

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

JORDAN INDUSTRIAL ESTATES CORPORATION (JIEC)  
THE HASHEMITE KINGDOM OF JORDAN

STUDY  
ON  
INDUSTRIAL DEVELOPMENT  
IN  
THE SOUTHERN DISTRICTS  
OF  
THE HASHEMITE KINGDOM OF JORDAN

FINAL REPORT  
SUMMARY

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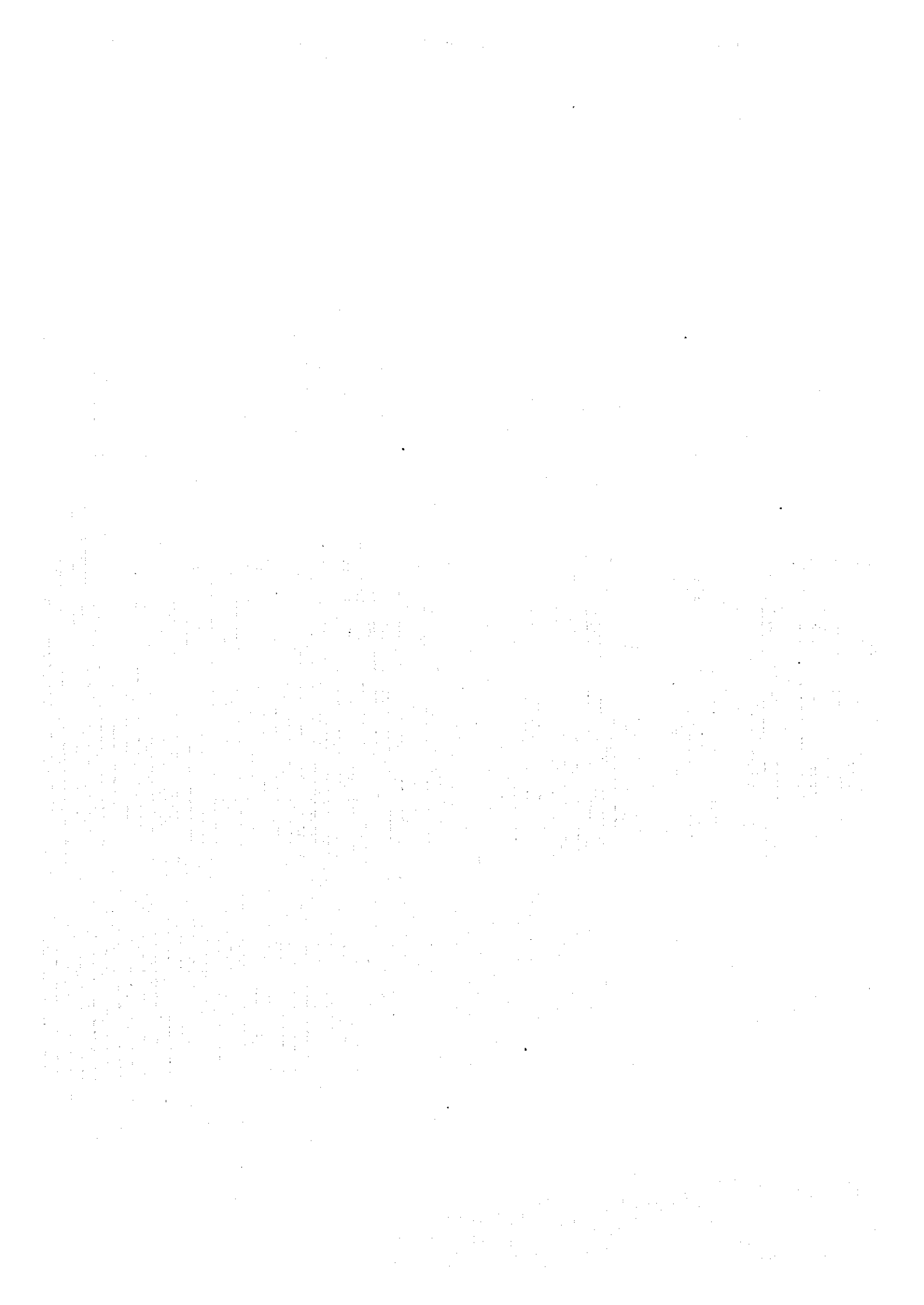
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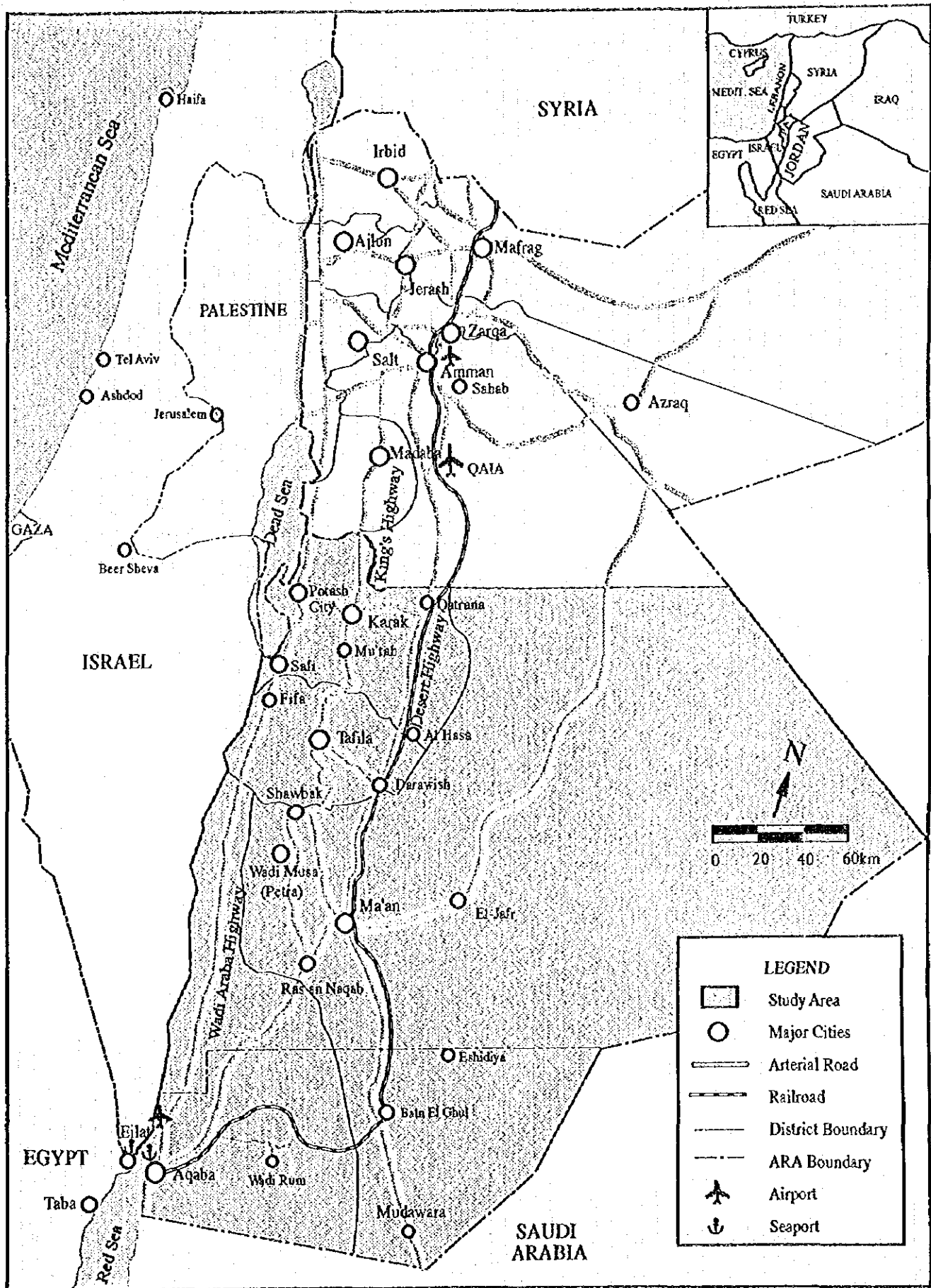
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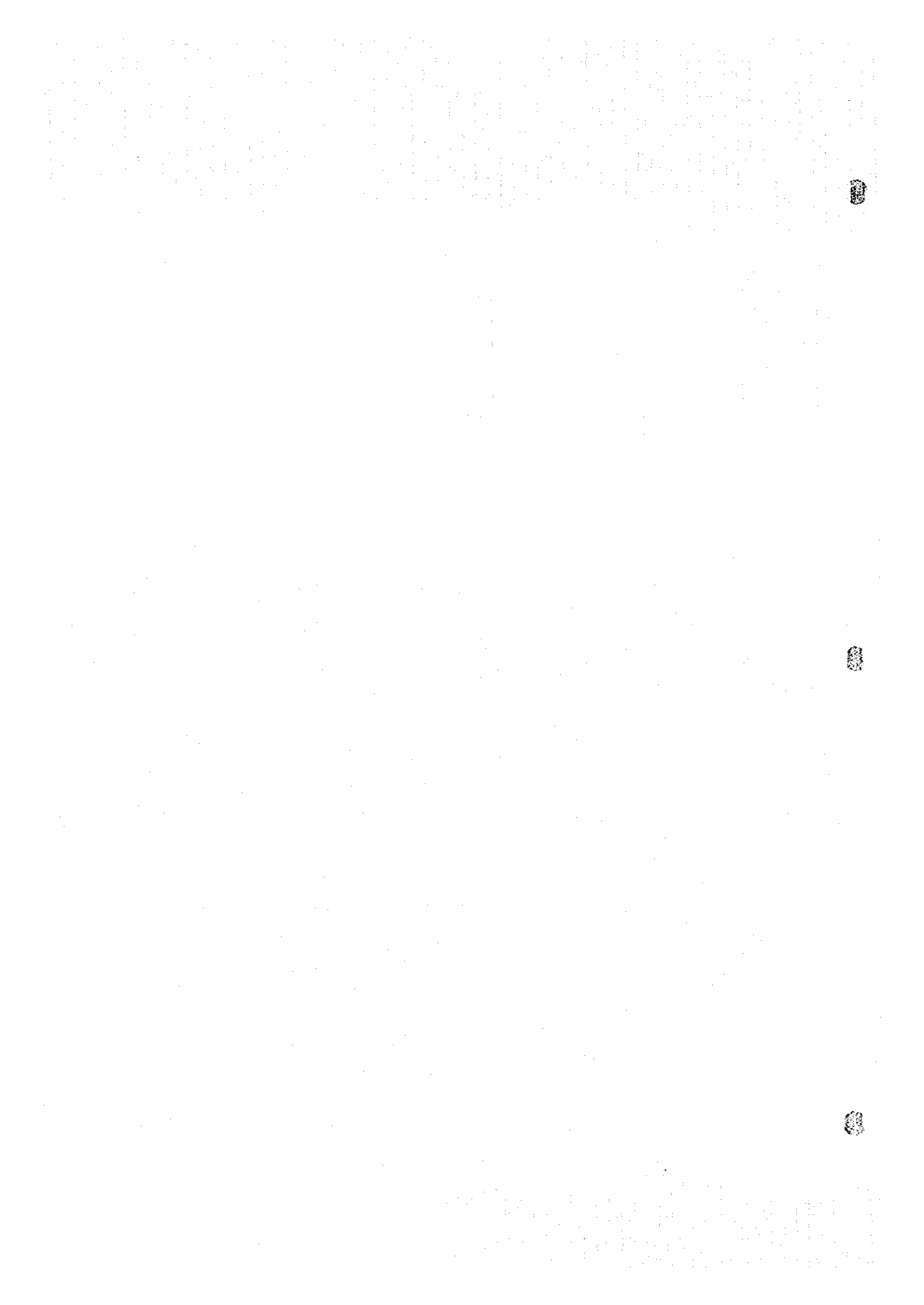
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LOCATION MAP



# EXECUTIVE SUMMARY

## OBJECTIVES AND STUDY AREA

01 *Objectives* : The Study on Industrial Development in the Southern Districts of the Hashemite Kingdom of Jordan (The Study) has the following three objectives:

- To prepare a master plan for the industrial development in the Southern Districts;
- To conduct a preliminary feasibility study (Pre-F/S) on an industrial estate with the highest potential among the candidate sites; and
- To conduct technology transfer to the Jordanian counterpart personnel.

02 *Study Area* : The Study Area roughly encompasses the southern half of Jordan comprising the four districts of Karak, Tafila, Ma'an, and Aqaba with approximately 43,000 km<sup>2</sup>.

03 *Scope* : It should be noted that the purpose of the Study is not to draw up a detailed industrial development plan for every part of the Study Area, but rather to show the basic direction of the industrial development in the Southern Districts and its role in the national economic development. It should also be noted that industrial infrastructures which are considered prerequisite for the takeoff of industrialization have been identified and profiles were worked out rather than formulating individual industrial projects.

## OUTLINE OF THE STUDY

04 *Outline* : Industrial development in the Southern Districts has close relevance with the national economic development and socioeconomic environment in the Middle East region as well, either directly or indirectly. Preparation of the industrial master plan for the Southern Districts has, therefore, firstly started with the formulation of a development scenario for the country, then has proceeded through several steps to provide the major outputs as described below.

### (a) Development Scenarios

- Basic policy direction
- Scenario for the Middle East Peace Process
- Industrial development scenario for the Southern Districts
- Macro-economic targets for the industrial development in the Southern Districts

(b) **Industrial Development Strategies for the Southern Districts**

Nine strategies have been worked out from the following 3 viewpoints:

- Strengthening of spatial linkage (formulation of regional development axes and economic development bases);
- Priority development of the social and economic infrastructures in the Southern Districts; and
- Upgrading of basic industrial infrastructures in the Southern Districts.

(c) **Overall Industrial Development Plan**

The overall plan for the Southern Districts comprises the following three principal components.

- Selection of target industrial categories and product mix, and strategy for the sub sector with highest potential
  - Target industrial categories: 13 categories
  - Product mix: More than 100 products
  - Sub-sector with the highest potential: Chemical industry
- Selection and evaluation of the high priority/priority projects
  - High priority projects: 3 projects
  - Priority projects: 11 projects
- Selection of the priority industrial estates

(d) **Selection of an Industrial Estate with the Highest Potential**

- An industrial estate with the highest potential
- Pre-F/S of the selected industrial estate

**INDUSTRIAL DEVELOPMENT SCENARIO**

05 *Development Scenario for Jordan* : The development scenario for Jordan as a whole, which should set the overall frame for the industrial development in the Southern Districts, has been worked out considering the following two factors.

- Development policy for the country
- Possible scenarios for the Middle East Peace Process and activation of the Middle East region

Of the two possible alternative policies, the self-reliant policy alternative is recommended to be adopted considering that national economic management in line with the self-reliant policy, if successful, could solve the chronic economic illness of deficit on



trade balance, vulnerability to the fluctuation of external economies, etc. and improve the productivity of the country's economy by strengthening the private sector economy as well as narrow down the regional socio-economic gap in the country.

Three alternative cases were contemplated for the scenarios for the Middle East Peace Process and activation of the Middle East region as follows.

- **Ideal Scenario**  
Major issues concerned will either be solved or realized in the short-term before the year 2000, including the lift of UN sanction against Iraq, a comprehensive Middle East peace agreement including independence of Palestinian State and restoration of the Golan Heights to Syria, and a regional agreement for free trade and investment.
- **Optimistic Scenario**  
Major issues will either be solved or realized in the middle term before the year 2005.
- **Conservative Scenario**  
Major issues will remain to be solved or realized after the year 2010 except UN sanction against Iraq to be lifted before 2010.

Assuming that the self-reliant policy is adopted under all the cases, the macro economic target for the country in terms of manufacturing sector development could be set for the year 2010 under ideal and optimistic scenarios as follows with the following assumptions.

- Under the ideal scenario, per capita GDP and share of the manufacturing sector of Jordan in the year 2010 should reach those of Thailand in the year 1994.
- Under the optimistic scenario, value-added of manufacturing sector should grow at an annual average rate of 7.8%

| Scenario   | VA of Manufacturing sector (JD million) | Number of employees               |                      |
|------------|---|-----------------------------------|----------------------|
|            |   | In Manufacturing sector (persons) | Industrial area (ha) |
| Ideal      | 2,506                                   | 383,727                           | 4,590                |
| Optimistic | 1,482                                   | 226,861                           | 2,714                |

**06 Development Scenario for the Southern Districts :** To determine the role and basic direction of the development of the Southern Districts and their industrial development scenario, the following advantages were taken into account.

- Relatively well-developed economic infrastructures including an international

- trading port and an international airport at Aqaba and electricity supply;
- Relatively rich groundwater resources at Dici;
- Phosphorous mineral and limestone resources and the Dead Sea mineral resources;
- Tourism resources including Petra, Wadi Rum and the Gulf of Aqaba;
- Though to a limited scale, agricultural and livestock products in the southern Ghor area, highland area and the Ma'an district; and
- Sharing long borders with Saudi Arabia and Israel, and easy access to Egypt.

Considering the above, the basic direction to be followed and roles to be played by the development of the Southern Districts should be:

- To establish a new growth pole of the country besides the Central-Northern Districts;
- To strengthen the getaway function of the Southern Districts for the country;
- To form an important core region for international economic/industrial cooperation;
- To increase GRP (*Gross regional product*) of the Southern Districts;
- To alleviate poverty, both in terms of abject and absolute poverty;
- To narrow the socio-economic development gap with the Central/Northern Districts;
- To keep the development gap among the four Governorates in the Southern Districts within a permissible range;
- To develop the agriculture and tourism sectors in the Southern Districts; and
- To utilize the mineral resources available in the Southern Districts.

Industrial development in the Southern Districts should be realized in the scenario with the following major factors.

- Mineral resources-based industries should be promoted aiming at attaining higher value-added;
- Processing of agricultural and livestock products should be promoted;
- Assembling type industries should be expanded in the vicinity of Aqaba, utilizing the international trading facilities;
- High quality labor-intensive products should be manufactured utilizing medium technology/medium wage level labor force of Jordan;
- Tourism related manufactures should be reinforced;
- Material industry, namely housing materials for increasing population and construction materials for the expected large-scale infrastructure projects, should

be promoted;

- Foreign investors utilizing the strategic location of the Southern Districts, well-developed transport infrastructures, relatively low wage labor with good academic background, should be attracted;
- Cooperation with the neighboring countries, in particular Saudi Arabia, Egypt, and Israel as well as West Bank and Gaza by means of utilizing their comparative advantages should be sought for the industrialization in the Southern Districts which share long borders with the neighboring countries;
- Intra-region linkage among the four Southern Districts should be strengthened in order to supplement the defects including limited population and labor force and small accumulation of urban and industrial facilities, as well as to make best use of the strong points of each district.

On the condition that determined and vigorous efforts for the industrial development in the Southern Districts be made both by the public and private sectors both in terms of structural infrastructures and non-structural infrastructures including policy and institutional measures, share of the value-added of the manufacturing sector of the Southern Districts in the national total should sharply be increased in 2010. In the Study, two cases were assumed where the share will be either about doubled or tripled as follows.

| Case | Policy       | Scenarios for the Middle East Peace Process | Share (%) of VA of Manufacturing Sector of the Southern Districts | Targets in 2010 |                     |                      |
|------|--------------|---|---|-----------------|---------------------|----------------------|
|      |              |   |   | VA (JDmillion)  | Employment (person) | Industrial Area (ha) |
| 1    | Self-reliant | Ideal                                       | 10  | 251             | 31,400              | 376                  |
| 2    | Self-reliant | Ideal                                       | 15  | 376             | 47,100              | 563                  |
| 3    | Self-reliant | Optimistic                                  | 10  | 148             | 18,600              | 222                  |
| 4    | Self-reliant | Optimistic                                  | 15  | 222             | 27,800              | 333                  |

## INDUSTRIAL DEVELOPMENT STRATEGIES FOR THE SOUTHERN DISTRICTS

07 *Strengthening of Spatial Linkage* : Aiming at the exploitation of the development potential of the Southern Districts and achievement of self-reliant economy for the Southern Districts, intra-region linkage should firstly be strengthened. Strengthening of spatial linkage should proceed step by step as shown below.

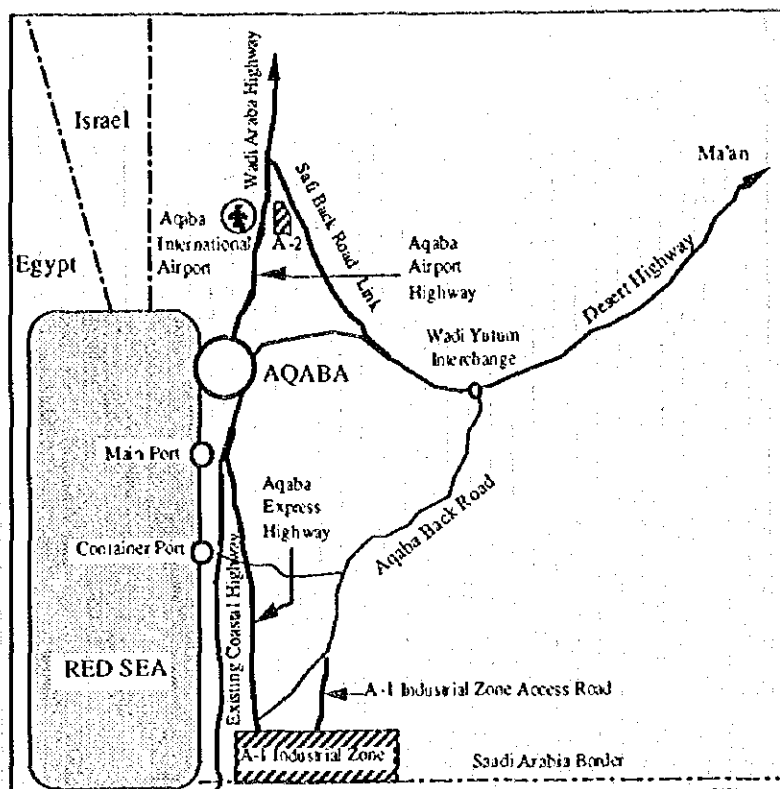
|  | 2005                      | 2010                      |
|--|---------------------------|---------------------------|
| Intra-region linkage in the lower south (Ma'an and Aqaba)    | Regional development axes | Economic development base |
| Intra-region linkage in the upper south (Karak and Tafila)   | Regional development axes | Economic development base |
| Inter-region linkage between the upper and lower souths      | -                         | Regional development axes |
| Inter-region linkage between the upper south and the capital | -                         | Regional development axes |
| International linkage  | -                         | Regional development axes |

08 *Priority Development of the Infrastructures in the Southern Districts* : Socio-economic infrastructures as a whole in the Southern Districts should be developed, with high priority being placed in the infrastructure development in the country. Particular attention should be paid to water supply and road transportation. Dici groundwater should be used suitably for the development of the Southern Districts and the Capital region.

A trial calculation of the use of Dici groundwater is shown below.

|                                      | Unit: million m <sup>3</sup> /year |               |               |
|--------------------------------------|------------------------------------|---------------|---------------|
|                                      | Alternative A                      | Alternative B | Alternative C |
| Planned Supply Volume to Amman       | 72                                 | 41            | 9             |
| Future Use in the Southern Districts | 53                                 | 84            | 116           |

The proposed road network around Aqaba City is shown below.



Future Development Plan for the Road Network Around Aqaba City

09 *Upgrading of Basic Industrial Infrastructures in the Southern Districts* : Strategies have been worked out for the following six fields:

- (a) Strengthening of basic industrial infrastructures,
- (b) Strengthening of institutional and legal framework,
- (c) Enhancement of value-added,
- (d) Export promotion,
- (e) International cooperation and promotion of foreign direct investment, and
- (f) Conservation of natural environment

**TARGET CATEGORIES, PRODUCT MIX AND DEVELOPMENT STRATEGY FOR CHEMICAL INDUSTRY AS STRATEGIC SUB-SECTOR**

10 *Target Categories and Product Mix* : Target categories (ISIC 3 digits) are selected in the light of the advantages/disadvantages of the four Governorates. More than 100 promising products in these target categories have also been selected for the Southern Districts.

## 11 *Development Strategies/Projects of the Strategic Industrial Sub-sector :*

### (a) Selection of the strategic industrial sub-sector

Chemical industry has been selected as the strategic industrial sub-sector for the Southern Districts for the following reasons:

- Effective utilization of local mineral resources,
- Presence of accumulated know-how and capital for the existing chemical industry
- Enhancement of value-added,
- Exportable products with high competitiveness, and
- Adequate water resources and supply capacity in the Southern Districts.

### (b) Formulation of the strategies/projects

The following products of the chemical industry should be developed in the Southern Districts:

- Potash-related products,
- Table salt,
- Industrial salt and related products,
- Magnesium-related products,
- Bromine-related products,
- Phosphate rock-related products (phosphoric acid; DAP, NPK fertilizer, etc.), and
- LNG receiving terminal

## **SELECTION CRITERIA AND SELECTED PRIORITY/HIGH PRIORITY PROJECTS**

12 *Selection and Profiles of the Priority/High Priority Projects:* The Identified projects have been assessed in the light of the criteria comprising urgency, economic viability, social benefits, environmental conservation, project implementability, regional development effect and multiplier effects and 14 projects have been selected accordingly as priority projects. Three projects with high potential have been selected among 14 priority projects based on additional selection criteria including sizable mutual linkage effects. The 14 priority projects are:

- (a) Establishment of the Southern Region Research and Technology Center (high priority project);
- (b) Establishment of the Southern Region Small and Medium Industries Center (high priority project);
- (c) Establishment of a community college or a university in Aqaba;

- (d) Establishment of an engineering department in Ma'an branch of Mu'tah University;
- (e) Strengthening of vocational training centers (high priority project) ;
- (f) Establishment of soft loans for subsistence and small enterprises;
- (g) Strengthening of the Investment Promotion Law;
- (h) Introduction of VAT (Value-Added Tax);
- (i) Establishment of the Southern Region Authority;
- (j) Strengthening of the cooperation between the GIE and FZ and study of the appropriateness of transferring the authority over EPZ from FZC/MOF to JIEC/MOIT;
- (k) JIEC capacity building;
- (l) Promotion of the A-1 site as a heavy/chemical industrial zone;
- (m) Provision of well-facilitated workshop apartments; and
- (n) Strengthening of the Aqaba Gulf environmental monitoring program.

#### **SELECTION AND EVALUATION OF PRIORITY INDUSTRIAL ESTATES**

13 *Selection of the Priority Industrial Estates* : All the 10 identified candidate sites have been evaluated considering 5 major factors: locational conditions, site conditions, investment demands, progress of approval procedure and actions taken, as well as special considerations. The A-2 site in the Aqaba district has been selected as the highest priority industrial estate and 3 other sites, one each in the districts of Karak, Tafila, and Ma'an, have been selected as priority ones. Pre-F/S was conducted for the A-2 site based on the topographic map with the scale of 1/5,000 with 2m contour interval prepared in the Study.

14 *Evaluation of the Priority Industrial Estates* : Based on the investment demand survey and other factors, the roles and functions, area size and implementation schedule of the industrial estates are proposed. The construction costs and the evaluation results of the industrial estates are summarized below.

Basic Indicators, Roles and Functions, Implementation Schedule, Construction Costs and Evaluation for each Industrial Estate

| IE site | Area Size (gross, ha) | Purposes             | Implementation Schedule/1 | Investors        | Market   | Type of Industries                                     | Costs (JD million) /2 | Sales Price (JD/m <sup>2</sup> ) | Generation of employment                     | FIRR(%) /3 | EIRR (%) | Repayment of loans   |
|---------|-----------------------|----------------------|---------------------------|------------------|----------|--|-----------------------|----------------------------------|--|------------|----------|----------------------|
| A-2     | 200                   | Economic Development | Short term                | Mainly foreign   | Foreign  | Machinery, Fabricated metal, Transport equipment, Food | 35.4 (41.7)           | 25.0                             | 28,000 (18,000 is from manufacturing sector) | 7.8 (9.1)  | 13.2     | Capable of repayment |
| M-2     | 80                    | Economic Development | Medium term               | Mainly domestic  | Domestic | Leather products, Glass, Wood & furniture              | 11.7 (15.1)           | 20.0                             | 7,000 (4,500 is from manufacturing sector)   | 1.5 (3.1)  | 6.3      | Not studied          |
| T-2     | 80                    | Economic Development | Long term                 | Mainly domestic  | Domestic | Food & beverage, Glass, Chemical                       | 12.9 (15.1)           | 15.0                             | 6,000 (4,000 is from manufacturing sector)   | -          | 2.0      | Not studied          |
| K-3     | 35                    | Regional Development | Medium term               | Domestic/foreign | Domestic | Wearing apparel, Fabricated metal, Chemical            | 6.3 (7.9)             | 15.0                             | 8,000 (5,000 is from manufacturing sector)   | -          | 0.2      | Not studied          |

Notes: (1) JD1.00=US\$1.41=Japanese Yen 151

/1: Short term; before 2000, Medium term; 2001-2005, Long term; 2006-2010

/2: Figures are in 1996 prices. Figures in brackets show the costs including ones outside the sites of the industrial estates.

/3: Figures in brackets show the FIRRs in the case the custom duties are excluded.

Since the opportunity cost of capital (OCC) in Jordan is considered to lie in the range of 5-10%, the A-2 IE Project can be considered as financially feasible. As for the M-2 and the T-2 sites, it is recommended that further detailed analyses be made of the selling price, size of the development and timing for implementation to determine their viability.

Although the K-3 IE Project may not be justified for implementation from the viewpoint of financial and economic viability, construction of the estate in Karak Governorate might be appropriate from the regional point of view.

JIEC and MOP strongly support the development of an industrial estate in Karak and the land for the IE site has been already purchased. Thus, the Study Team agrees that the K-3 IE Project should be implemented if the following conditions are fulfilled.

- The site should be so selected as to minimize the land preparation cost in consideration of topographic and geological conditions;
- Development should be phased in steps with the increase of investment demand;
- Strong investment incentives including exemption of corporate income tax should be provided; and
- Financial viability should not be evaluated only from the viewpoint of a single K-3 IE Project, but from all the JIEC projects as a whole.



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## ABBREVIATIONS

### International/Foreign Organization

|          |   |  |
|----------|---|--|
| ASEAN    | : | Association of Southeast Asian Nations                                   |
| CARE     | : | Cooperative for American Relief Everywhere                               |
| COMECON  | : | Council for Mutual Economic Assistance                                   |
| E.E.C    | : | European Economic Community  |
| EIB      | : | European Investment Bank   |
| IAMTI    | : | International Aviation Management Training Institute                     |
| IBRD     | : | International Bank for Reconstruction and Development                    |
| ICAO     | : | International Civil Aviation Organization                                |
| ILO      | : | International Labor Organization   |
| IMF      | : | International Monetary Fund  |
| IUCN     | : | International Union for the Conservation of Nature and Natural Resources |
| JICA     | : | Japan International Cooperation Agency                                   |
| JOCV     | : | Japan Overseas Cooperation Volunteers                                    |
| OECD     | : | Overseas Economic Cooperation Fund, Japan                                |
| PLO      | : | Palestine Liberation Organization  |
| T. A. P. | : | Trans - Arabian Pipeline Company   |
| UN       | : | The United Nations   |
| UNDP     | : | United Nations Development Program                                       |
| UNESCO   | : | United Nations Educational, Scientific and Cultural Organization         |
| UNICEF   | : | United Nations International Children's Emergency Fund                   |
| USAID    | : | United States Agency for International Development                       |
| WB       | : | World Bank   |
| WTO      | : | World Trade Organization   |

### Jordanian Governmental Organization

|     |   |                           |
|-----|---|---------------------------|
| ACI | : | Amman Chamber of Industry |
|-----|---|---------------------------|

|       |   |   |
|-------|---|---|
| APA   | : | Aqaba Port Authority                                      |
| ARA   | : | Aqaba Region Authority                                    |
| ARC   | : | Aqaba Railway Corporation                                 |
| CAA   | : | Civil Aviation Authority                                  |
| CBJ   | : | Central Bank of Jordan                                    |
| CD    | : | Custom Department   |
| CSC   | : | Cooperative Service Councils                              |
| CVDB  | : | City and Village Development Bank                         |
| FJCC  | : | Federation of Jordan Chambers of Commerce                 |
| FZC   | : | Free Zones Corporation                                    |
| GCEP  | : | General Corporation for Environmental Protection          |
| GOJ   | : | Government of Jordan                                      |
| HCST  | : | The Higher Council for Science and Technology             |
| HRC   | : | Hijaz Railway Corporation                                 |
| HTC   | : | Hotel Training Center                                     |
| IDB   | : | Industrial Development Bank                               |
| IPC   | : | Investment Promotion Corporation                          |
| ISM   | : | Institution for Standard and Metrology                    |
| ITD   | : | Income Tax Department                                     |
| JEA   | : | Jordan Electricity Authority                              |
| JEDCO | : | Jordan Export Development & Commercial Center Corporation |
| JIC   | : | Jordan Investment Corporation                             |
| JIEC  | : | Jordan Industrial Estates Corporation                     |
| JNCP  | : | Jordanian National Committee for Population               |
| JNCW  | : | Jordanian National Committee for Women                    |
| JUH   | : | Jordan University Hospital                                |
| JVA   | : | Jordan Valley Authority                                   |
| LPITC | : | Local and Public Industrial Technology Center             |
| MEMR  | : | Ministry of Energy and Mineral Resources                  |
| MMRAE | : | Ministry of Municipalities, Rural Affairs and Environment |
| MOC   | : | Ministry of Communication                                 |
| MOE   | : | Ministry of Education                                     |
| MOF   | : | Ministry of Finance                                       |
| MOH   | : | Ministry of Health  |
| MOHE  | : | Ministry of Higher Education                              |
| MOIT  | : | Ministry of Industry and Trade                            |

|      |   |  |
|------|---|--|
| MOL  | : | Ministry of Labor                          |
| MOP  | : | Ministry of Planning                       |
| MOT  | : | Ministry of Transport                      |
| MPWH | : | Ministry of Public Works and Housing       |
| MWI  | : | Ministry of Water and Irrigation           |
| NIC  | : | National Information Center                |
| NRA  | : | Natural Resources Authority                |
| OSHI | : | Occupational Safety and Health Institute   |
| PHC  | : | primary health care                        |
| PTC  | : | Public Transport Corporation               |
| RGC  | : | Royal Geographic Center                    |
| RJ   | : | Royal Jordanian Airline                    |
| RMS  | : | Royal Medical Services                     |
| RSCN | : | Royal Society for Conservation of Nature   |
| RSS  | : | Royal Scientific Society                   |
| SSIH | : | Small Scale Industrial and Handicraft Fund |
| TCC  | : | Telecommunication Corporation              |
| TDI  | : | Training and Development Institute         |
| TPC  | : | The Ports Corporation                      |
| TTC  | : | Trade Training Center                      |
| TTI  | : | Testing and Training Institute             |
| UDTC | : | Urban Development Training Center          |
| VTC  | : | Vocational Training Corporation            |
| WAJ  | : | Water Authority of Jordan                  |
| WRC  | : | Water Resources Corporation                |

Jordanian Non-Governmental Organization & Private Company

|      |   |  |
|------|---|--|
| APC  | : | Arab Potash Company                                |
| GUVS | : | General Union of Voluntary Societies               |
| IJC  | : | Indo-Jordan Chemical Company                       |
| JCFC | : | Jordan Cement Factories Co. Ltd.                   |
| JISD | : | Jordan Investment and Southern Development Company |
| JMTS | : | Jordan Mobile Telephone Service                    |
| JNCW | : | Jordan National Committee for Women                |



|        |   |   |
|--------|---|---|
| JODICO | : | Jordan Dead Sea Industries Company          |
| JPMC   | : | Jordan Phosphate Mines Company Ltd.         |
| JPRC   | : | Jordan Petroleum Refinery Co. Ltd.          |
| NEPCO  | : | National Electric Power Company             |
| NHF    | : | Noor Al-Hussein Fund for Social Development |
| NJFC   | : | Nippon Jordan Fertilizer Company Ltd.       |
| QAF    | : | Queen Alia Fund for Social Development      |
| SCC    | : | South Cement Company                        |
| SPIC   | : | Southern Petrochemical Corporation          |

#### Others

|      |   |                                    |
|------|---|------------------------------------|
| ACA  | : | Aminan Civil Airport               |
| AIA  | : | Aqaba International Airport        |
| ATPS | : | Aqaba Thermal Power Station        |
| BOO  | : | Built, Operation and Own           |
| BOT  | : | Built, Operation and Transfer      |
| BPSD | : | Barrel Per Stream Day              |
| CIS  | : | Commonwealth of Independent States |
| DAP  | : | Diammonium Phosphate               |
| EIA  | : | Environmental Impact Assessment    |
| EPZ  | : | Export Processing Zone             |
| FDI  | : | Foreign Direct Investment          |
| FEED | : | front - end engineering and design |
| FMP  | : | Fused Magnesium Phosphate          |
| FTZ  | : | Free Trade Zone                    |
| FZ   | : | Free Zone                          |
| GDP  | : | Gross Domestic Product             |
| GIE  | : | General Industrial Estate          |
| GST  | : | General Sales Tax                  |
| GVA  | : | Gross Value Added                  |
| HJR  | : | Hijaz Jordan Railway               |
| HTPS | : | Hussein Thermal Power Station      |
| IEE  | : | Initial Environmental Examination  |
| IES  | : | Industrial Extension Services      |

|       |   |  |
|-------|---|--|
| ISIC  | : | International Standard Industrial Classification |
| LNG   | : | Liquefied Natural Gas                            |
| MAP   | : | Monaammonium Phosphate                           |
| MEED  | : | Middle East Economic Digest                      |
| MEFTA | : | Middle East Free Trade Agreement/Area            |
| MENA  | : | Middle East and North Africa                     |
| NGOs  | : | Non-Governmental Organizations                   |
| ODA   | : | Official Development Aid                         |
| PNA   | : | Palestinian National Authority                   |
| QAIA  | : | Queen Alia International Airport                 |
| RLU   | : | Remote Line Unit                                 |
| SC    | : | Steering Committee                               |
| SEZ   | : | Special Economic Zone                            |
| TBBPA | : | Tetrabromobisphenol - A                          |
| TDS   | : | Total Dissolved Solids                           |
| VAT   | : | Value-Added Tax                                  |
| WID   | : | women in development                             |

# I. BACKGROUND AND THE OBJECTIVES OF THE STUDY

## 1-1 Background and Objectives

In the Jordanian economy, performance of the agriculture sector and the industry sector has been relatively inactive while mining and service sectors and public sector have been dominating in GDP. In the total production, the public sector including state-owned enterprises accounts for the major portion. In terms of the employment, the share of the public sector is also the majority, accounting for about 51% of the total.

Trade balance has been in red figures due to the weakness of the export sector, while substantial import of manufactured goods including both consumer goods and capital goods as well as intermediate goods have been indispensable because of the weak structure of the manufacturing industry in the country. The balance has been made up by the external financial aid and fund transfers by the Jordanian workers overseas.

In terms of the regional development, population as well as economic activities have been concentrated in the Northern and Central Districts where the capital city, Amman is located. Population is sparse in the Southern Districts and the economy in the area has been lagging behind the national development.

On the other hand, the Southern Districts are richly endowed with mineral resources of phosphate and limestone as well as potash and other minerals in the Dead Sea located at the west side of Karak Governorate. Water resource is relatively well-endowed in the form of groundwater. Infrastructures have also been well-developed, in particular power and transport facilities including port, airport, road and railway. The Southern Districts have the advantage of sharing long border with Saudi Arabia to the south and east and with Israel to the west. Via the Red Sea, Egypt is eventually a neighbor of Jordan. In other words, the Southern Districts have strong locational advantage and potential for industrial development yet to be exploited.

In addition, a ray of hope has recently appeared in the improvement of the relationship between the Arab countries and Israel. Jordan already has established diplomatic relations with Israel in October, 1994. PLO and Israel are trying to reach agreement on the future self-government of the West Bank of the Jordan River as well as Gaza. If peace framework for the Middle East Region is established, Jordan would have a big positive turning point for changing and strengthening its economy by benefiting from its strategic location in the region.

It is urgent and of vital importance, therefore, to realize the industrialization of the Southern Districts by making the best use of its potential, for their own sake as well as for the benefit of the whole country. The objectives of the Study on Industrial Development in the Southern Districts of the Hashemite Kingdom of Jordan (the Study) are to work out strategies and formulate priority projects aiming at materializing the industrialization of the Southern Districts.

Under such circumstances, the Government of Jordan (GOJ) requested technical assistance of Japanese Government to conduct a master plan study of industrial development in the Southern Districts of Jordan. The Scope of Work (S/W) for the Study was concluded between Jordan Industrial Estates Corporation (JIEC) and Japan International Cooperation Agency (JICA) in June 1995.

The principal objectives of the Study are: 1) to prepare a master plan for industrial development, 2) to formulate a conceptual plan for the optimum industrial estate in the Southern Districts and conduct its pre-feasibility study, and 3) to perform technology transfer to Jordanian counterpart personnel.

#### 1-2 Execution of the Study

The Study has been carried out by the consortium of the consultants contracted by JICA. The consortium comprises the following Japanese consulting firms:

Nippon Koei Co., Ltd.  
Japan Industrial Location Center  
Regional Planning International Co., Ltd.

On the Jordanian side, a Steering Committee (SC) was formed in order to coordinate and to extend support for the activities of the Study with thirteen ministries/corporations and organizations with the Director General of the Jordan Industrial Estates Corporation (JIEC) as Chairman.

It is noted that ARA and FZC were added as members of SC during the initial stage of the Study for the efficient and effective conduct of the Study at the request of the Study Team.

Of the SC members, two (2) members were invited to Japan to receive technology transfer in the field of industrial development including lectures for the history and institutional settings of the industrialization in Japan and site visits to industrial estates/parks as well as discussions on the methodologies for the formulation of the

**industrial master plan of the Southern Districts.**

**The Study was initiated in October 1995 and was completed in March, 1997 for the gross time period of about 16 months, of which 158 days have been devoted to the study in Jordan before the completion of the Study.**



## II. DEVELOPMENT SCENARIOS FOR JORDAN

### 2-1 Objectives of the Socio-Economic Development for Jordan

The objectives of the socio-economic development for Jordan are stipulated in the New Third Economic and Social Development Five-Year Plan (1993 - 1997) which has been formulated by the Government of Jordan in due consideration for the Medium-Term Economic Program (1989 - 1993) and Medium-Term Economic Structured Adjustment Plan (1992 - 1998) prepared with International Monetary Fund (IMF) and International Bank for Reconstruction and Development (IBRD) as follows.

- Economic liberalization, improved investment environment
- Development of natural resources, particularly water and energy
- Development of new export/sales routes, expansion of traditional markets, development of export sectors
- Balance between human resources and economic resources
- Expanded production sector employment

In addition, it may be proposed that the followings be included among the objectives.

- Substantial reduction of the vulnerability of the Jordanian economy with regard to the external political and economic environment
- Enhancement of income level and eradication/alleviation of poverty
- Narrowing the development gap among the regions, in particular between the Northern/Central and the Southern Districts
- Decreasing the trade deficit, in particular in terms of manufactured goods

### 2-2 Development Scenarios for Jordan

#### 2-2-1 Key Factors to be Considered

Future development scenario for Jordan is affected by various factors, the followings being the most significant ones.

- Development policy alternatives for Jordan
- Scenarios or possible outcomes of the peace process and activation of the Middle East region

Development scenario or future perspective of Jordan will be determined by the interaction between the two.

## 2-2-2 Development Policy Alternatives for Jordan

The past and current Jordan's economy is characterized by its dependence in various aspects both domestically and internationally as follows, though degree of the dependability fluctuates by time.

### International dependability

- Dependability on imported goods
- Dependability on the earnings by Jordanian migrant workers
- Dependability on ODA countries
- Dominance of the mineral ores in the exports
- Big number of foreign workers in Jordan mainly engaged in agriculture and service sectors

### Domestic Dependability

- Regional concentration of population and economic activities in the Central and Northern Districts
- Dependability on the Government sector in terms of GDP and of employment

Owing to the peculiarities of the Jordan's economy characterized by the above-mentioned two kinds of the dependability, Jordan has been suffering chronic illness in its economy including:

- Big trade deficit due largely to the import of manufactured goods,
- Vulnerability to the fluctuation of the economies of the foreign countries where Jordanian migrant labors are working and to the change of political environment in the Middle East,
- Low labor productivity resulting in small domestic products and weak competitiveness on the world market, and
- Demerits of over-concentration of population and economy in the capital region, in particular the severe water shortage which is already prevalent in the region at the present moment.

Two options can be conceived as policy alternatives:

- Dependent policy
- Self-reliant policy

The dependent policy is a continuation of the policy adopted in the past.

Merits of this alternative are;



- Economic management of the economy is an extension of that in the past and no sizable change is expected. Smooth and efficient handling of the economy, therefore, can be expected.
- Under ideal situation, regional cooperation in the international perspective including the establishment of free trade and investment areas in the Middle East region with the similar agreement with EU and others can be expected. Jordan can develop the economy fully utilizing its comparative advantages including its strategic location with expanded market for its products.

Weak point of this policy is the inability of curing the chronic economic illness, namely:

- Jordan's economy continues to be vulnerable to the fluctuation of business conditions of external economies, either prosperity or recession as well as political and economic ties with other countries.
- Being dependent on the public sector economy with lower labor productivity, GDP growth rate ought to remain at low level and competitiveness of Jordanian products on the world market remain weak.
- By continuing to be dependent on the economy of the capital region, the regional economic gap between the capital region and the others is likely to be further widened which is against the basic government policy.

Self-reliant policy aims at reinforcing the constitution of the domestic economy of the country to alleviate the vulnerability of the country's economy in relation to the external political and economic environment.

Merits of this policy alternative are:

- Stable economic management can be expected with the domestic economy less vulnerable to the prosperity and recession of the external economies and change of external political environment.
- All the fruits of the economic activities will be given to the country and in the long-term perspective, high economic growth can be expected.

Weak points are:

- Until attaining self-reliance, approach run or preparation and transition period will be needed. The growth rate in the short-run, therefore, might be lower than that under dependent policy.
- In order to change the system, high adaptability and vigorous efforts would be required for the public and private sector entities relative to the case of Dependent Policy alternative.

Though quantitative comparison between the two alternatives with regard to the effects on the enhancement of the socio-economy of Jordan in the future is not possible, it is recommended that self-reliant policy be adopted because:

- Long-time economic illness of Jordan could be cured by materializing this policy.
- Being endowed with able manpower and relatively well-established educational system as well as located at the strategic location in the Middle East region, Jordan has adequate potential to reinforce its manufacturing and export sectors which are strong enough to support the self-reliant economy of Jordan.
- Though it would take time to realize self-reliant economy and would require continued vigorous efforts of all the entities and people in Jordan, sound and stable economy can be finally realized through the adoption of this policy and accomplishing the targets of the policy.

### 2-2-3 Possible Scenarios for Middle East Peace process and Activation of the Middle East Region.

Major factors of the scenarios comprise:

- Economic relations between Jordan and Gulf countries
- Establishment of autonomy and independent country for the Palestine
- Conclusion of peace treaty between Syria and Israel
- Comprehensive peace agreement for the Middle East region
- Regional trade and investment agreement

Although the outcomes of the peace process and activation of the Middle East region would substantially affect the economy of Jordan, it would be a difficult task to make projection. Several cases or alternative scenarios are, however, conceived based on the time range when the outcomes are realized as follows:

#### (a) Ideal Case (Scenario)

Problems are solved and agreement are concluded within the shortest time span as can be expected.

**(b) Optimistic Case (Scenario)**

Negotiations and talks will be progress quite smoothly and outcomes can be expected in no distant future.

**(c) Conservative Case (Scenario)**

Progress will be gradual.

Details of the cases are shown in Tables 2-1 through 2-3.

**2-2-4 Macro-economic Targets for Jordan**

In response to the above-mentioned scenarios while assuming that self-reliant policy be adopted, two macro economic targets for Jordan are prepared for the Ideal Scenario and the Optimistic Scenario although they are only a plausible guide to the consequence of the future and not a exact forecast as follows:

**(a) Optimistic Scenario**

|   |   |                  |
|---|---|------------------|
| Value added of manufacturing sector in 2010 | : | JD 1,482 million |
| Number of employees                         | : | 226,861 persons  |
| Estimated industrial area                   | : | 2,714 ha         |

**(b) Ideal Scenario**

|   |   |                  |
|---|---|------------------|
| Value added of manufacturing sector in 2010 | : | JD 2,506 million |
| Number of employees                         | : | 383,727 persons  |
| Estimated industrial area                   | : | 4,590 ha         |

The details are shown in Figures 2-1 and 2-2.

Table 2-1 Ideal Scenario for Peace Process and Stabilization of the Middle-East Region

|  | Present Conditions   | Short-term (~2000)  | Middle-term (2001-2005)  | Long-term (2006-2010)  | Beyond 2010 (2011-~) |
|--|--|---|--|--|----------------------|
| <b>Gulf War Related</b>                                  |  |   |  |  |                      |
| - Deteriorated Relations between Jordan and Gulf States  | <ul style="list-style-type: none"> <li>Diplomatic and economic relations between Jordan and the Gulf States including Saudi Arabia and Kuwait are gradually getting improved.</li> </ul>                                 | <ul style="list-style-type: none"> <li>Diplomatic and economic relations between Jordan and the Gulf States will be fully recovered to the level before the Gulf War in 1990.</li> </ul>  |  |  |                      |
| - UN Sanctions against Iraq                              | <ul style="list-style-type: none"> <li>UN sanctions have partially been lifted allowing Iraq to export about 700,000 barrels of oil a day, 30% of its earnings being put into the Gulf War Compensation Fund.</li> </ul> | <ul style="list-style-type: none"> <li>UN sanctions against Iraq will completely lifted allowing Iraq to export its crude oil (Before the sanctions, Iraq's quota in OPEC was about 2.88 million barrels.)</li> </ul>                       |  |  |                      |
| <b>Middle-East Peace</b>                                 |  |   |  |  |                      |
| - Palestine Issues                                       | <ul style="list-style-type: none"> <li>Partial autonomy are given to the eight cities in the West Bank and Gaza areas.</li> </ul>  | <ul style="list-style-type: none"> <li>Palestinian independent country will be established after the agreement among all the concerned nations and parties.</li> </ul>  |  |  |                      |
| - Syrian Golan Heights                                   | <ul style="list-style-type: none"> <li>No noticeable move has been made with regard to the restoration of the Golan Heights.</li> </ul>  | <ul style="list-style-type: none"> <li>Security measures will be agreed upon and the Golan Heights will be fully restored to Syria.</li> </ul>  |  |  |                      |
| - Comprehensive Middle-East Peace                        | <ul style="list-style-type: none"> <li>Only two Arab countries, i.e., Egypt and Jordan have entered into diplomatic relations with Israel as in 1996.</li> </ul>   | <ul style="list-style-type: none"> <li>Comprehensive peace agreement will be reached for the Middle-East region and all the Arab nations will enter into diplomatic relations with Israel.</li> </ul>                                       |  |  |                      |
| <b>Regional Agreements for Free Trade and Investment</b> | <ul style="list-style-type: none"> <li>Jordan has applied for the associate membership of EU but it is yet to be approved.</li> </ul>  | <ul style="list-style-type: none"> <li>Jordan will be admitted into EU as associate member.</li> </ul>  | <ul style="list-style-type: none"> <li>Middle East Free Trade and Investment Agreement/Area (MEFTA) will be established and Jordan will be admitted as full member.</li> </ul> | <ul style="list-style-type: none"> <li>Middle East Free Trade and Investment Agreement/Area (MEFTA) will be established between EU and MEFTA.</li> </ul> |                      |
|  |  | <ul style="list-style-type: none"> <li>"Middle East Regional Development Bank" will be established for extending financial assistance to the member countries for development and reconstruction with its headquarters in Cairo.</li> </ul> |  |  |                      |

Table 2-2. Optimistic Scenario for Peace Process and Stabilization of the Middle-East Region

|  | Present Conditions   | Short-term (~2000)   | Middle-term (2001-2005)   | Long-term (2006-2010)  | Beyond 2010 (2011-~)  |
|--|--|--|---|--|---|
| <b>Gulf War Related</b><br>- Deteriorated Relations between Jordan and Gulf States | <ul style="list-style-type: none"> <li>Diplomatic and economic relations between Jordan and the Gulf States including Saudi Arabia and Kuwait are gradually getting improved.</li> </ul>                                 | <ul style="list-style-type: none"> <li>UN sanctions have partially been lifted allowing Iraq to export about 700,000 barrels of oil a day, 30% of its earnings being put into the Gulf War Compensation Fund.</li> </ul> | <ul style="list-style-type: none"> <li>Diplomatic and economic relations and cooperation between Jordan and the Gulf States will be fully recovered to the level before the Gulf War in 1990.</li> </ul>              |  |   |
| - UN Sanctions against Iraq  | <ul style="list-style-type: none"> <li>UN sanctions have partially been lifted allowing Iraq to export about 700,000 barrels of oil a day, 30% of its earnings being put into the Gulf War Compensation Fund.</li> </ul> |  | <ul style="list-style-type: none"> <li>UN sanctions against Iraq will completely lifted allowing Iraq to export its crude oil (Before the sanctions, Iraq's quota in OPEC was about 2.88 million barrels).</li> </ul> |  |   |
| <b>Middle-East Peace</b><br>- Palestine Issues                                     | <ul style="list-style-type: none"> <li>Partial autonomy are given to the eight cities in the West Bank and Gaza areas.</li> </ul>  | <ul style="list-style-type: none"> <li>Complete autonomy will be given to the West Bank and Gaza areas.</li> </ul>   | <ul style="list-style-type: none"> <li>Palestinian independent country will be established after the agreement among all the concerned nations and parties.</li> </ul>  |  |   |
| - Syrian Golan Heights   | <ul style="list-style-type: none"> <li>No noticeable move has been made with regard to the restoration of the Golan Heights.</li> </ul>  |  | <ul style="list-style-type: none"> <li>Security measures will be agreed upon and the Golan Heights will be fully restored to Syria.</li> </ul>  |  |   |
| - Comprehensive Middle-East Peace  | <ul style="list-style-type: none"> <li>Only two Arab countries, i.e., Egypt and Jordan have entered into diplomatic relations with Israel as in 1996.</li> </ul>   |  | <ul style="list-style-type: none"> <li>Comprehensive peace agreement will be reached for the Middle-East region and all the Arab nations will enter into diplomatic relations with Israel.</li> </ul>                 |  |   |
| <b>Regional Agreements for Free Trade and Investment</b>                           | <ul style="list-style-type: none"> <li>Jordan has applied for the associate membership of EU but it is yet to be approved.</li> </ul>  |  | <ul style="list-style-type: none"> <li>Jordan will be admitted into EU as associate member.</li> </ul>  | <ul style="list-style-type: none"> <li>Middle-East Free Trade and Investment Agreement/Area (MEFTA) will be established and Jordan will be admitted as full member.</li> </ul> | <ul style="list-style-type: none"> <li>Agreement for free trade and investment will be concluded between EU and MEFTA.</li> </ul>   |
|  |  |  |   |  | <ul style="list-style-type: none"> <li>"Middle-East Regional Development Bank" will be established for extending financial assistance to the member countries for development and reconstruction with its headquarters in Cairo.</li> </ul> |

Table 2-3 Conservative Scenario for Peace Process and Stabilization of the Middle-East Region

|  | Present Conditions  | Short-term (~2000)   | Middle-term (2001-2005)  | Long-term (2006-2010)   | Beyond 2010 (2011+) |
|--|---|--|--|---|---------------------|
| <b>Gulf War Related</b>                                  | <ul style="list-style-type: none"> <li>Deteriorated Relations between Jordan and Gulf States</li> <li>Diplomatic and economic relations between Jordan and the Gulf States including Saudi Arabia and Kuwait are gradually getting improved.</li> </ul> | <ul style="list-style-type: none"> <li>UN sanctions have partially been lifted allowing Iraq to export about 700,000 barrels of oil a day. 30% of its earnings being put into the Gulf War Compensation Fund.</li> </ul> | <ul style="list-style-type: none"> <li>Diplomatic and economic relations and cooperation between Jordan and the Gulf States will be fully recovered to the level before the Gulf War in 1990.</li> </ul> | <ul style="list-style-type: none"> <li>UN sanctions against Iraq will completely lifted allowing Iraq to export its crude oil. (Before the sanctions, Iraq's quota in OPEC was about 2.88 million barrels.)</li> </ul>  |                     |
| <b>Middle-East Peace</b>                                 | <ul style="list-style-type: none"> <li>Partial autonomy are given to the eight cities in the West Bank and Gaza areas.</li> <li>No noticeable move has been made with regard to the restoration of the Golan Heights.</li> </ul>                        |  |  | <ul style="list-style-type: none"> <li>Complete autonomy will be given to the West Bank and Gaza areas.</li> <li>Security measures will be agreed upon and the Golan Heights will be fully restored to Syria.</li> </ul>  |                     |
| <b>Comprehensive Middle-East Peace</b>                   | <ul style="list-style-type: none"> <li>Only two Arab countries, i.e., Egypt and Jordan have entered into diplomatic relations with Israel as in 1996.</li> </ul>  |  |  | <ul style="list-style-type: none"> <li>Comprehensive peace agreement will be reached for the Middle-East region and all the Arab nations will enter into diplomatic relations with Israel.</li> </ul>   |                     |
| <b>Regional Agreements for Free Trade and Investment</b> | <ul style="list-style-type: none"> <li>Jordan has applied for the associate membership of EU but it is yet to be approved.</li> </ul>   |  |  | <ul style="list-style-type: none"> <li>Jordan will be admitted into EU as associate member.</li> <li>"Middle-East Regional Development Bank" will be established for extending financial assistance to the member countries for development and reconstruction with its headquarters in Cairo.</li> </ul> |                     |

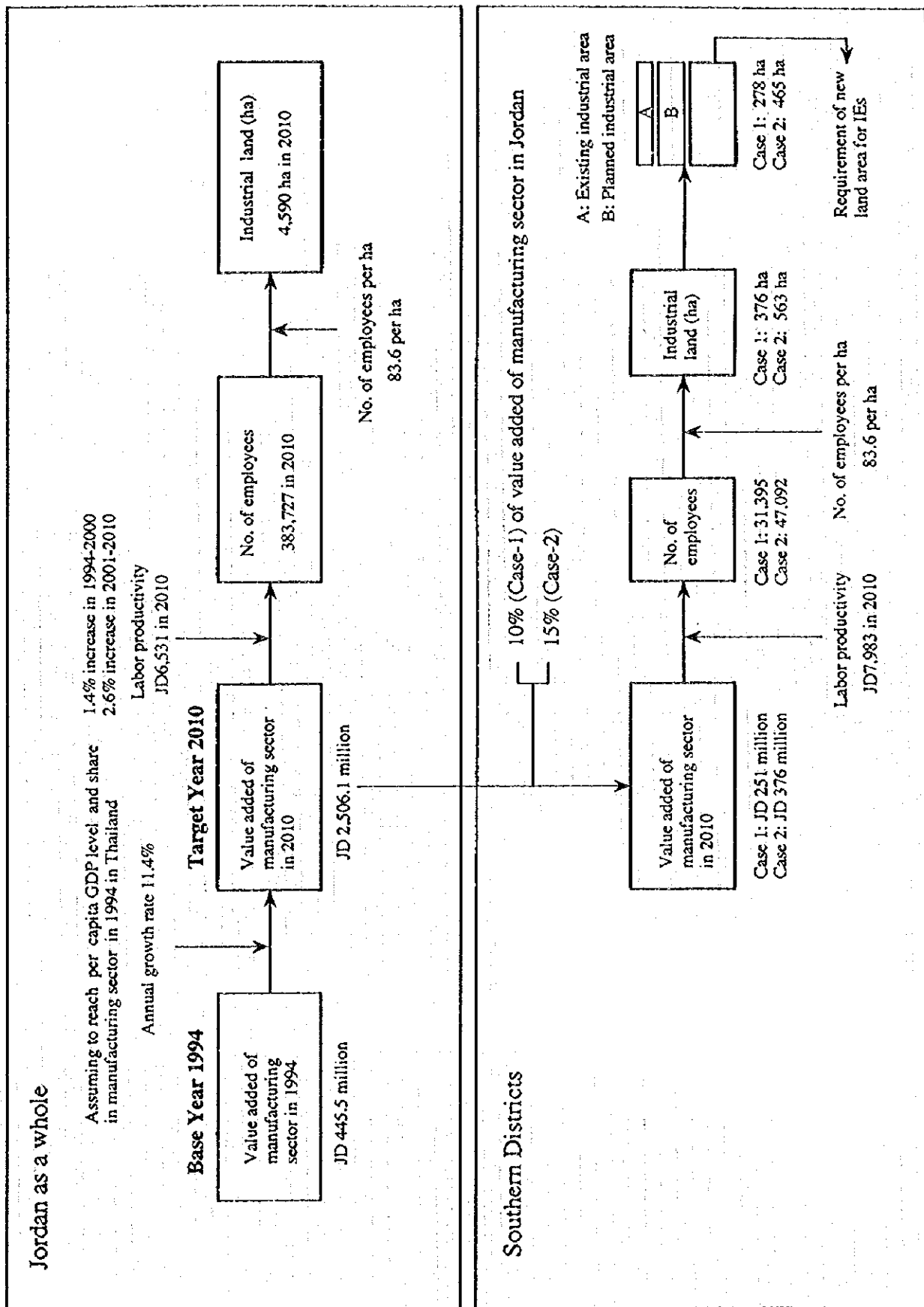


Figure 2-1 Macro-economic Targets and Industrial Land Requirements for Jordan and the Southern Districts for the Year 2010 (Ideal Scenario)

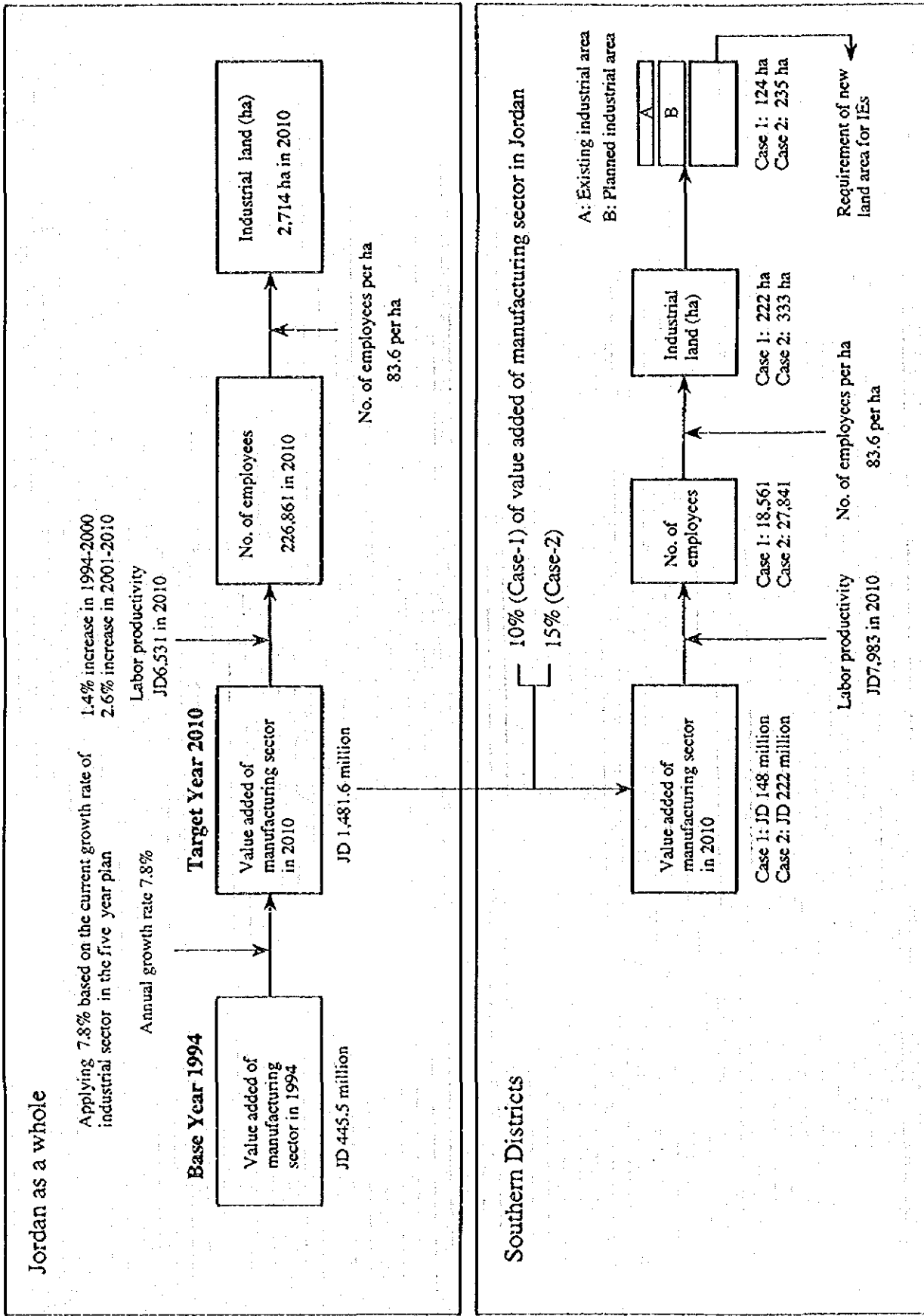


Figure 2-2 Macro-economic Targets and Industrial Land Requirements for Jordan and the Southern Districts for the Year 2010 (Optimistic Scenario)



### III. DEVELOPMENT SCENARIO FOR THE SOUTHERN DISTRICTS

#### 3-1 Comparative Advantages / Disadvantages and Expected Role of the Southern Districts

The Southern Districts are equipped with well developed economic infrastructures. The Port of Aqaba opening out into the Gulf of Aqaba is Jordan's only and the Middle East region's leading port for international trade with about 30 million cargo handling capacity per year, and continue to play a vital role on the physical distribution. It is also a gateway to the rapidly growing Asia region and the Mediterranean countries via Suez Canal.

Aqaba also has Aqaba International Airport (AIA), which is located 9 km north of Aqaba City near Israeli border. AIA has a runway of 3,000 m long which can accommodate Airbus-class airplanes. Its current capacity is 150,000 passengers per year.

With regard to the electricity supply, Aqaba Governorate has the highest capacity to supply electricity in Jordan, being installed with Aqaba Thermal Power Station (ATPS) with a current installed capacity of 263 MW, which will be expanded to 650 MW under the ATPS Expansion Project financed by OECF loan.

Aqaba, Ma'an and Tafila are endowed with the relatively abundant ground water resources in Jordan. Aqaba Governorate has Dici Sandstone Aquifer, the largest and the least developed ground water source in Jordan, which is estimated to last about 50 years with an annual consumption of 125 million m<sup>3</sup> of water, compared with current consumption of 75 million m<sup>3</sup>. Tafila Governorate has relatively large ground water sources along the Desert Highway including the area of Al Hasa phosphate mines and its vicinity to the south. Ma'an Governorate is also comparatively rich in ground water resources, having two aquifers in Jafer Basin.

The Southern Districts are rich in underground resources and the Dead Sea mineral resources. Specifically, limestone, potash, phosphates, oil shale and other underground sources, besides the Dead Sea mineral resources in Karak Governorate, are found in abundance in three governorates of Karak, Tafila and Ma'an, while Aqaba is noted for its silica sand.

In terms of industrial structure, Governorates of Karak and Tafila possess large enterprises in the phosphorous ore and cement business, while Aqaba has major firms in the potassium chloride (fertilizer) field.

Tourism is one of the industries in which Jordan holds particularly high hopes over the years to come. The Southern Districts possess valuable tourist resources such as Petra, Wadi Rum and the Gulf of Aqaba. When its potential is fully exploited, the tourism sector will require various manufactured goods including housing materials, electric appliances and furniture as well as processed food.

The Southern Districts shares long borders with various countries, Saudi Arabia to the south and east and Israel to the west. Egypt also is eventually a neighbor via Red Sea. This geographic location can bring about big opportunity for the Southern Districts in terms of trading and industrial cooperation.

### 3-2 Expected Role and Basic Direction of the Development of the Southern Districts

Considering the comparative advantages and disadvantages of the Southern Districts, the following direction is recommended to be headed for.

#### In the National Perspective

- To establish a new growth pole of the country besides the Central / Northern Districts,
- To strengthen the gateway function of the Southern Districts for the country, and
- To form an important core region for the international economic / industrial cooperation, in particular with respect to Saudi Arabia, Egypt and Israel.

#### In the Regional Perspective

- To increase the GRP (gross regional product) of the Southern Districts,
- To alleviate poverty, both in terms of object and absolute poverty,
- To narrow the socio-economic development gap with the Central / Northern Districts in terms of the levels of income, education, health care, etc., and
- To keep the development gap among the four Governorates within permissible range.

To achieve the above-mentioned, firstly potential of the Southern Districts should be exploited and linkage and cooperation among the Southern Districts should be reinforced. Subsequently, reinforcement of the economic ties with the Central and Northern Districts should be sought.

The reasons are:

- The Southern Districts have their own potentiality of development including the resources endowment, strategic location and well developed transport infrastructures.
- Strengthening the linkage between the Central / Northern and the Southern Districts before exploiting the potential of the Southern would aggravate the over-concentration in the capital region which goes against the Government policy.

### 3-3 Industrial Development Scenario for the Southern Districts

Considering the above-mentioned basic direction of the regional development of the Southern Districts and their comparative advantages/disadvantages, the following scenario is proposed for the industrial development in the Southern Districts toward the year 2010.

The resources endowed in the Southern Districts should fully be utilized. Mineral resources such as phosphate mining at Eshidiya and other mines, limestone quartz should continue to be exploited. Transformation of these minerals into higher value products such as glass and fertilizers should be sought. These mineral-resource-based production should either be located in the vicinity of the mines or near the international trading port for the convenience of importing medium products for the production and exporting the final products.

Though the amount is limited, the agricultural products in the Southern Ghor area and in the high lands along the King's Highway including vegetables, fruits/olives should be processed to make juice, ketchup, wooden furniture and others. Livestock-based-industries should also be developed including leather industry.

Fully utilizing the Aqaba international trading port which has various ocean routes, fabricated metal and machinery industries should be developed, importing the components/parts and intermediate goods. The products should be transported to the Central and Northern Districts via the Desert Highway and further to Saudi Arabia, Gulf countries and Iraq by the RN5 and the RN65. They can also be shipped to the Mediterranean countries including Turkey, East Europe and West Europe. Aqaba is a physical distribution center of Jordan and should further be developed to assume the role of regional hub for the physical distribution in the Middle East region. Industries for the packaging materials and parts of transportation equipments of simple structure should be developed.

Jordanian labor force having medium-level technology, high and medium level apparel industry such as men's suits, ladies' dresses and lingerie should be promoted. The Southern Districts are endowed with the world-famous tourism resources of the Aqaba Gulf and cultural asset of Petra. Resort facilities including hotels of international standard and villas should be constructed to attract the tourists and supporting industries including housing materials, interior materials, construction materials as well as printing industry should be strengthened. Besides, housing industry such as brick, tile, concrete blocks, glass, doors, window frame and furnitures should be reinforced to meet the increasing demand by the increased population associated with the development of the various industries in the Southern Districts including mining and manufacturing. Demand for the construction material would sharply be increased due to the implementation of the large-scale infrastructure projects including bi- and multi-lateral projects. Accordingly material industry should be strengthened.

Foreign investors in particular from the Arab countries, Israel, Europe and USA as well as the Jordanian investors from the advanced areas including capital region and Irbid will be the main driving force for the industrialization of the Southern Districts. Strategic location together with well-developed transport infrastructures and relatively low wage rates of labor with good academic background as well as the preferential treatments for investment will be major attraction. In order to provide hospitality for these investors, well-equipped industrial estates and export processing zones will be constructed within easy access of the major transport infrastructures and urban facilities. Cooperation among the neighboring countries, in particular Jordan, Saudi Arabia, Egypt and Israel as well as West Bank and Gaza by means of utilizing their comparative advantages will be another useful tool for the industrialization in the Southern Districts which share the borders with these countries.

Aqaba, being equipped with the only international port of the country and an international airport, will be the principal growth pole in the Southern Districts and a new growth pole of the country as well. Land available for development in and around Aqaba City is limited, however, with the high lands and mountains located close to the east of the city. On the other hand, spacious land is available around Ma'an City. Once Aqaba-Ma'an section of the Desert Highway is totally expanded to 4 lanes in 1998, the two cities will be connected within one hour drive distance and strong economic and industrial linkage will be established, utilizing and supplementing the advantages and weakpoints each other.

In the northern part of the Southern Districts, new industrial corridor will be set up between the two district capitals of Karak and Tafila by means of strengthening the road,

link and utilizing the urban and educational/scientific facilities as well as labor force of the two capitals and their suburban areas.

### 3-4 Macro-economic Targets for the Industrial Development of the Southern Districts

#### 3-4-1 Setting the Share of the Southern Districts Along the National Targets as a case study

Value added of manufacturing sector in the Southern Districts in 2010 is derived from assuming the holding shares of the region in the national targets that are projected through two Scenarios (the Ideal Scenario and the Optimistic Scenario) for the country as a whole. Two cases for each Scenario are set up for this projection. First case is set at 10% and the second one is at 15%, while the current region's share of value added in manufacturing sector in the country is estimated at 4.1%, considering the region is expected to play the role of an engine for the industrial development in the country.

#### 3-4-2 Region's Targets in Manufacturing Sector in 2010

Targets 2010 are shown below. Details and shown in Figures 2-1 and 2-2.

##### Optimistic Scenario

###### (Case-1)

|   |   |                |
|---|---|----------------|
| Value added of manufacturing sector in 2010 | : | JD 148 million |
| Number of employees                         | : | 18,561 persons |
| Estimated industrial area                   | : | 222 ha         |

###### (Case-2)

|   |   |                |
|---|---|----------------|
| Value added of manufacturing sector in 2010 | : | JD 222 million |
| Number of employees                         | : | 27,841 persons |
| Estimated industrial area                   | : | 333 ha         |

##### Ideal Scenario

###### (Case-1)

|   |   |                |
|---|---|----------------|
| Value added of manufacturing sector in 2010 | : | JD 251 million |
| Number of employees                         | : | 31,395 persons |
| Estimated industrial area                   | : | 376 ha         |

###### (Case-2)

|   |   |                |
|---|---|----------------|
| Value added of manufacturing sector in 2010 | : | JD 376 million |
| Number of employees                         | : | 47,092 persons |
| Estimated industrial area                   | : | 563 ha         |



## **IV. INDUSTRIAL DEVELOPMENT STRATEGIES FOR THE SOUTHERN DISTRICTS**

### **4-1 Concept for the Development Strategies**

Development strategies have been worked out to achieve the objectives of the industrial development in the Southern Districts of Jordan in line with the basic direction and scenario formulated in the Study.

Strategies have been worked out from the following viewpoints.

- (a) Strengthening of the spatial relationship and linkage,
- (b) Upgrading of the overall economic infrastructures, and
- (c) Upgrading of the industrial infrastructures, both in terms of structural and non-structural measures.

Details of the development strategies are given in the subsequent sections.

### **4-2 Strengthening of Spatial Linkage**

Aiming at the exploitation of the development potential of the Southern Districts and achieving rapid economic growth of the Southern Districts as a whole, economic and industrial linkage among the districts and between the districts and the neighboring Central region and countries should be strengthened.

Firstly, regional development axes should be formulated between the core areas through reinforcing the infrastructures of the areas and their transport link. Secondly, the development axis should be developed to form an economic development base encompassing the core areas as well as the connecting corridor by intensifying economic activities in the corridor and flow of cargoes.

In time-frame, in order to achieve self-reliant economy for the Southern Districts and thereby to alleviate the over-concentration in the Central region as well as to attain equitable development among the four governorates, intra-region linkage should firstly be strengthened. Secondly, inter-region and international linkage should be sought. Specifically, it is recommended that development axis or stronger socio-economic linkage be formulated, one each in the upper Southern Districts (Karak and Tafila) and lower Southern Districts (Ma'an and Aqaba) in the middle-term by the year 2005 as shown in Figure 4-1. In the long-term by the year 2010, these two axes should be evolved to economic development bases which should be connected each other by a new

development axis. At the same time, the economic development base in the upper Southern Districts should be connected with the Capital region by a new axis as shown in Figure 4-2. Economic and industrial linkage with the neighboring Saudi Arabia, Egypt, Iraq and Israel should also be reinforced.

#### 4-3 Priority Development of the Infrastructures in the Southern Districts

In parallel with the development of the industrial infrastructures which would directly affect the promotion of the industrial activities, socio-economic infrastructures as a whole in the Southern Districts should be developed, being placed high priority in the infrastructure development in the country. Sector-wise, particular attention should be paid to:

- Water supply
- Transportation
- Electricity and telecommunications

In determining the order of implementation or priority order among the development projects, due attention should be paid to the formulation of the development axes/economic development bases within the Southern region and between the Southern region and the Central as well as the promotion of international cooperation.

#### 4-4 Upgrading of Basic Industrial Infrastructures in the Southern Districts

##### 4-4-1 Technology Improvement

The existing industrial enterprises in the Southern Districts can be classified into two extremes:

- Large-scale mining and chemical enterprises with more than 1,000 employees, and
- Workshops and household industries with less than 10 employees

While the big enterprises are developing and introducing their technologies, technologies of the subsistence industries and workshops remain at the level of the household industries. Namely, accumulation of industrial technology in the Southern Districts is quite limited at present except for particular industries.

To achieve the full-scale industrial development of the Southern Districts, full-fledged basic industrial technology should be either developed or introduced for the provision for the investors.



In the Southern Districts, existing enterprises do not possess business management know-how of adequate level except for limited number of large enterprises. At present, their markets are mostly limited to the local markets, mainly major regional cities and their suburbs and partly the capital region. In the future, however, they will be required to open up new markets in the country and overseas for their expanded production. In parallel with the relocation and expansion into the Southern Districts of the enterprises currently located in the Central and Northern Districts, new investors/enterprises of medium-to-small scale should be reared and established, and encouraged to enter into the Southern Districts.

#### 4-4-2 Manpower Development and Training

Out of the 12 universities established in the country, only one university is located in the Southern Districts, i.e., Mu'tah University near the Karak City. In order to promote the industrialization in the Southern Districts, academic facilities should be enhanced for bringing up required manpower.

At present, 6 vocational training centers are in operation under the Vocational Training Corporation. As industrialization develops in the Southern Districts, skilled manpower will increasingly be needed and kinds of skills will be diversified. Vocational training is recommended to be, therefore, reinforced in terms of teaching staff and quota of students as well as quality of curricula. Special attention should be paid to absorb the needs of the industrial society so that appropriate and up-to-date skills be acquired by the Trainees.

#### 4-4-3 Provision of Well-facilitated Industrial Land

In order to materialize the industrial development in the Southern Districts, tracts of land well-equipped with the utilities of water supply, sewerage, electricity and telecommunication as well as internal and access roads to the highways should be constructed to accommodate the investors for production. These industrial estates would be quite effective to receive the medium-to-small scale enterprises as well as foreign investors and their joint ventures with Jordanian enterprises. For the subsistence enterprises and workshops which require smaller size of factory lots and floor areas, workshop apartments with limited land scale, being provided with adequate utility facilities.

#### 4-5 Strengthening of Institutional and Legal Framework

In 1995, investment promotion law was revised so that the preferential treatment applicable to the Arab investors should also be applicable to the non-Arab foreign

investors. In order to strengthen the economic activities outside of the capital region, investment zones, A, B, C, have been set up so that stronger incentives are provided for the less-developed areas in the country.

To succeed in attracting the foreign investors to the country in the midst of the keen competition among the countries including Asian emerging economies, the investment environment should further be reinforced with stronger and varied investment incentives. Considering the significant differences in the provision of urban facilities and public services as well as cultural and amenity facilities, differential treatment among the zones further should be widened.

Weak finance being the most serious hindrance against the productivity improvement and modernization of the small and subsistence enterprises, a subsidiary loan system for promoting of industrialization in the Southern Districts should be established with soft loan conditions.

To accelerate the overall development including industrialization, of the less-developed Southern Districts, it is desirable to have a comprehensive development authority endorsed by sound financial strength. Manpower of the entity responsible for industrialization should also be reinforced both in quantity and quality.

#### 4-6 Enhancement of Value-Added and Productivity of Manufacturing Industries

About 70 % of phosphate rock are exported in the form of ore and the remaining 30 % in the form of fertilizer. Higher processing of phosphate rock to produce higher value-added products including phosphoric acid and phosphatic fertilizer should be practiced for reinforcing the manufacturing industries and increasing the value of exports.

Of the 743 enterprises in operation in the Southern Districts, large majority of 650 enterprises employ less than 5 employees or 2.2 on the average with low labor productivity. The renewal and modernization of their production facilities together with higher management and marketing skills should be sought seriously.

#### 4-7 Export Promotion

Suffering chronic trade imbalance and current account deficit, export promotion is an effective remedy together with import substitution of certain categories. For export promotion, special attention should be paid for:

- Higher processed products based on mineral resources including phosphate and various resources from the Dead Sea, and
- Assembly and processing of imported parts/components for export

Attracting foreign direct investment will be a powerful measure for export promotion utilizing their marketing channels overseas. Aqaba being an international trading port facing the Red Sea, exports to the emerging Asian economies should be strengthened. In the case, Jordan comes to have the direct access to the Mediterranean countries through the land link with Israel, export to these countries should be promoted via the ports of Haifa and Ashdod.

#### 4-8 International Cooperation and Promotion of Foreign Direct Investment

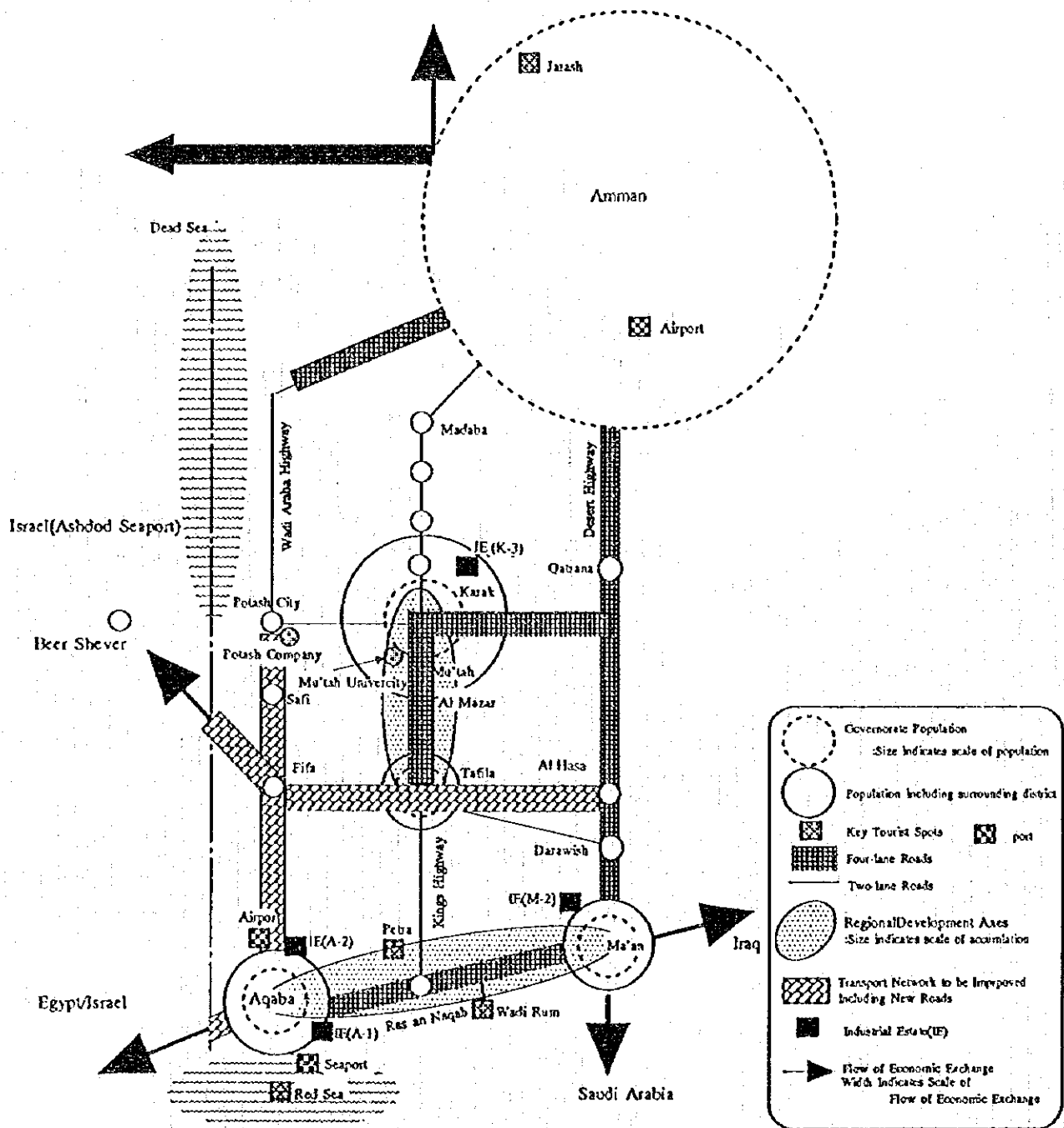
The Southern Districts share the border with three countries, i.e., Saudi Arabia to the south and east, Egypt to the southwest via the Aqaba Gulf and Israel to the west. Though not directly adjacent, the West Bank of the Jordan river is within easy access of Karak Governorate. Jordan has been historically maintaining close relationship with Saudi Arabia and Egypt both in terms of cultural and economic ties. With Israel, Jordan has already established diplomatic relationships in 1994. The industrial cooperation with these countries/area should be one of the principal strategies for the industrial development in the Southern Districts, utilizing the comparative advantages of these countries/area as follows:

- Saudi Arabia : Financial capacity
- Egypt : Big pool of un-skilled and semi-skilled labor
- West Bank : Skilled and semi-skilled labor
- Israel : Advanced/high-technology, financial capacity, marketing capacity
- Jordan : Medium-technology and managerial manpower

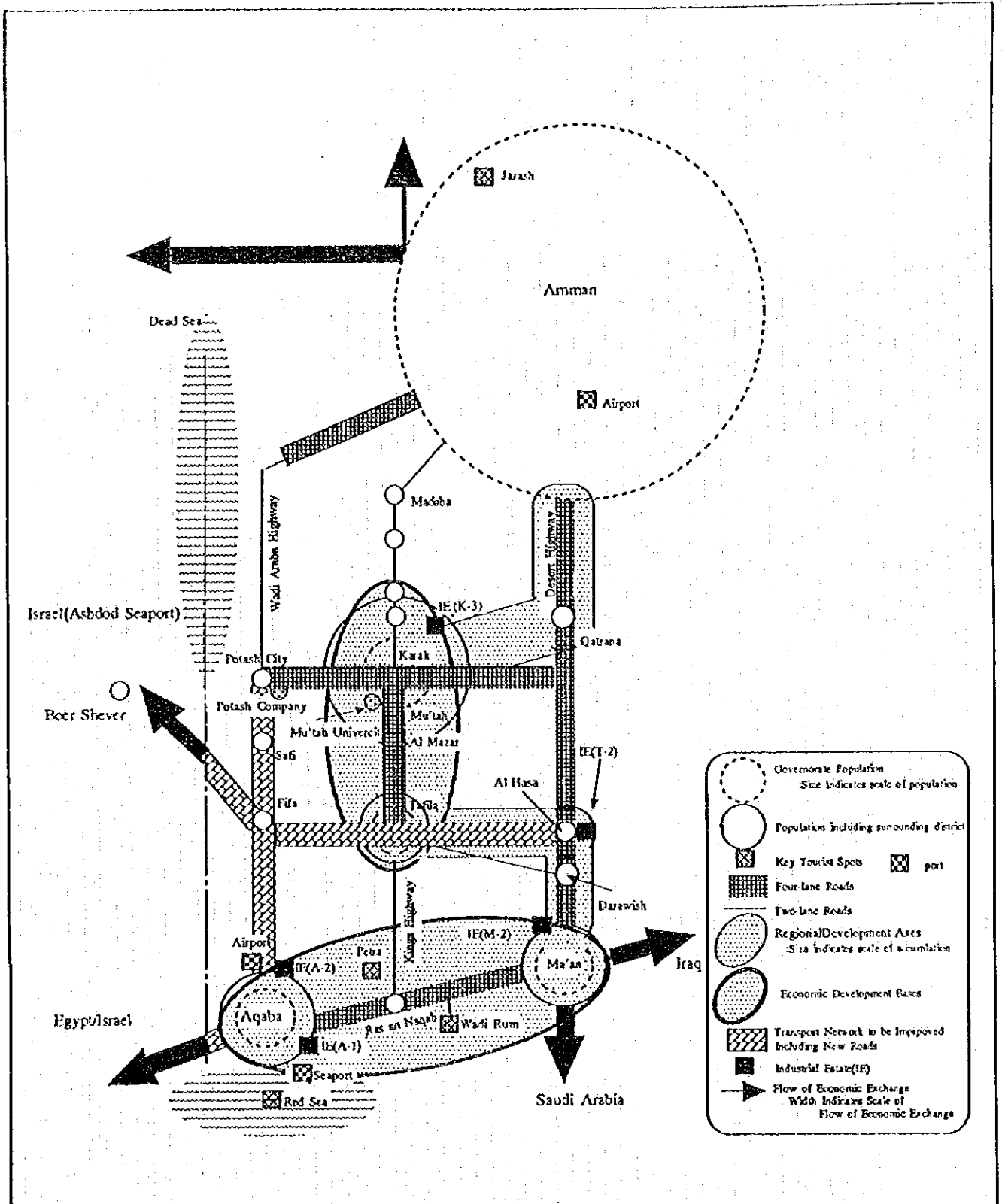
Although availability of long-term investment fund is a pre-requisite to the full-scale industrial development, domestic savings in Jordan is quite small and long-term financial facilities are also limited. Attraction of the foreign direct investment would give the solution for this problem and also would bring in technology and markets. The Southern Districts can offer good location for receiving the foreign investment with well-developed transport infrastructures and long borders with the neighboring countries.

#### 4-9 Conservation of the Natural Environment

Future industrial development and related activities such as urbanization may cause undesirable impacts on various environmental resources. To prevent and alleviate the adverse effects of the industrialization, legal as well as administrative frameworks should be further developed and reinforced. More specifically, by-laws, regulations and standards for and related to the Environmental Law of Jordan should be prepared. The current limited staff of GCEP should be strengthened as soon as possible.



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 Figure 4-1 Urban Economic Linkage and Regional Development Axes (Medium-Term: 2005)  
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 REGIONAL PLANNING INTERNATIONAL CO., LTD



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 Figure 4-2 Urban Economic Linkage and Regional Development Axes (Long-Term: 2010)  
 NIPPON KOEI CO., LTD  
 JAPAN INDUSTRIAL LOCATION CENTER  
 REGIONAL PLANNING INTERNATIONAL CO., LTD

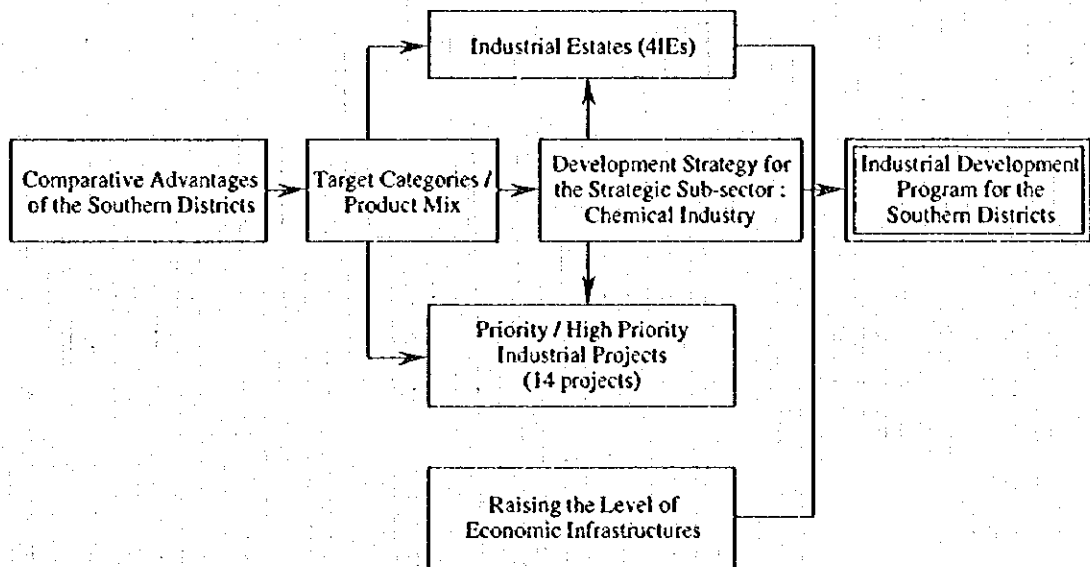


## V. OVERALL INDUSTRIAL DEVELOPMENT PLAN FOR THE SOUTHERN DISTRICTS

### 5-1 Overall Industrial Development Plan

The overall industrial Plan for the Southern Districts has been formulated in line with the proposed development strategies, as shown below:

Formulation of Industrial Development Plan for the Southern Districts



The principal components of the overall Plan comprise the following three components which are further divided into sub-components.

- (a) Selection of target industrial categories and strategy for sub-sector with the highest potential
  - a) Selection of target industrial categories and product mix suitable for the Southern Districts
  - b) Formulation of the development strategy for the industrial sub-sector with the highest potential (strategic sub-sector)
- (b) Detailed strategy for the infrastructure development in the Southern Districts
- (c) Development projects for the industrial infrastructures in the Southern Districts
  - a) Industrial estate projects

b) Industrial development projects with high potentiality other than the industrial estates

In total, thirteen categories of industries in terms of the international standards for industrial classification (ISIC) with 3 digits were selected as promising industrial categories. As strategic sub-sector, chemical industry was selected and detailed strategy was formulated.

Four industrial estates were chosen as priority projects worth conducting further detailed study, one each in the districts of the Southern Region. Out of the four, a Pre-F/S was conducted in the Study on the one with the highest potential, A-2. Other than the four industrial estates, fourteen industrial projects with high potential (priority projects) were formulated in the Study and proposed to be implemented. Of the fourteen, three projects which were considered as most needed for the industrial development, were categorized as high priority projects and further looked into.

The overall plan is presented in Table 5-1 to show its impacts in terms of economic sectors and regions to be affected. Proposed prospective industries and industrial sites to be implemented by the target year of 2000 are illustrated in Figure 5-1. The proposed priority and high priority projects are shown in Figure 5-2 by location of district.

The relationship between the proposed overall plan and the target beneficiaries are illustrated in Figure 5-3 together with the resulting achievements. More details are shown in Figures 5-4 and 5-5 by target beneficiaries with major functions of the priority / high priority projects as well as the priority industrial estate projects.

A number of Government bodies and the private sector will be involved for the execution and management of the overall plan, components of which are closely related each other. Close coordination among the bodies / entities would be essential for the successful implementation of the program. The principal entities responsible for the components or projects of the program together with the relevant entities are shown in Table 5-2.

The implementation of the plan should be well timed in order to obtain the maximum outputs. Followings should be taken into consideration for this purpose:

- (a) Urgency for implementation,
- (b) Maturity for implementation including time required for the adjustment and coordination with the existing legal and institutional settings,



- (c) Formation of the regional development axes and economic development bases within the Southern Region and axes / links with the neighboring regions and countries, and
- (d) Inter-dependence and synergism among the proposed projects

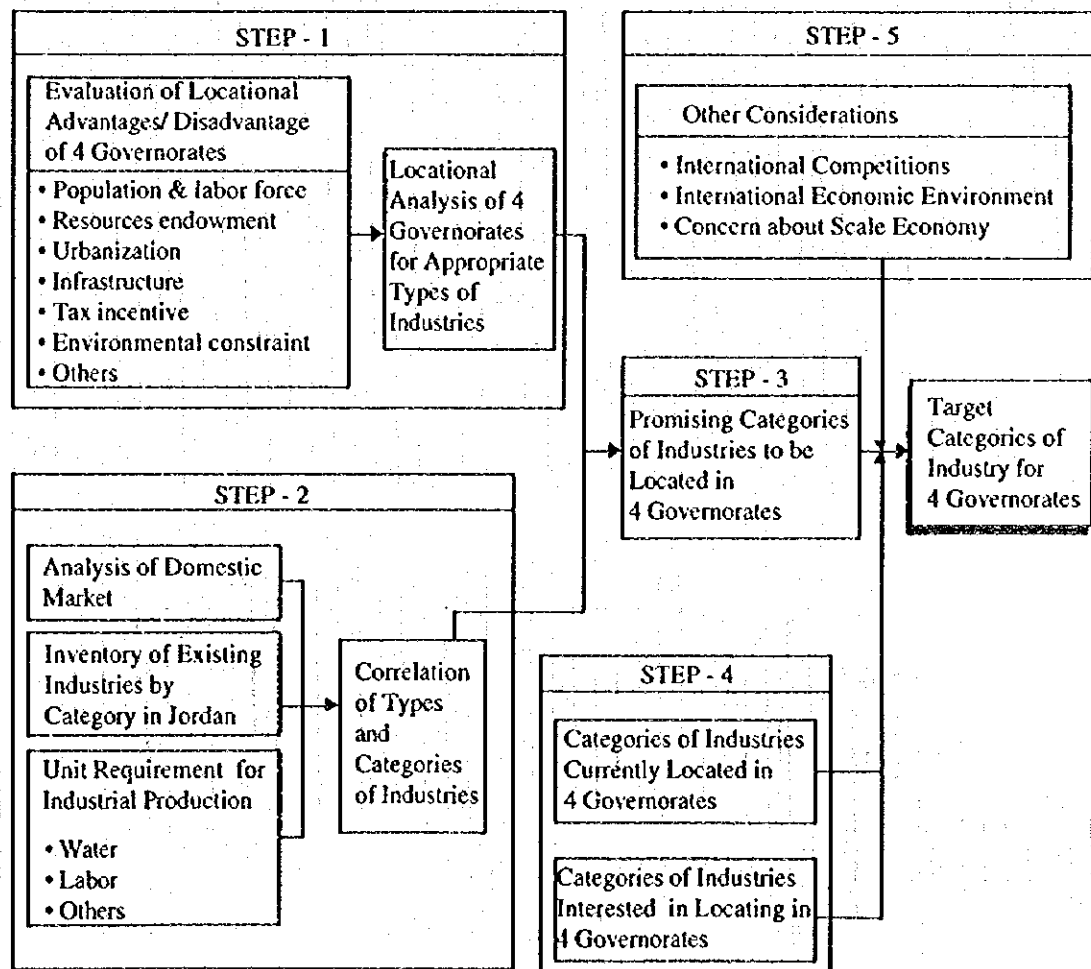
The proposed implementation schedule for the priority / high priority projects and industrial estates are shown in Figure 5-6.

## 5-2 Appropriate Product Mix and Development Strategy for Chemical Industry as Strategic Sub-Sector

### 5-2-1 Target Categories and Product Mix for the Southern Districts

Categories of industries fit for the development in the Southern Districts or target categories of industries are selected by means of the screening procedure shown below.

Screening Procedure for Selecting Target Categories of Industry

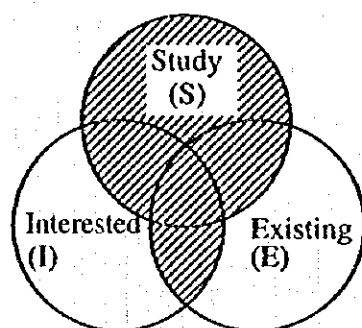


After Step-3 and Step-4, these categories should remain.

- (a) Promising categories selected during Step - 3 (the circle indicated as Study (S) in the figure below).
- (b) Categories currently existent (the circle indicated as Existing (E) in the figure below) and preferred as well by the potential inventors to be located in the governorate (the circle indicated as Interested (I) in the figure below).

The striped part in the figure below indicates the selected target categories of industry unless they are eliminated in Step-5.

The selected target categories are given below.



Target Categories of Industry for the Southern Districts

| Categories of Industry                 | Karak | Tafila | Ma'an | Aqaba |
|--|-------|--------|-------|-------|
| 290 Mining                             | 0     | 0      | 0     | 0     |
| 311 Food manufacturing                 | 0     |        |       | 0     |
| 313 Beverage                           | 0     |        |       |       |
| 322 Wearing apparel                    | 0     |        | 0     | 0     |
| 331/332 Wood & Cork / Furniture        | 0     |        | 0     | 0     |
| 341 Paper products                     | 0     |        |       |       |
| 351/352 Chemical, pharmaceutical       | 0     |        | 0     | 0     |
| 361/362/369 Pottery, glass & Non-metal | 0     | 0      | 0     | 0     |
| 381 Fabricated metal                   | 0     |        | 0     | 0     |
| 382 Machinery                          |       |        | 0     | 0     |
| 383 Electrical machinery               |       |        |       | 0     |
| 384 Transport equipment                |       |        | 0     | 0     |
| 385 Professional equipment             |       |        | 0     | 0     |
| The number of target categories        | 9     | 2      | 9     | 11    |

The product mix has been selected for the selected categories of industries based on the potentiality of the product mix in the light of the advantages / disadvantages of the four

governorates, not only in the current perspective but also middle and long-term perspectives as shown below.

#### Karak Governorate

| Categories of Industry                 | Product Mix   |
|--|---|
| 290 Mining                             | Phosphate rock, gypsum, oil shale, limestone, wadi sediment and pure limestone  |
| 311 Food Manufacturing                 | Canning of fruits and vegetables, jams and jellies; pickles and sauces; biscuits; candies   |
| 313 Beverage                           | Soft drinks including fruit-flavored and carbonated fruit drinks  |
| 322 Wearing apparel                    | Wearing apparel of high and medium quality including underwear, outerwear, hat, etc.  |
| 331/332 Wood & cork / furniture        | Lumber, building materials such as sash, doors window and door frames, wooden furniture and fixture, etc.   |
| 341 Paper products                     | Shipping boxes or cases made of corrugated or solid fiberboard.   |
| 351/352 Chemical, pharmaceutical       | The Dead Sea mineral resource-based chemicals such as potassium chloride fertilizer, magnesium oxide, bromine and its derivatives, industrial and table salt, etc.; paint; synthetic detergent  |
| 361/362/369 Pottery, glass & Non-metal | Pottery; structural clay product such as bricks, tile, pipe and refractories; gypsum plaster; concrete block  |
| 381 Fabricated metal                   | Cutlery, hand tools and general hardware; structural metal products such as metal doors and screens, window frame and sashes, metal staircase and other architectural metal work; kitchen works |

#### Tafila Governorate

| Categories of Industry                 | Product Mix   |
|--|---|
| 290 Mining                             | Phosphate rock, oil shale, natural sand, limestone and copper   |
| 361/362/369 Pottery, glass & Non-metal | Glass and glass products; cement; gypsum-plaster; structural clay product such as bricks, tile, pipe and refractories; concrete block |

Ma'an Governorate

| <u>Categories of Industry</u>          | <u>Product Mix</u>   |
|--|--|
| 290 Mining                             | Phosphate rock, limestone and kaolin   |
| 322 Wearing apparel                    | Wearing apparel of high and medium quality including underwear, outerwear, hat, etc.   |
| 331/332 Wood & cork / furniture        | Lumber, building materials such as sash, doors window and door frames, wooden furniture and fixture, etc.  |
| 351/352 Chemical, pharmaceutical       | Phosphoric acid and phosphate rock-based chemicals   |
| 361/362/369 Pottery, glass & Non-metal | Glass and glass products; structural clay product such as bricks, tile, pipe and refractories; concrete block  |
| 381 Fabricated metal                   | Cutlery, hand tools and general hardware; structural metal products such as metal doors and screens, window frame and sashes, metal staircase and other architectural metal work |
| 382 Machinery                          | Alteration and repair of heavy machinery and equipment used by mining industry and chemical industry; agricultural machinery and equipment                                       |
| 384 Transport equipment                | Assembling, alteration and repair of motor vehicles; manufacturing parts for small transportation equipment  |
| 385 Professional equipment             | Laboratory and scientific instruments; watches and clocks  |

## Aqaba Governorate

| <u>Categories of Industry</u>          | <u>Product Mix</u>   |
|--|--|
| 290 Mining                             | Granite and glass sand   |
| 311 Food Manufacturing                 | Ice cream; bakery; candies   |
| 322 Wearing apparel                    | Wearing apparel of high and medium quality including underwear, outerwear, hat, etc.   |
| 331/332 Wood & cork / furniture        | Lumber, building materials such as sash, doors window and door frames, wooden furniture and fixture, etc.  |
| 351/352 Chemical, pharmaceutical       | Phosphate rock-based chemicals such as phosphoric acid and phosphatic fertilizers; potash-based chemicals such as potassium sulfate; paint                                       |
| 361/362/369 Pottery, glass & Non-metal | Glass and glass products; structural clay product such as bricks, tile, pipe and refractories; concrete blocks; artificial marble board  |
| 381 Fabricated metal                   | Cutlery, hand tools and general hardware; structural metal products such as metal doors and screens, window frame and sashes, metal staircase and other architectural metal work |
| 382 Machinery                          | Alteration and repair of heavy machinery and equipment used by seaport, construction industry and chemical industry; agricultural machinery and equipment                        |
| 383 Electrical machinery               | Renovation and repair of electric motors; assembling of electric appliances such as TV, and refrigerator; fluorescent lamp   |
| 384 Transport equipment                | Ship building and repair; alteration and repair of motor vehicles; spare parts for vehicles  |
| 385 Professional equipment             | Laboratory and scientific instruments; watches and clocks  |

### 5-2-2 Selection of the Strategic Industrial Sub-sector and Its Development Strategy

#### (1) Selection of the strategic industrial sub-sector

Among the target categories of manufacturing industry selected in the previous section, the chemical industry has been selected as the strategic industrial sub-sector in the Southern Districts for the following reasons:

- (a) The chemical industry can effectively utilize mineral resources in the Southern Districts, such as phosphate rock and minerals involved in the Dead Sea water.

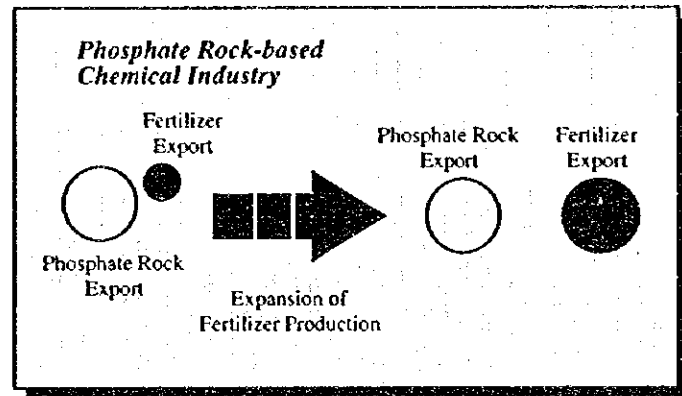
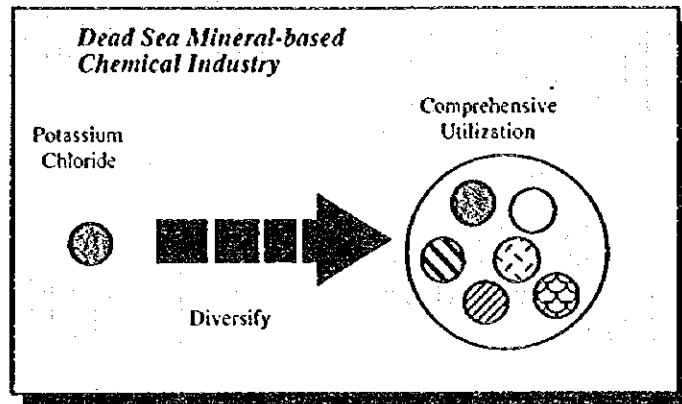
- (b) The chemical industry can generate more value added by processing local mineral resources.
- (c) The chemical industry can produce exportable products, which enable Jordan to earn more foreign currency.
- (d) The chemical industry that will be developed from the existing potash and phosphatic fertilizer industries can use accumulated know-how of technology, operation and product dealing. Utilization of a part of the existing facilities in these industries can reduce the required capital investment as well.
- (e) The chemical industry can manufacture chemical commodities which have possibilities of high cost-competitiveness by utilization of local mineral resources.
- (f) The presence of fund in the two large-scale enterprises of JPMC and APC make it possible to develop the chemical industry that is capital intensive.
- (g) In the Southern Districts, the site area is available for the chemical industry that needs a wide land and consumes a large amount of water.
- (h) The chemical industry has possibilities for new development and diversification.
- (i) The chemical industry development would have positive impacts on the development of other industries, such as machine and electrical machine industries.
- (j) In the field of the chemical industry, cooperation with Israel might be useful.

## (2) Formulation of the strategy

### (a) Core fields for development

For the development strategy for the chemical industry, a realistic measure is to concentrate in the following core fields that have great potentialities as illustrated below.

- Dead Sea mineral-based chemical industry
- Phosphate rock-based chemical industry

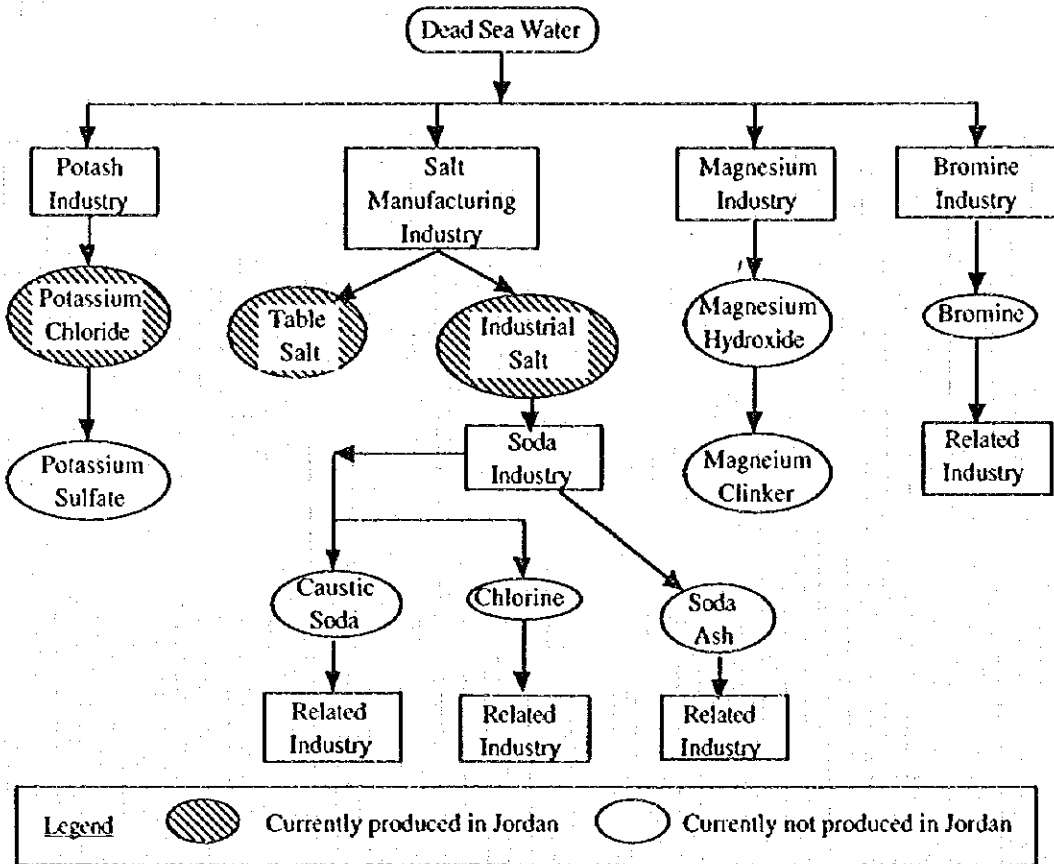


Development Strategy for Chemical Industry

(b) Dead Sea mineral-based chemical industry

The following structure is recommended for the Dead Sea mineral-based chemical industry although it needs further in-depth study and verification.

### Recommendable Structure of the Dead Sea Mineral-Based Chemical Industry



The recommended Dead Sea mineral based-chemical products would be utilized for agricultural and industrial purposes as shown below.

#### Users of the Dead Sea Mineral-Based Chemicals

|                     | Agricultural |           | Industrial |                |      |         |                |              |                |           |       |
|---------------------|--------------|-----------|------------|----------------|------|---------|----------------|--------------|----------------|-----------|-------|
|                     | Fertilizer   | Pesticide | Chemical   | Pharmaceutical | Food | Textile | Paper and pulp | Oil Refining | Water treating | Non-metal | Glass |
| Potassium Chloride  | ○            |           | ○          |                |      |         |                |              |                |           |       |
| Potassium Sulfate   | ○            |           |            |                |      |         |                |              |                |           |       |
| Table Salt          |              |           |            |                | ○    |         |                |              |                |           |       |
| Industrial Salt     |              |           | ○          |                | ○    |         |                |              |                |           |       |
| Caustic Soda        |              |           | ○          | ○              |      | ○       | ○              | ○            | ○              |           |       |
| Chlorine            |              |           | ○          |                |      | ○       | ○              |              | ○              |           |       |
| Soda Ash            |              |           | ○          |                |      |         |                |              |                |           | ○     |
| Magnesium Hydroxide | ○            | ○         | ○          |                |      |         |                |              |                | ○         |       |
| Magnesium Clinker   |              |           |            |                |      |         |                |              |                | ○         |       |
| Bromine             |              | ○         | ○          |                |      |         |                |              |                |           |       |



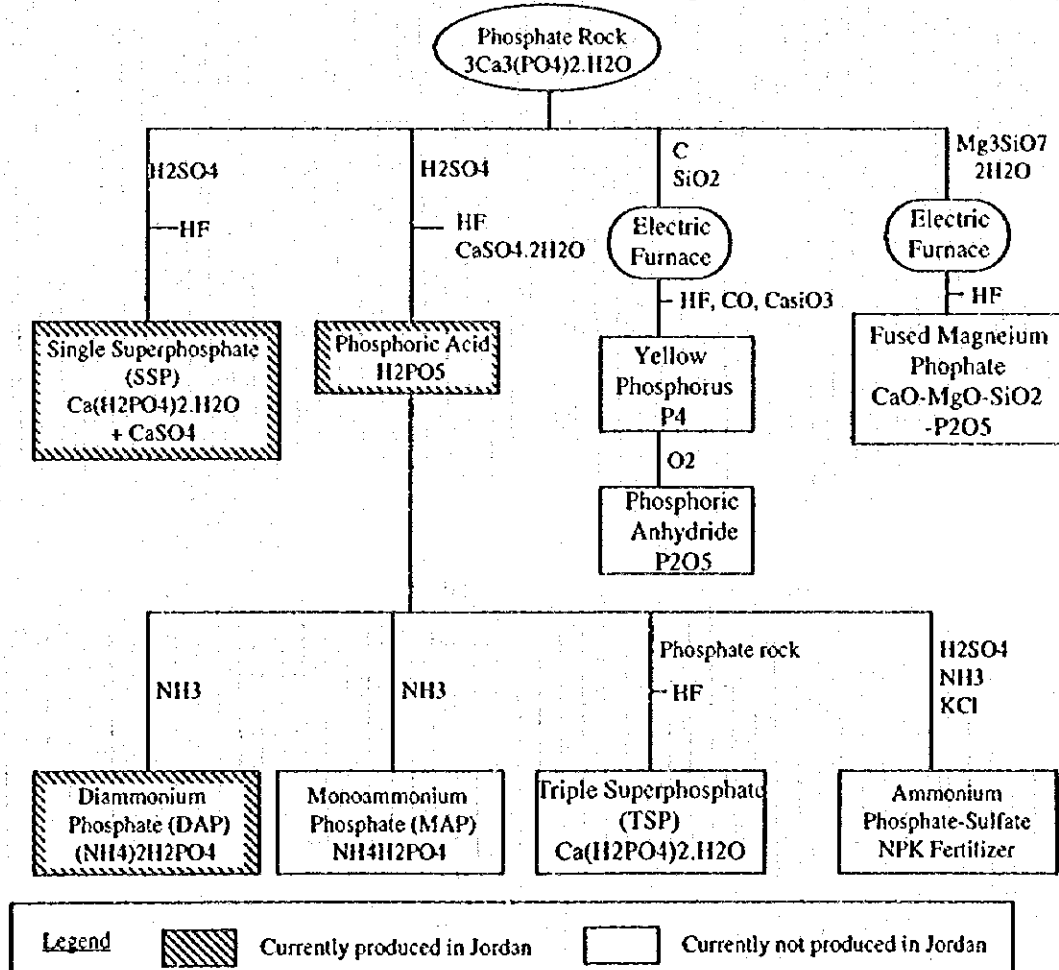
(c) Phosphate rock-based chemical industry

It is recommended to increase the amount of phosphate rock to be processed up to half of the total production. Based on this strategy and increase in production, the balance of phosphate rock will become as follows:

|  |                           |
|--|---------------------------|
| Total produced                         | 10-11 million tons/year   |
| Domestic consumption                   | 5.0-5.5 million tons/year |
| Industrial complex in Aqaba (Existing) | 1.1 million tons/year     |
| Phosphoric acid plant (IJC)            | 0.8 million tons/year     |
| Increase by new projects               | 3.1-3.6 million tons/year |
| Export                                 | 5.0-5.5 million tons/year |

The following structure is recommended for the rock phosphate-based chemical industry.

Recommendable Structure of the Rock Phosphate-Based Chemical Industry



Eshidiya or Aqaba is seemed to be the best location of the plants of the phosphate rock-based chemical industry. Eshidiya, where Jordan has the largest reserves of phosphate rock, is suitable to provide phosphate rock. Aqaba, where Jordan has a seaport, is the best for product exports.

Site location should be decided depending on the type of products. For example, the wet process phosphoric acid plant, which needs 3.2 tons of phosphate rock to produce 1 ton of phosphoric acid (as 100 %  $P_2O_5$ ), may be better to locate in Eshidiya from view points of transportation cost.

### 5-3 Development of Economic and Social Infrastructures

Placing the first priority on the regional development of the Southern Districts as Government policy, priority should also be placed on the Southern Districts for the infrastructure development.

It should be noted that although they are presented in the form of projects, they should be considered as detailed strategies or directions of infrastructure development that have been worked out through the site investigation of the Southern Districts and discussions with the agencies concerned of the GOJ, without conducting any detailed studies during the course of the Study.

#### 5-3-1 Water Supply

Following three projects are the most relevant to the water supply for the Southern Districts.

- Dici-Amman water supply project
- Southern Ghors project
- Al Hasa water project

Due to the rapid increase of population as well as growing economic activities, acute water shortage is expected in the Capitol region, in and around Amman in the near future. In order to meet the expected deficit, various water supply projects has been envisaged including the water resources development in the Yarmouk River in the northern part of the country and conveyance of the Dici ground water to Amman, which is located in the southern-most part of the country.

A feasibility study has been completed on the Dici-Amman water supply project in Mid-1996, recommending that 100 million  $m^3$ /year of Dici ground water be conveyed to Amman by the year 2000 and 150 million  $m^3$ /year by 2020. However, as the

development in the Southern Districts takes place, demand for water is to rise and Aqaba and Ma'an in particular would seriously be affected by the Dici-Amman project should be implemented. Further, the unit water cost of the project is much higher than the current average unit water cost. Considering these, it may be advisable that the following issues be looked into in-depth before decision is made for its implementation.

- Confirmation of safe yield of Dici ground water
- Restrain the increase of population and economic activities, resulting in the control of the future water demand in line with the Government policy of checking the over concentration in the Capital region
- Projection of the future water demand in the Southern Districts, in particular Aqaba and Ma'an
- Nation-wide study on the water demand/supply balance paying due attention to the overall cost-effectiveness of the water supply program for the country

In the study, a trial calculation has been made for the use and supply of the Dici ground water for reference as given hereunder.

#### Trial Calculation for Dici Groundwater Development in 2010

| Component  | Unit: million m <sup>3</sup> /year  |                                   |                                 |
|--|-------------------------------------|-----------------------------------|---------------------------------|
|  | Alternative Plan A                  | Alternative Plan B                | Alternative Plan C              |
| Planned Water Supply Area  | Amman                               | Amman and<br>Southern Districts   | Aqaba and Ma'an                 |
| (1) Planned Supply Volume to Amman   | 72                                  | 41                                | 9                               |
| (2) Current Dici Groundwater Use   | 75                                  | 75                                | 75                              |
| (3) Additional Dici Groundwater Supply to the Southern Districts for M. and Ind. | 41                                  | 41                                | 41                              |
| (4) Additional Irrigation Use in Dici-Mudawara Area                              | -63 (should be drastically reduced) | -32 (should be gradually reduced) | 0 (maintain the existing state) |
| (5) Future Use in the Southern Districts: (2)+(3)+(4)                            | 53                                  | 84                                | 116                             |
| (6) Total Future Use of Dici GW: (1)+(5)   | 125                                 | 125                               | 125                             |

It is recommended that the Southern Ghors project be implemented to develop available water resources south and east of the Dead Sea to permit additional supplies for:

- the Arab Potash Company,
- municipal use in Safi township,
- expansion of tourism facilities on the eastern shores of the Dead Sea and
- maximum production in the JVA's Southern Ghors Irrigation project.

To use the Wadi Mujib base flow, which is currently lost to the Dead Sea, a concrete weir would be constructed across the wadi just below the Wala and Mujib confluence.

An intake at the weir would divert the flow through a 3 km tunnel into a settling tank near the shore of the Dead Sea. Gravity would allow the water to flow from this tank through a steel pipeline to the Arab Potash Company complex, a distance of about 50 km.

Three dams, Wala dam in the Wadi Wala, Mujib dam in the Wadi Mujib and Tannur dam in the Wadi Hasa are recommended to be constructed with the total reservoir capacity of 61.1 million m<sup>3</sup> in order to augment the water resources in these rivers.

In order to supply additional domestic water to the Tafila City from the Al Hasa wellfield, it is recommended that Al Hasa water project be implemented by laying the pipeline of 45 km long through Al Hasa-Jurfed Darawish-Eth Thuwana-Al Qadeseya.

This project would provide about 3 million m<sup>3</sup>/year of groundwater to Tafila through the existing reservoir at Al Qadeseya by year 1999. When the project will be completed, the current Shawbak supply of about 1 million m<sup>3</sup>/year from Ma'an Governorate could be availed for the use in Ma'an Governorate.

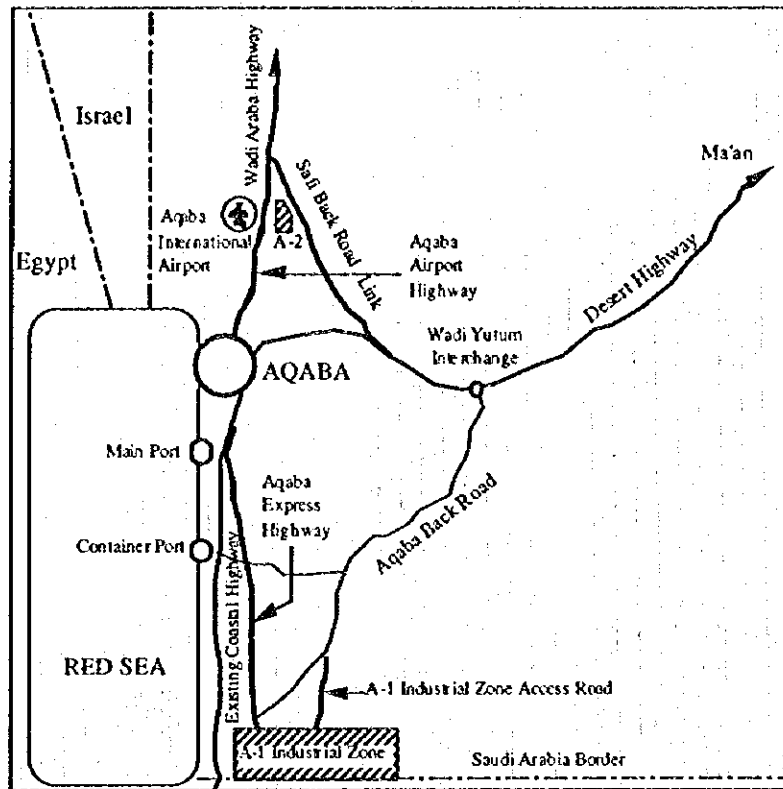
### 5-3-2 Transportation Network

The basic strategies of transport development are:

- to reinforce the transportation network within the Southern Districts that will strengthen industrial linkage and function of distribution service,
- to formulate development axes/economic sub-regions in the Southern Districts and to reinforce the linkage with the Northern/Central Districts as well as the industrial centers in Jordan,
- to reinforce the function of Aqaba gateway by road, air and sea transportation development in order to contribute to economic development for the country, and
- to establish international artery function focusing on industrial cooperation, trade/physical distribution and tourist attraction.

#### (1) Development of road network

The development plan for the road network is made by three term periods according to their urgency and possibility of realization. The detailed contents for the development plan are illustrated in Figure 5-7 and the proposed road network is illustrated below.



**Short-term period (1996 - 2000)**

- **Strengthening of the Desert Highway**
  - To expand the section between Ras an Naqab and Aqaba to 4 lanes which is under construction and to be completed by the middle of 1998.
- **Upgrading Aqaba By-pass Road: Aqaba Back Road**  
 Substantial improvement of the vertical alignment or changing the horizontal alignment to provide safe and efficient passage for industrial vehicles (trucks).
- **Improving Aqaba By-pass Road: Safi Back Road Link**
  - To construct 2-lane road that diverges from the Desert Highway to the north of Aqaba City and links to the Wadi Araba Highway to the north of the Aqaba International Airport (AIA) which will provide direct connection between the two highways without penetrating into the Aqaba City and provide improved access to the AIA as well as to upgrade the access from A-2 Industrial Estates to Wadi Araba Highway and Aqaba City.
- **Strengthening East-West Link: Tafila-Fifa Road**
  - To construct 2 lane paved road for 12.5 km from Fifa toward Tafila which will form another east-west link together with the existing paved section besides RN50 in the Southern Districts.

#### Middle-term period (2001 - 2005)

- Formulation of Karak-Tafila sub-region
  - To reinforce the Karak-Tafila linkage by expanding the current King's Highway to 4 lanes in this section
  - expanding RN50 to 4 lanes between Karak and Qatrana
  - To construct a new 2-lane road between Tafila and Al Hasa, aiming at promoting the formulation of Karak-Tafila sub-region together with the above-mentioned two projects
- Development of industrial roads
  - To upgrade the Potash City Aqaba section with 220 km distance of the Wadi Araba Highway providing improved vertical alignment and new pavement for the expected increased transport needs for Dead Sea minerals
  - To construct the Aqaba Express Highway with new 4 lanes between the Aqaba City and A-1 IZ for about 10 km to serve for industrial and daily trips
  - To construct a new access road for A-1 IZ with 5 km length which branches off from the Aqaba Back Road
- Development of international roads and improvement of access roads
  - To construct a new road from Fifa, located south of the Dead Sea in Karak Governorate, to Israeli border with about 5 km length which could be connected with the existing Israeli road by about 10 km extension from the border in order to promote the economic and industrial cooperation between Jordan and Israel
  - To expand the section of Aqaba City - the Aqaba International Airport of the Wadi Araba Highway from the existing 2-lanes to 4-lanes for 7 km
  - To construct an international ring road that connects Aqaba region to Taba in Egypt by way of Israel as an extension of the Safi Back Road Link to the west which would serve as an international network to accelerate the international cooperation in tourism sector as well as distribution function among the three.

#### Long-term period (2006 - 2010)

- East-west Road in the northern part of the Southern Districts
  - To expand the existing 2-lane road between Karak and Potash City to 4-lane road, providing another east-west road for the sub-region of Karak and Tafila.

- Agricultural / international road
  - To expand the existing RN5 to 4-lane highway in the section of Ma'an-Saudi Arabia border via Mudawara to secure stronger international linkage with Saudi Arabia and other Gulf countries in terms of physical distribution as well as distribution of agricultural products from Mudawara.

## (2) Development of railway network

Four major railway development in the Southern Districts are proposed as follows:

- Dead Sea - Red Sea (New construction)
- Eshidiya - Batn El Ghul (New construction)
- Amman - Aqaba (Rehabilitation)
- Aqaba - A-1 Industrial Zone (New construction)

### Short-term period (1996 - 2000)

- Eshidiya-Batn El Ghul rail link
  - To construct a new railway between Eshidiya and Batn El Ghul and thereby to provide continuous rail transport service from the phosphate mine at Eshidiya up to the Port of Aqaba

### Mid-term period (2001 - 2005)

- Aqaba port-A-1 IZ rail link
  - To construct a new railway from the Port of Aqaba up to A-1 IZ, enabling to transport the products at Eshidiya mine further up to A-1 IZ via Aqaba Port only by means of rail transport mode

### Long-term period (2006 - 2010)

- Amman-Aqaba rail link
  - To rehabilitate the existing railway between Amman and Aqaba and activate the section between Amman and Al Abiad which is currently not in operation and possibly change into the standard gauge from the current narrow gauge which is adopted in the country
- Dead Sea-Red Sea rail link
  - To construct a new railway between Dead Sea and Red Sea to cope with the expected incremental transport demand for the mineral products exploited in the Dead Sea

## (3) Development/reinforcement of International Airport

A feasibility study (F/S) was completed on the expansion and upgrading of the existing Aqaba International Airport (AIA) which included the construction of new passenger terminal(s) either only on Jordanian side or both on Jordanian and Israeli sides.

The alternatives proposed in the feasibility study should further be analyzed and final conclusion should be made at the earliest opportunity.

#### (4) Expansion of international trading port

The necessity and appropriateness of the Aqaba Port expansion have been evaluated through feasibility study of " The Study on the Improvement Plan of the Port of Aqaba in Jordan" conducted through Japanese technical cooperation.

According to the above-mentioned study, the scenario of future development for the Aqaba Port has been prepared assuming nine different cases mainly considering the following two external factors.

- The possibility of lifting sanctions on Iraq
- The process of the Middle East peace

Based on the assumption on the two factors above, nine cases has been made. Citing the major cases, Case 1 is made on the assumption of comprehensive settlement of the Middle East peace process and total lifting of sanctions against Iraq. Case 5 is made on the assumption of steady progress of the Middle East peace process and partial lifting of sanctions on Iraq. Case 9 is made on the assumption of slow progress of the Middle East peace process and Iraq sanctions in status quo.

The future development plan for the Aqaba Port is summarized below. According to the plan, expansion project is scheduled to be completed by year 2010.



## Future Development Plan of the Aqaba Port

| Main Port  | Container Port  | Industrial Port  |
|--|---|--|
| <p>* In the scenario of Case (1)</p> <p>(Alternative 1)</p> <ul style="list-style-type: none"> <li>· Improvement of Berth</li> <li>- Quay-front reinforcement of grain berth located in general cargo No.1&amp;2 berths (L=280m)</li> <li>- New 2 quay construction of general cargo berth located Phosphate A berth (L=340 m) &amp; others</li> </ul> <p>(Alternative 2)</p> <ul style="list-style-type: none"> <li>· Improvement of Berth</li> <li>- Construction of vegetable oil piping/ inlet of general cargo berth located in general cargo No.1 &amp; 2 berth (L=110 m)</li> <li>- New 1 quay construction of grain berth located Phosphate A (L=310 m) , pavement &amp; others</li> </ul> <p>* In the scenario of Case (5)&amp;(9)</p> <ul style="list-style-type: none"> <li>· Improvement of Berth</li> <li>- Quay-front reinforcement of grain berth located in general cargo No.1 &amp; 2 berth (L=280m)</li> </ul> | <p>* In the scenario of all cases</p> <ul style="list-style-type: none"> <li>· Extension of Berth</li> <li>- Berth construction (L=60 m)</li> <li>- Reclamation (0.6ha)</li> <li>- Retaining wall (L=120 m)</li> <li>· Construction of Outside Access Road (L=300 m)</li> <li>· Building for Office &amp; Maintenance Shop (8,250 sq.m)</li> <li>· Yard Work (pavement: 50 ha)</li> </ul> | <p>* In the scenario of all cases</p> <ul style="list-style-type: none"> <li>· Expansion of Berth (for fertilizer &amp; phosphate)</li> <li>- New construction of jetty, trestle, control &amp; angle tower and cargo handling equipment</li> </ul> <p>* In the scenario of Case (1)</p> <ul style="list-style-type: none"> <li>· Construction of new oil berth (Capacity : 250,000 DWT oil tanker)</li> </ul> |

Taking into consideration that the function of the Aqaba Port has vital importance not only for Jordanian economy but also for the Middle East regional economy, it is desirable that the expansion should be made basically following the above recommendations.

However, the current handling volume is almost half of that of mid 1980s due mainly to the sanctions against Iraq. Supposing that the road linkage is provided between the Northern/Central Districts of Jordan and Israel (the Haifa Port, the Ashdod Port) with the development of the Middle East peace process, a part of cargo handling volume of the Aqaba Port might be transferred to the Haifa Port or the Ashdod Port. On the other hand, there is a possibility that a part of cargo handling volume of the Eilat Port in Israel be transferred to the neighbouring Aqaba Port.

The decision for implementation schedule of expansion should be made based on the JICA Study on the improvement of the Aqaba Port, taking duly into consideration of external circumstances mentioned above.

### 5-3-3 Electricity and Telecommunications

#### (1) Electricity supply

Continuous development of the electricity sector is a pre-requisite to the industrialization of the Southern Districts. Specifically, the following strategies are recommended for the Southern Districts.

- Inspection and rehabilitation as well as timely renovation of the existing old power generators, economic life of which will be reached before 2010, should be reinforced.
- Considering that the Rashadiya substation is subject to heavy air pollution, it is recommendable that the existing outdoor equipment be replaced by indoor gas insulated switchgear.
- To satisfy the future demand that will be created in the Southern Districts by industrial development, a new 132 kV transmission line should be planned from The Aqaba thermal power station to Qatrana substation via Ma'an and El-Hasa substation along the Desert Highway.

#### (2) Telecommunication

High grade telecommunication service including real time interconnection is essential for the industrialization of any country/region, particularly for attracting foreign investors and should be provided for the Southern Districts. Bearing these in mind, the followings are recommended for the telecommunication development for the Southern Districts.

- The current 15-year plan which covers most of the areas and required services for the Southern Districts should be implemented without delay.
- More attention should be paid to the area along the Desert Highway. More specifically it is recommendable that optical fibre be installed from Amman to Aqaba along the Desert Highway.