other hand.

F. SETTING UP TRANSPORT DATABASE

One of the main problems in conducting specific studies in the transportation sector is the lack of well documented information on the different elements of the transportation system, including the supply side—existing infrastructure and associated facilities—and the demand side—including the use of such infrastructure. A comprehensive transport database on a national and regional level is therefore a prerequisite to the efficient use of the existing transport infrastructure.

G. CHANGING THE ROLE OF GOVERNMENT

Until recently the transport sector in most countries in the ESCWA region was dominated by government control. Government, in addition to providing transport infrastructures, did intervene in the field of transport operation for political and or socio-economic reasons. In order to promote economic and social integration between countries, many bilateral transport agreements have been signed between the States in the region and have included elements for establishing multinational transport companies in both passenger and freight regional transport services. These companies operated in a field that was and is still dominated by the private sector, but, owing to heavy government support, they were in a privileged position with regard to their financing. With the new trend of economic reforms taking place in most countries in the region, and with a more transparent policy allowing free competition between all operators, these operators will face severe challenges. There is also the general feeling that the transport sector has had more than its appropriate share of investments over the last two decades. Hence transport authorities will face the challenge of seeking different ways to raise the necessary funds. These matters have to be considered seriously by the concerned transport authorities in the region, and the role of government in the development of transport systems should not be underestimated

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