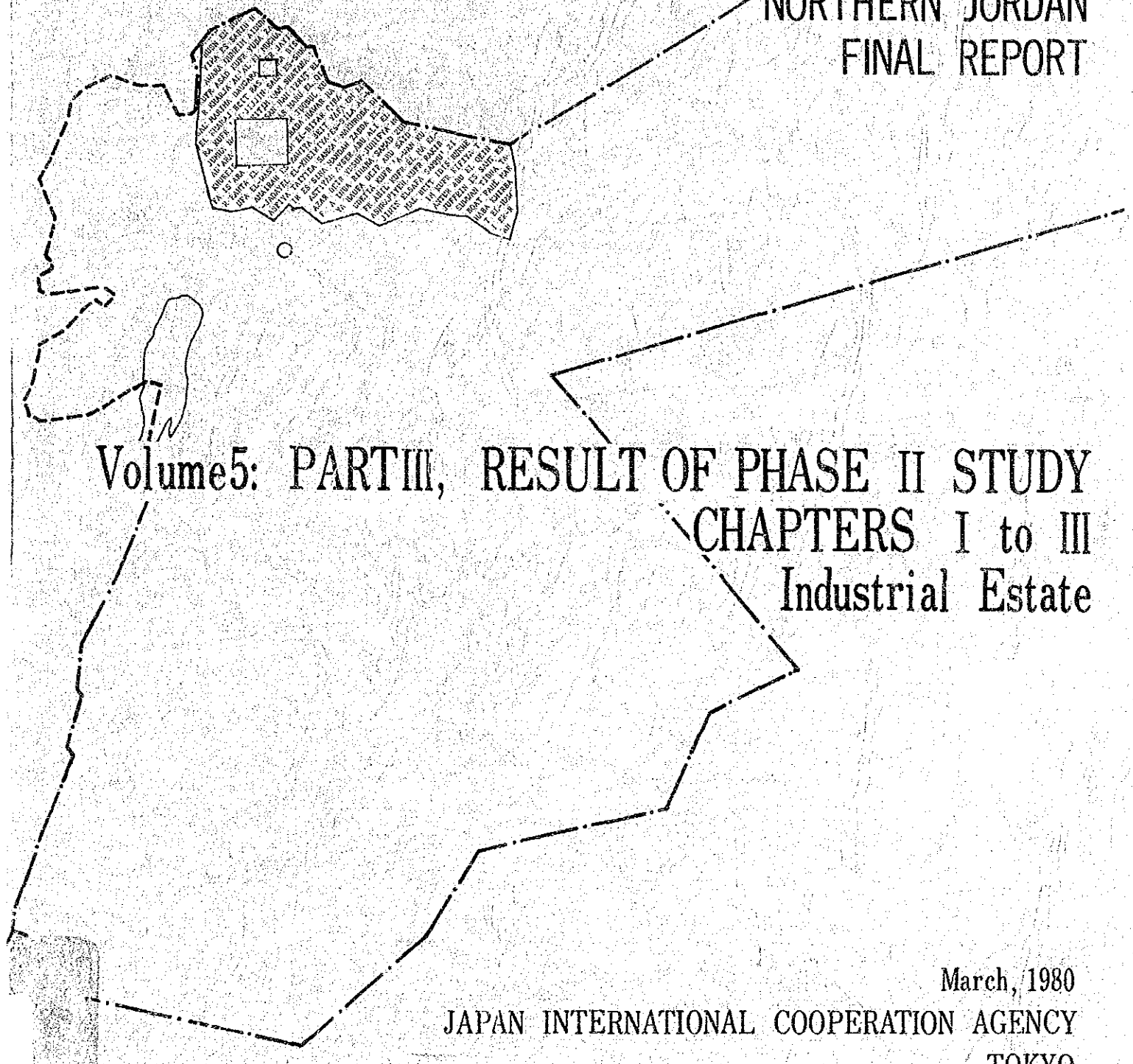
THE HASHEMITE KINGDOM OF
JORDAN

INTEGRATED REGIONAL DEVELOPMENT STUDY OF NORTHERN JORDAN
FINAL REPORT



Volume5: PARTIII, RESULT OF PHASE II STUDY
CHAPTERS I to III
Industrial Estate

March, 1980
JAPAN INTERNATIONAL COOPERATION AGENCY
TOKYO

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PART III

RESULT OF PHASE II STUDY

CHAPTER I

INTRODUCTION AND BACKGROUND

CHAPTER I

INTRODUCTION AND BACKGROUND

1.1 Background

1.001 This report presents the results of Phase II of the Integrated Regional Development Study of Northern Jordan. The Phase II Study was undertaken based on the Minutes of Discussion signed on May 31, 1979, a copy of which is included in the Inception Report for Phase II, and on the document entitled "Scope of Work for the Study of Integrated Regional Development of Northern Jordan" approved by the Government of the Hashemite Kingdom of Jordan and the Government of Japan on May 11 and 16, 1978.

1.002 The Phase I Study was undertaken from April through the end of October, 1978. As the Mission's highest priviledge, His Highness Crown Prince Hassan led the conference at which the Phase I Draft Final Report was presented, on October 28, 1978. After the presentation, the Government of Hashemite Kingdom of Jordan has made an effective and quite extensive effort to carry the study forward. To cite several of the various facets of that effort, special note may be made here of the establishment and subsequent work of the Steering Committee, headed by H.E. the Prime Minister; other organizational measures, as well as the thoughtful provision of an office and related accommodations for the Irbid Urban Regional Planning Group; preparation of an Arabic edition of the Phase I report and other key documents; cartography work done by IURPG; preliminary discussion by Dr. Tell in Tokyo on the Phase II Study and comments to the Phase I Study; and preparation of formal comments and proposals in a letter dated May 15, 1979 signed by H.E. Minister for MRA, Mr. Ibrahim Ayoub.

1.003 Based on the formal comment dated May 15, 1979, the Japanese Team (hereinafter the Team) commissioned by the Japan International Cooperation Agency prepared the Additions and Amendment to the Phase I Draft Final Report on July 19, 1979. With this Additions and Amendment, the Team received approval of the Phase I Draft Final Report from most of concerned Ministries and Agencies on September 3, 1979.

1.004 The Phase II Study started in May 1979 and produced the Inception Report on June 3, 1979. Intensive field work in Jordan was performed from August 1 through October 10; the Team held an interim presentation meeting on 27 and 28 of August and presented the Tentative

Draft Final Report on October 10. Thus the Team is now presenting this Final Report as a result of extensive, thoughtful efforts made by counterpart officers as well as of our own work.

1.2 Projects to be Studied and Project Areas

1.005 The above-mentioned 1978 Scope of Work specifies that in the Phase II Study there would be undertaken pre-feasibility studies of three development projects in the Study Area, which is the entire region north of the Zarqa River, east of the Jordan Valley, south of the Syrian border and west of the 36°50' line of east longitude. As a result of discussion between representatives of the Jordan Government and the Japan International Cooperation Agency, it was agreed to take up three projects for the Phase II Study. They are:

(1) Irbid Industrial Zone,
(2) Irbid Ring Roads, and
(3) Irbid Tourism Project: Jerash-Dibbin-Ajlun Tourism Project.

These three were then studied, with results as provided in this report.

1.006 In addition to these three studies, it was agreed upon by both parties that one expert will be provided by the Japanese Government as a member of the Phase II Team to assist the Irbid Urban Regional Planning Group (hereinafter IURPG) in preparing a land use plan but not to make the plan itself. For this, one urban planner joined the Team and helped the IURPG to successfully complete the following tasks for the Greater Irbid Region:

(1) Review and assessment of urban land expansion,
(2) Assessment of economic potential,
(3) Examination of agricultural land in view of urban expansion,
(4) Population projection,
(5) Projection of urban expansion, and
(6) Alternative projection of urban expansion.

1.007 As to the Irbid Industrial Zone, this word "Industrial Zone" was used by the representatives of the Jordan Government to mean "industrial estate" in terms of the United Nations definition. In order to avoid conceptual confusion, this Report uses the UN terminology and renamed the first project as "Industrial Estate of Irbid (IEI)." For a detailed explanation, see Section 3.1.2 of this Volume. The outline of the Industrial Estate of Irbid, as proposed in the Volume 3 of Part II, calls for IEI to be located in the outskirts of Irbid City, to encompass an area of about 20 hectares, and to be either an expansion of the existing industrial estate or a new estate.

1.008 The Irbid Ring Roads have been renamed as "Ring Roads of Irbid (RRI)" for the purpose of avoiding confusion with IRR (Internal Rate of Return) when it was acronymed. There are three planned ring roads in Irbid City: one new ring road around the Irbid Municipality which can tentatively be called "Outer Ring" and two other ring roads tentatively called Inner (First) and Boundary (Second) Rings. Through discussions between the Japanese Team and Jordan Government officials, it was agreed that the Boundary and Outer Rings are to be studied.

1.009 The Irbid Tourism Project is not suitable for pre-feasibility study but, rather, suitable for a type of planning study, and consequently does not fit into the 1978 Scope of Work. Even so, it was studied in Phase II in accordance with the strong recommendation of the Government of Jordan. In accordance with the agreement, this study covered the cities of Jerash and Ajlun, and their environs inclusive of Dibbin National Park, King Talal Dam, Wadi Elyabis and Ishtafina Tourist Park areas. This area is called "Target Area" in this Report. Since the result of this study showed the importance of the Ajlun area in terms of tourism development, we renamed this project as "Ajlun-Dibbin-Jerash Tourism Plan (ADJ Tourism Plan)" in this Report.

1.3 Relationship of Selected Projects to Phase I Study

1.3.1 Decentralized Pattern and Combined Pattern

1.010 Adoption of the Decentralized Pattern in planning was decided by the Ministerial Development Committee, as included in the formal comment signed by Minister for Municipal and Rural Affairs. This decision can be interpreted as that the recommendation in Chapter III of Part II was adopted, since the recommended strategy of the Combined Pattern is a combination of the Decentralized Pattern in 1985 and the Duo-Centric Pattern in 2000.

1.3.2 Relation of the Three Projects to Phase I Study

1.011 The Industrial Estate of Irbid and the Ring Roads of Irbid projects will obviously contribute to creation of a development core for the Irbid Governorate at the Municipality of Irbid. On the other hand, the Ajlun-Dibbin-Jerash Tourism Plan will contribute to enhancement of the decentralization of economic activities in the Study Area. Both of them in total will support the Combined Pattern of development strategy, and the Governmental policy of decentralization of economic activities now concentrated in Amman.

1.4 Objectives and Output of the Study

1.4.1 Objectives

1.012 The objectives of the Study in Part III are to carry out pre-feasibility studies for the Ring Roads of Irbid project and the Industrial Estate of Irbid project and to prepare a tourism development plan for Ajlun-Dibbin-Jerash area.

1.013 The purpose of the pre-feasibility studies is to provide the Government and external lending agencies with information and guidelines necessary for them to determine, without expending unnecessary time and expense, that the projects are sound objectives of investments, for it would be a grave mistake to spend a large amount of money on a feasibility study if there were serious impediments to successfully carrying out these tentative projects and if they could be detected by a brief, but efficient study, i.e., pre-feasibility study. The study, therefore, covered considerations on technical, institutional, financial and economic aspects, within suitably limited parameters.

1.014 As for the Ajlun-Dibbin-Jerash project, the study was carried out to prepare a general tourism development plan for the Target Area. The study is aimed at preparation of an appropriately phased long-term tourism plan and a more detailed first phase plan.

1.4.2 Outputs

1.015 The output of the pre-feasibility studies for the Ring Roads of Irbid project and the Industrial Estate of Irbid project are:

(1) Preliminary design of an appropriately selected project, based on comparison of alternatives;
(2) Cost estimate of the above designed project;
(3) Financial and economic evaluation, and
(4) Recommendation of arrangements for implementation.

1.016 The output of preparation of the tourism development plan are:

(1) An appropriately phased long-term tourism plan up to the year 2000,
(2) Detailed plans for development cores, and
(3) List of projects to be implemented, their cost estimates, and investment schedule.

1.5 Format of This Report

1.017 Following this chapter, Chapter II presents the results of population-and-urbanization projection for the Irbid metropolitan area, which forms a base for financial and economic analyses of the Industrial Estate and the Ring Roads projects. Chapter III of this Volume and IV

of Volume 6 present the results of the pre-feasibility study of the Industrial Estate and the Ring Roads respectively. Finally, Chapter V of Volume 7 presents the results of the Ajlun-Dibbin-Jerash Tourism planning study.

CHAPTER II

PROJECTION OF POPULATION AND URBANIZATION, IRBID CITY AND ITS SURROUNDINGS

CHAPTER II

PROJECTION OF POPULATION AND URBANIZATION, IRBID CITY AND ITS SURROUNDINGS

2.1 Framework of Projection

2.001 Projection of population and urbanization has been undertaken in order to obtain a perspective view of spatial patterns of development in Irbid City and its surroundings and to establish a basis for determining the demand and location of Ring Roads and Industrial Estate projects.

2.002 Key indicators used in the projection are population size, built-up area and population density in the built-up area. Although "built-up area" is not an officially defined statistical term in Jordan, it needs to be given special attention for the reasons that population increase is observed to result immediately in built-up area expansion and that built-up area indicates basic patterns of land-use, on which the location of Ring Roads and Industrial Estate depends to a considerable extent. This study defines built-up area as the area in which buildings are observed contiguously in aero-photo maps at intervals of not more than 84 m.[1/]

2.003 Projection has been made at three levels, i.e., Greater Irbid,[2/] Irbid Expanded[3/] and Irbid City, taking into account that the location of Ring Roads or Industrial Estate needs to be examined in the light of urbanization pattern in the whole of Greater Irbid in which settlements will be integrated economically and functionally in the foreseeable future and that Irbid City will merge with those

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1/ This is equivalent to the population density of 10 persons per hectare on the assumption that each building has a seven member family on average.

2/ Greater Irbid includes Irbid Municipality, Hawara, Aidun, Bishra, Beit Ras, Hakama, Ramtha, Husn, Es Sarih, El Mughayir, Sal and Maru.

3/ Irbid Expanded includes Irbid Municipality, Hawara, Aidun, Bishra, Beit Ras and Hakama.

settlements soon. It is misleading to assess the growth of the city by looking at the population and urbanization only within the present administrative boundary. The baseline of the projection is 1975 and the reference years of projection are 1985 and 2000. Projection for the year 1985 has been made primarily to obtain the most probable consequence of present trends whilst the projection for the year 2000 aims at having a long-term perspective of the urbanization pattern, which is to be influenced and controlled by government policy measures and investments.

2.004 For population projection, several basic assumptions have been made of population distribution at both interregional and intra-regional levels.

2.005 In terms of interregional population distribution, two alternatives have been considered with reference to the population growth of Greater Irbid. The first alternative is that Greater Irbid will grow as the center of the Irbid Governorate; thus, its population growth is dependent upon changes in total population of the Governorate. In other words, the proportion of the population to be absorbed into Greater Irbid in relation to the total incremental population of the Irbid Governorate is assumed to be based on the past trends. The second alternative is that Greater Irbid will grow not only as the center of Irbid Governorate but also as a part of the expanding Amman metropolitan region, thus receiving the overspill from economic activities and the population of the capital region. Likewise, the proportion of the population to be absorbed in Greater Irbid, compared to the total incremental population in both the Irbid and Amman Governorates, is assumed to be based on the past trends. A firsthand projection has revealed that future population is comparatively low under the first alternative and high under the second alternative. The most probable trend seems to lie somewhere inbetween. Total population of Greater Irbid therefore, has been determined as the average of the two trends under the two alternatives.

2.006 Population distribution within Greater Irbid is highly related to land use pattern and patterns of expansion in built-up areas in particular. Therefore, a firsthand population projection has been made by municipality/village, without taking into account the population absorptive capacity of each municipality or village, and the results of the firsthand population projection have been readjusted after the extent and direction of built-up area expansion were determined.

2.007 In the firsthand projection, the proportion of population to be potentially absorbed by Irbid City in relation to the total incremental population of Greater Irbid has been determined, based primarily on the trend of the proportion in the past, and hence on the incremental population in the rest of Greater Irbid. The total population of the rest of Greater Irbid estimated through the process mentioned above therefore, has to be broken down further to the population of each municipality and village, other than Irbid City, in proportion to the present population distribution amongst them.

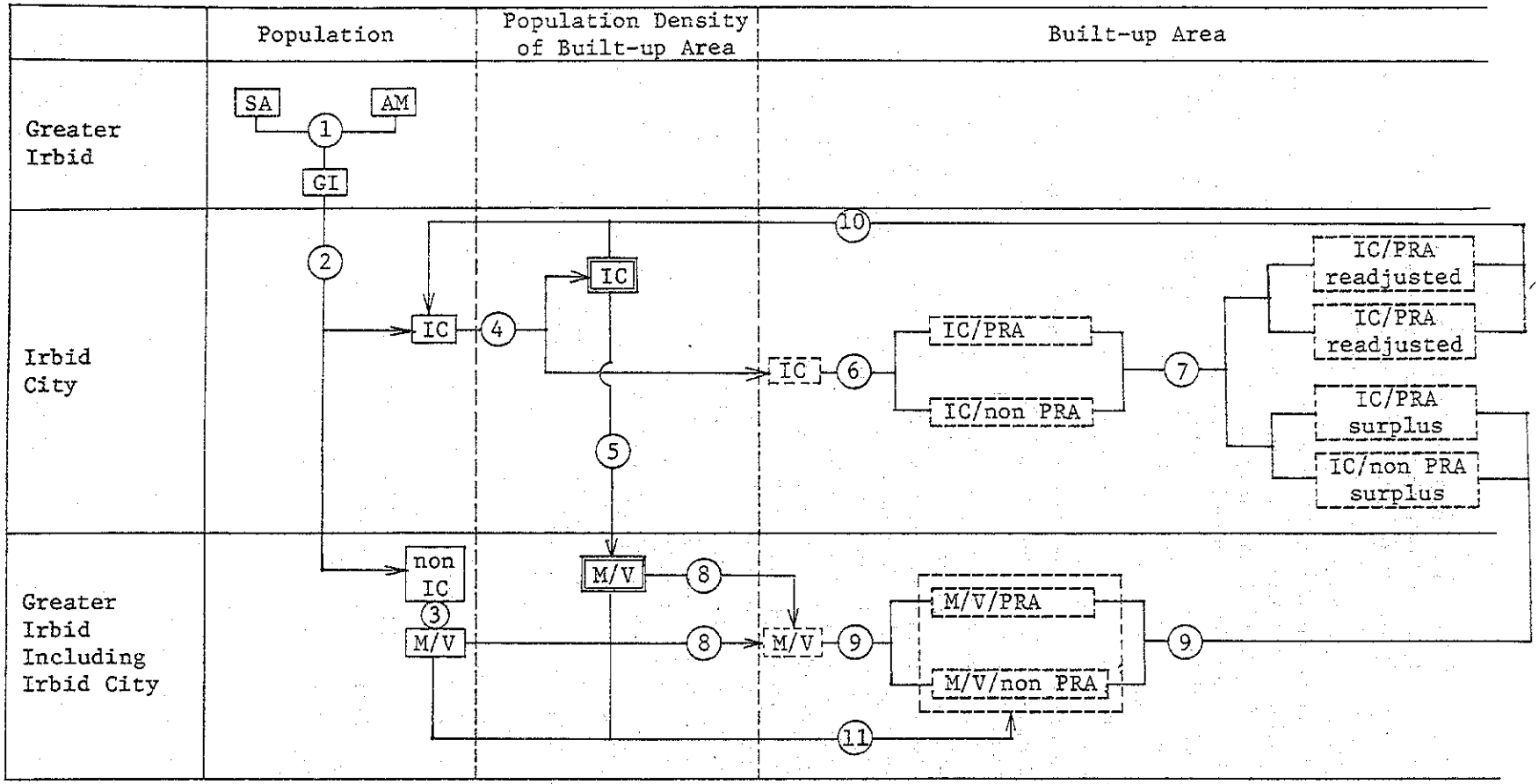
2.008 Results of the firsthand projection have been readjusted for the built-up area, projected in the following way. Firstly, the extent of the built-up areas in 1985 and 2000 have been estimated for Irbid City by using a population density function. Secondly, the extent of the built-up areas of other municipalities and villages have been estimated, based on the built-up area of Irbid City and correlations between population size and density of respective settlements. Thirdly, by assuming that Irbid City has only 2,600 hectares of land suitable for built-up area expansion, the surplus portion of the built-up area of Irbid City will be allocated to the municipalities/ villages in Irbid Expanded, in proportion to their built-up areas.

2.009 This process involves two important assumptions on the urban land use policies which would make future built-up areas compact to the greatest possible extent. The first assumption is that although population density in built-up areas will decline until 1985, as has been experienced in the past, the declining speed will lessen after 1985 with the introduction of reinforced land use regulations, which primarily aim at the utilization of the many scattered empty lands in the existing built-up areas. In the projection model, the first assumption means that the theoretical population density at the central point of the built-up area will decline at the same rate as in the past, but at a lower rate after 1985. The second assumption is that planned residential areas, with a reasonably high population density of 100 persons per hectare, will be developed and that they will have as much as 10 percent of newly expanded built-up area until 1985 and 20 percent after that. Under this assumption, planned residential areas may expand to the extent that they will exceed the limited size of land, suitable for built-up expansion within the current city boundary as built-up areas as a whole continue to expand. The surplus portion of the planned residential areas have, therefore, been allocated to the two municipalities of Aidun and Hawara equally because they have high potential for developing residential areas.

2.2 The Model of Projection

2.010 Figure 2.1 shows the flow of projection. Formulae and assumptions used are as follows:

Figure 2.1 Flowchart of Projection



Source: Study Team.

Notes: Population Population Density Built-up Area

(n) Numbering of Formula

SA: Study Area AM: Amman Governorate GI: Greater Irbid IC: Irbid City

M/V: Municipalities/Villages in Irbid Expanded Excluding Irbid City PRA: Planned Residential Area

Formula 1: $$P^t_{GI}=P^{t-5}_{GI}+1/2(P^{75}_{GI}-P^{61}_{GI})\left[\frac{P^t_{SA}-P^{t-5}_{SA}}{P^{75}_{SA}-P^{61}_{SA}}+\frac{(P^t_{SA}-P^{t-5}_{SA})+(P^t_{AM}-P^{t-5}_{AM})}{(P^{75}_{SA}-P^{61}_{SA})+(P^{75}_{AM}-P^{61}_{AM})}\right]$$

Formula 2: $$\begin{cases} P^t_{IC}=P^{t-5}_{IC}+\dfrac{(P^t_{GI}-P^{t-5}_{GI})\ (P^{75}_{IC}-P^{61}_{IC})}{(P^{75}_{GI}-P^{61}_{GI})} \\ P^t_{nonIC}=P^t_{GI}-P^t_{IC} \end{cases}$$

Formula 3: $$P^t_{M/V}=P^t_{nonIC}\times\frac{P^{75}_{M/V}}{P^{75}_{nonIC}}$$

Formula 4: $$\begin{cases} 10=Ce^{-bR} \text{ 4/} \\ P^t_{IC}=\dfrac{2\pi C}{b^2}\left(1-\dfrac{10bR}{C}-\dfrac{10}{C}\right) \end{cases}$$

$b=0.319$ in 1975, 0.183 in 1985 and 0.121 in 2000

$$A^t_{IC}=\pi R^2,\quad D^t_{IC}=P^t_{IC}/A^t_{IC}$$

Formula 5: $$D^t_{M/V}=D^{t-5}_{M/V}\cdot\frac{D^t_{IC}}{D^{t-5}_{IC}}\cdot\left[\frac{P^t_{M/V}}{P^{t-5}_{M/V}}\right]^{0.3482}$$

4/ The simultaneous equations are derived from the population density function, $d=Ce^{-bx}$ where d is population density (persons/hectare) at the distance x (100 m) away from the center of built-up area with population density C (persons/hectare). The first equation expresses the assumption that population density is 10 persons/hectare at the border of the built-up area which is at the distance R (100 m) away from the center. The integral of the population density function gives the total population in built-up area. Hence,

$$P=\int_0^R 2\pi x\cdot d\cdot dx=\frac{2\pi C}{b^2}\left(1-\frac{10bR}{C}-\frac{10}{C}\right).$$

Formula 6: $A^{t}_{IC/PRA} = (A^{t}_{IC} - A^{t-5}_{IC})\ r$

$$A^{t}_{IC/nonPRA} = A^{t}_{IC}\left[1 - \frac{100r\ (A^{t}_{IC} - A^{t-5}_{IC})}{P^{t}_{IC}}\right]$$

r = 0.1 until 1985 and 0.2 after 1985

Formula 7: When $A^{t}_{IC/PRA} \geq 2{,}600$

$$\begin{cases} A^{t*}_{IC/PRA} = 2{,}600\left[A^{t}_{IC/PRA}/(A^{t}_{IC/PRA} + A^{t}_{IC/nonPRA})\right] \\ A^{t**}_{IC/PRA} = A^{t}_{IC/PRA} - A^{t*}_{IC/PRA} \end{cases}$$

$$\begin{cases} A^{t*}_{IC/nonPRA} = 2{,}600\left[A^{t}_{IC/nonPRA}/(A^{t}_{IC/PRA} + A^{t}_{IC/nonPRA})\right], \\ A^{t**}_{IC/nonPRA} = A^{t}_{IC/nonPRA} - A^{t*}_{IC/nonPRA} \end{cases}$$

$$A^{t*}_{IC} = A^{t*}_{IC/PRA} + A^{t*}_{IC/nonPRA}$$

When $A^{t}_{IC/PRA} < 2{,}600$

$$A^{t*}_{IC/PRA} = A^{t}_{IC/PRA}\ ,\quad A^{t**}_{IC/PRA} = 0$$

$$A^{t*}_{IC/nonPRA} = A^{t}_{IC/nonPRA}\ ,\quad A^{t**}_{IC/nonPRA} = 0$$

$$A^{t*}_{IC} = A^{t}_{IC}$$

Formula 8: $A^{t}_{M/V} = P^{t}_{M/V} \ / \ D^{t}_{M/V}$

Formula 9:
$$\begin{cases} A^{t}_{M/V/PRA} = 1/2\ A^{t**}_{IC/PRA} & \text{(for Hawara and Aidun only)} \\ A^{t}_{M/V/PRA} = 0 & \text{(for municipalities/village other than Hawara and Aidun)} \end{cases}$$

$$A^{t}_{M/V/nonPRA} = A^{t}_{M/V}\left(1 + \frac{A^{t**}_{IC/nonPRA}}{\Sigma A^{t}_{M/V}}\right)$$

$$A^{t*}_{M/V} = A^{t}_{M/V/PRA} + A^{t}_{M/V/nonPRA}$$

Formula 10:
$$P^{t*}_{IC} = 100\ A^{t*}_{IC/PRA} + D^{t}_{IC} \cdot A^{t*}_{IC/nonPRA}$$

$$D^{t*}_{IC} = P^{t*}_{IC} / A^{t*}_{IC}$$

Formula 11:
$$P^{t*}_{M/V} = 100\ A^{t}_{M/V/PRA} + D^{t}_{M/V} \cdot A^{t}_{M/V/nonPRA}$$

$$D^{t*}_{M/V} = P^{t*}_{M/V} / A^{t*}_{M/V}$$

In the formula above,

P	:	Population in persons;
D	:	Population density in persons per hectare;
A	:	Built-up area in hectares;
C and R	:	See footnote 4/;
Suffix t	:	Year;
Suffix GI	:	Greater Irbid;
Suffix IC	:	Irbid City;
Suffix nonIC	:	Greater Irbid excluding Irbid City;
Suffix M/V	:	Municipality/village other than Irbid City;
Suffix PRA	:	Planned residential area;
Suffix nonPRA	:	Built-up area other than planned residential area;
Asterisk *	:	Readjusted figure;
Asterisk **	:	Overspill from Irbid City due to the adjustment;
r	:	Share of the planned residential area within the newly expanded built-up area; and
IC/PRA	:	Planned residential area in Irbid City.

2.3 Results of Projections

2.011 Results of projection are as follows. The population of Greater Irbid should increase from 199,652 to 281,000 during the period 1975 to 1985 at the rate of increase of 3.5 percent per annum. After 1985, the population increase should accelerate further, at the annual rate of 3.8 percent until reaching 491,665 in the year 2000 or 2.5 times as much as in 1975, presumably because of the increasing influence of the Amman metropolitan region. Irbid Expanded will increase its population accordingly, but at a higher rate of increase. Thus the percentage of the population of Irbid Expanded in Greater Irbid will increase from 72 to 75 percent during the period 1975 to 2000. The populations of Irbid Expanded and Irbid City are shown on Table 2.1. The population of Irbid City itself is not expected to increase much, particularly after 1990 to 1991, when expansion of built-up area will reach the saturation point due to the limited area of land suitable for expansion within the current city boundary. Population may then shift from the area within the current city boundary to the adjacent municipalities and villages resulting in a population increase rate of 14.1 percent per annum.

2.012 According to Table 2.1, the total built-up area of Irbid Expanded should increase from 1,461 to 6,048 hectares during the period 1975 to 2000. Regarding the increment in the built-up area of Irbid Expanded, Irbid City itself will share 76 percent of it until 1985 and then 19 percent of it during the period 1985 to 2000. After 1985, expansion of the built-up area should be remarkable, particularly in Hawara and Aidun, which are endowed with large areas of lands suitable for good residential areas, from where easy access to major centers of activity including Irbid City, Amman and Yarmouk University, will be possible. Planned residential areas will be located also in these municipalities as an extension of those in Irbid City.

2.013 On average, the population density of the built-up area has been declining in Greater Irbid from 99 to 61 persons per hectare since 1975 and will continue to do so until the year 2000. Until 1985, population density will decline, both within and outside the city, due to the rapid expansion of built-up areas in respective municipalities and villages. It should then start to increase outside the city after 1985 and population within the city may flock into adjacent municipalities and villages during the period 1985 to 2000. In spite of a declining average population density, the population density in the present built-up area will increase considerably, implying that Irbid City will increase its economic potential as urbanization takes place in its surroundings (see Table 2.2).

Table 2.1 Projection of Population, Built-up Area and Population Density, Irbid Expanded

		1975	1985	2000	Annual Rate of Increase (in percent) 1975-1985	1985-2000
Population (in person)	Total	144,913	206,154	369,199	3.6	4.0
	Irbid City	128,000	182,600	201,675	3.6	0.7
	Hawara	4,561	6,168	54,487	3.1	15.6
	Aidun	3,631	5,013	52,451	3.3	16.9
	Bishra	3,310	4,561	22,684	3.3	11.3
	Beit Ras	3,152	4,471	23,494	3.6	11.7
	Hakama	2,259	3,341	14,408	4.0	10.2
	Planned Residential Areas	0	11,230	67,040	-	12.6
	Other Areas	144,913	194,924	302,159	3.0	3.0
Built-up Area (in hectares)	Total	1,461	2,916	6,048	7.2	5.0
	Irbid City	889	1,995	2,600	8.4	1.8
	Hawara	165	322	1,044	6.9	8.2
	Aidun	157	299	1,031	6.7	8.6
	Bishra	100	200	525	7.2	6.6
	Beit Ras	100	196	552	7.0	7.1
	Hakama	50	104	296	7.6	7.2
	Planned Residential Areas	0	112	670	-	12.7
	Other Areas	1,461	2,804	5,378	6.7	4.4
Population Density (in persons per hectare)	Total	99	71	61	-	-
	Irbid City	144	92	78	-	-
	Hawara	28	19	52	-	-
	Aidun	23	17	51	-	-
	Bishra	33	23	43	-	-
	Beit Ras	32	23	43	-	-
	Hakama	45	32	49	-	-
	Planned Residential Areas	0	100	100	-	-
	Other Areas	99	70	56	-	-

Source: Study Team.

Table 2.2 Population Density of Built-up Area by Period of Built-up, Irbid Expanded

(Unit: Persons per hectare)

Period of Built-up		1975	1985	2000
The Area Built-up During the Period:	Before 1975	144	176	222
	1975 to 1985	-	23	60
	1985 to 2000	-	-	19
	Before 2000 Average Density (Total Area)	144	92	78

Source: Study Team.

2.4 Spatial Pattern of Past Urbanization

2.014 In old days, Irbid was comprised of small settlements centering around Tell and it gradually expanded towards the south, east and west along El Hastumi Street, without expanding much towards the north. According to an aerial photograph taken in 1952, the built-up area of the city is estimated at only 131 hectares.

2.015 However, since then, the built-up area of the city started to expand quite rapidly at the increased rate of 8.7 percent during the period 1952 to 1975. The rapid expansion was attributed to an increase in the existing population, caused partly by an influx of refugees but considerably more so by higher land values and higher car ownership. It is said that those who work and earn in neighboring Arab countries invest their money primarily in real estate. Thus, people tend to move outward from urban centers, in quest of cheaper land. Motorization seems to have accelerated this trend by enabling people to live in otherwise inconvenient, far-away places.

2.016 By 1976, the city expanded to the north, along Hakama Street, as refugee camps for Palestinians were constructed in the hills, north of Tell. Along Hakama Street, an industrial estate has been established. The northern part of the city is populated relatively densely by lower income group people.

2.017 To the west, the city has not expanded much because of steep slopes which are not suitable for residential use. A deep wadi, stretching from north to south in the western part of the city is also a definite obstacle to city expansion. To the southwest, however, expansion has been somewhat remarkable around El Bariha and in the hills to the immediate south of El Bariha.

2.018 So far, urban expansion is most remarkable in the southern part of the city, especially along the road stretching to Aidun and further on to Amman. The rapid expansion to the south can be attributed to favorable topographic conditions and good accessibility to Amman. In fact, the southern part of the city is said to be a good residential area for the middle or high income group people.

2.019 Equally remarkable is the expansion towards the east. The newly built-up area in the eastern part of the city is the largest, and expansion to east has been taking place regardless of the proximity to major trunk roads. In addition, some impact from the new Yarmouk University development is observed over the area along the Baghdad Street, which includes a complex of three-story apartment houses constructed by the Housing Corporation for the teaching staff of the University. With the completion of the Yarmouk University at 12 km east of the city and the Ring Roads development relating to the upgrading of Bishra Street, expansion of the built-up area towards the east is expected to be further accelerated.

2.5 Built-up Area in 1985 and 2000

2.020 Figure 2.2 shows the urbanization projection of Irbid Expanded. By 1985, all parts of the city will be built-up, except for the northwestern part, where steep slopes will keep the area from being intensively used for urban expansion. Expansion will be most remarkable in the eastern part because of large flat areas available for residential use and the comparatively low price of land. In 1985, the built-up area will expand to reach or slightly exceed the proposed location of the Outer Ring Road in almost all directions. Along major trunk roads, the built-up area will expand further so that built-up areas of Beit Ras, Hakama, Bishra, Hawara and Aidun will merge with the built-up area of Irbid City. The area surrounding the intersection of the Boundary Ring Road and Baghdad Street will be developed as a planned residential area with a considerably high population density.

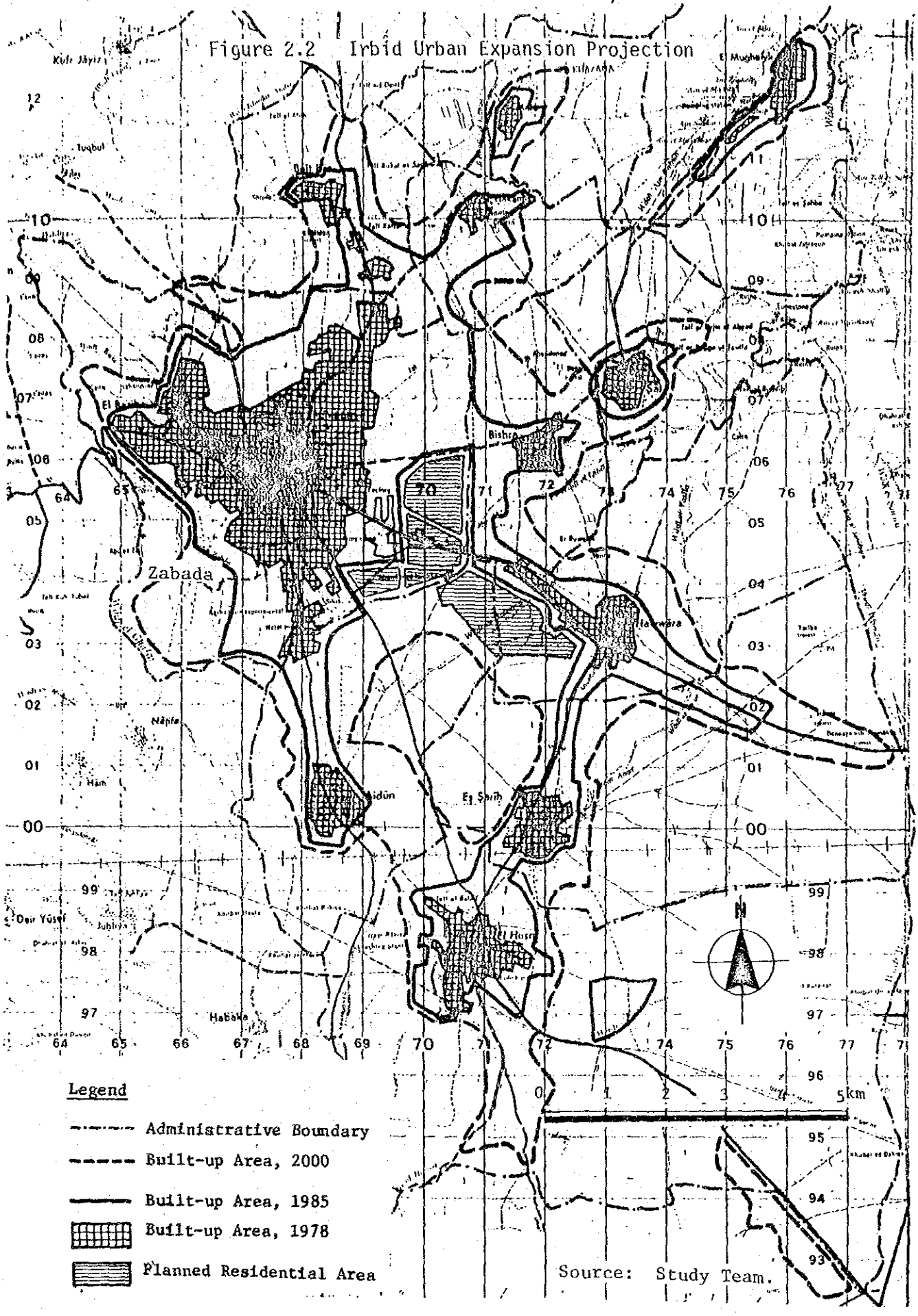
2.021 After 1985, the built-up area will expand in such a way that agricultural lands and moderate slopes left between major trunk roads are converted into urban land. Such expansion will take place in the areas between Hawara and Aidun, and between Aidun and Husn. Zabada will also be entirely built-up area. The planned residential area is expected to expand toward Hawara.

2.022 Although this projection demonstrates the most likely situation in Irbid in the future, it is not necessarily desirable to create large-scale urban sprawl from the viewpoint of protection of agricultural land and efficient supply of urban utilities. And, compact urban areas can be formed if the national government enforces strong land use regulations to greatly reduce the area and number of vacant, under-utilized land in the built-up area by, for example, charging very heavy taxes on the vacant land holdings of more than a certain

size. As an alternative, another population projection has been made, based on the assumption that government land use regulations will be introduced to keep the population within the city, whose population would otherwise move to the suburbs outside the city boundary. Based on this second alternative, population in Irbid City will then be 182,600 in 1985 and 304,000 in 2000.

2.023 Thus, the conclusion is that, if the present land use control regulations prevail even in the future, the built-up area will have the shape shown on Figure 2.2, and that, if very strong land use regulations would be enacted in the future, the built-up area would have a shape different from Figure 2.2. We took the assumption that the present land use control regulations will prevail.

Figure 2.2 Irbid Urban Expansion Projection



Source: Study Team.

CHAPTER III

INDUSTRIAL ESTATE OF IRBID

(IRBID MUNICIPALITY INDUSTRIAL PARK)

CHAPTER III

INDUSTRIAL ESTATE OF IRBID

(IRBID MUNICIPALITY INDUSTRIAL PARK)

3.1 Background and Objectives

3.1.1 Background

a. Needs for Industrialization

3.001 Among the five Governorates in Jordan, Irbid Governorate is the second most densely populated region, next to Amman Governorate. According to "Census of Population and Housing in 1961," Irbid Governorate had around 30 percent of the population in the East Bank. Although there is no reliable data about the population more recent than that of this census, it is estimated that the population has increased in every Governorate, but that the ratio of population of the all Governorates except for Amman Governorate to the total population of the East Bank has gradually decreased as a result of concentration of population in the Amman metropolitan region (Table 3.1). This means the Amman metropolitan region is growing so much that it is becoming difficult to maintain a good living environment there. Therefore, two of the most important objectives of the National Five Year Plan are to restrict concentration into the Amman metropolitan region, to keep it at a moderate degree, and to encourage the development of other regions. Among these local regions, Irbid Governorate deserves high priority for Irbid Governorate possesses a large population.

3.002 The economic growth of Jordan depends quite a degree on other surrounding countries, particularly on Arab countries. According to "External Trade Statistics," 43.9 percent of the value of exports was the trade with Arab countries in 1977 (Table 3.2). Although the ratios have slightly decreased, Arab countries are surely the most important export market for Jordan. Jordan is situated in the center of these Arab countries, and the Study Area contains the main gateway of land transport from Europe. Thus the Study Area is connecting Europe with the Gulf countries. From the viewpoint of economic development, it might be quite reasonable to encourage the economic growth of such a region as Irbid which does possess a strategic locational advantage.

Table 3.1 Estimated Population of the East Bank at the End of 1977 and in 1961

(Unit: Persons)

Governorate	1977			1961		
	Female	Male	Total	Female	Male	Total
East Bank	1,046,113	1,080,427	2,126,540	431,369	469,407	900,766
Amman	597,363	621,745	1,219,108 (0.5733)	202,856	230,762	433,618 (0.4814)
Balqa	68,360	69,740	138,100 (0.0649)	38,780	40,227	79,057 (0.0878)
Irbid	296,439	303,637	600,076 (0.2822)	136,452	137,524	273,976 (0.3042)
Karak	56,421	57,330	113,751 (0.0535)	32,531	34,680	67,217 (0.0746)
Ma'an	27,530	27,975	55,505 (0.0261)	20,750	26,164	46,914 (0.0521)

Source: Department of Statistics, Statistical Year Book, 1977.

Note: ( ): The ratio of the Governorate to East Bank.

Table 3.2 External Trade with Arab Countries and with Arab Common Market, 1971 and 1977

(Unit: JD 1,000)

	1971	1977
Total Imports	76,627	454,518
from Arab Countries	16,759	72,507
Share of total	0.219	0.160
from Common Market	7,055	23,074
Share of total	0.092	0.051
Total Exports	11,441	82,100
to Arab Countries	6,686	36,046
Share of total	0.584	0.439
to Common Market	4,093	16,418
Share of total	0.358	0.200

Source: External Trade Statistics, 1971 and 1977.

Note: Common Market Countries are the followings: Iraq, A.R. of Egypt, Syrian Arab Republic, Kuwait, Sudan, Yemen Republic and Algeria.

3.003 Jordan has achieved a remarkable economic growth during the last three years (1976 to 1978). GDP at 1972 prices was JD 186.7 million in 1969 and it increased to JD 244.1 million (Table 3.3) in 1978, though there have been difficult years due to the unfortunate social disturbance. However, the growth rate of per capita GDP at constant prices is not so high as compared with the growth rate of GDP due to the high rate of population growth.

3.004 Nevertheless, it seems to be certain that per capita income, in other words disposable income, is growing steadily in spite of population increase. And it becomes more and more clear that further economic growth of the country largely depends on industrial development. The current 1976 to 1980 Five Year Plan (FYP) aims at 12 percent annual real growth rate in GDP, to be achieved by growth rates of 40 percent in agriculture, 220 percent in mining and manufacturing, 120 percent in electricity and water supply and 51 percent in services during the FYP period. It stresses a structural shift in the national economy away from the dominant service sector to productive activities, particularly in mining, manufacturing and also agriculture. High priority has been given to the commodity producing sectors and related infrastructural schemes. According to "National Accounts in Jordan, 1952 to 1956," the domestic product of productive sectors such as

agriculture, mining and quarrying, manufacturing and electricity, occupied around 25.7 percent of the total GDP at market prices in 1971 and 22.9 percent in 1977. The relative share of the service sector, including government service sub-sector has reached the level of over 70 percent in 1971 and has decreased after that (Table 3.4). Even though it shows decreasing trend, such a characteristic of the Jordan economy, i.e., being too heavily oriented to the service sector, is thought not desirable from the viewpoint of maintaining stable economic growth. Therefore, encouragement of productive acitivities (agriculture, mining and manufacturing) is one of the most important objectives of the economic development plan in Jordan.

Table 3.3 National Accounts, East Bank, 1967 to 1978

Year	GDP at Factor Cost (Current Price) (JD million)	Implicit Deflator (1972=100)	GDP at Constant Price (1972) (JD million)	Annual Growth Rate (%)	Per Capita at Constant Price (JD)
1967	115.6	82	141.0	-	109.6
1968	138.2	86	160.7	14.0	118.8
1969	162.5	87	186.8	16.2	131.7
1970	154.7	90	171.9	8.0	116.4
1971	166.0	95	174.7	1.6	113.8
1972	182.8	100	182.8	4.6	116.8
1973	188.9	113	167.2	8.5	105.7
1974	242.4	128	189.4	13.2	102.4
1975	269.4	145	185.8	1.9	98.3
1976	344.7	167	206.4	11.1	102.2
1977	397.7	180 1/	220.9	7.0	103.9
1978	471.1	193 1/	244.1	10.5	109.5 2/

Sources: Statistical Year Book, 1967 - 1975.
Central Bank of Jordan, Annual Report, 1976 - 1978.

Notes: 1/ Estimated based on price index in this study.
2/ Population in 1978 are estimated by annual growth rate at around 5.0 percent to 2,126,540 in 1977.

Table 3.4 Industrial Origin of Gross Domestic Product at Market Prices, 1971 and 1976

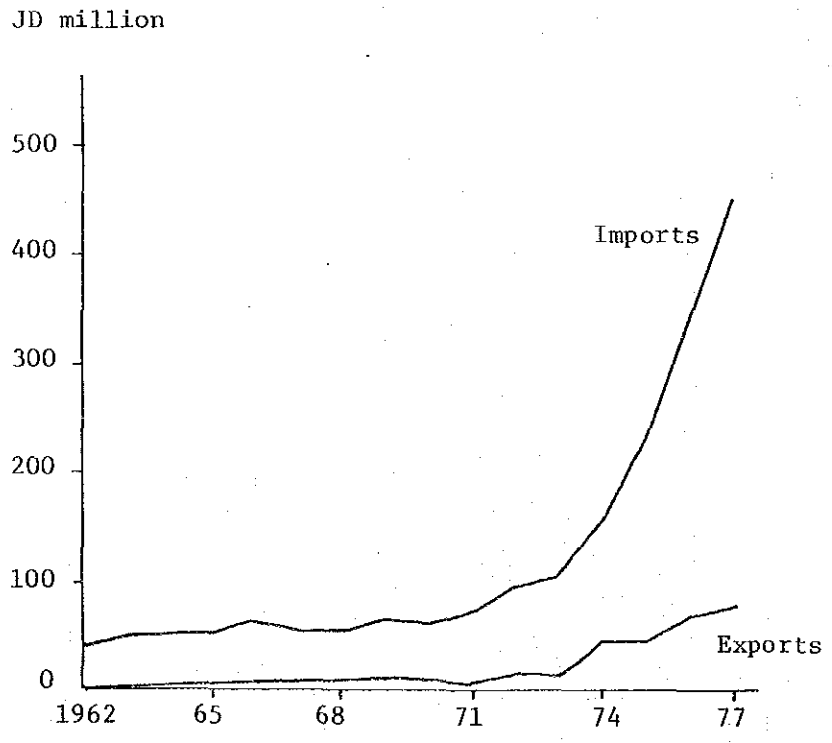
(Unit: JD million)

	1971		1976	
	Domestic Product at Market Prices	Distribution Ratio by Sector	Domestic Product at Market Prices	Distribution Ratio by Sector
1. Industries				
1.1 Agriculture, Forestry and Fishing	23.9	0.128	27.3	0.075
1.2 Mining and Quarrying	2.3	0.012	14.2	0.039
1.3 Manufacturing	19.6	0.105	38.3	0.105
1.4 Electricity	2.2	0.012	3.6	0.010
1.5 Construction	7.6	0.041	23.9	0.065
1.6 Wholesale and Retail Trade, Restaurants and Hotels	34.6	0.186	57.4	0.157
1.7 Transport and Communications	16.2	0.087	37.6	0.103
1.8 Financing, Real Estate and Business Services	19.8	0.106	33.3	0.091
1.9 Community, Social and Personal Services	2.9	0.016	9.7	0.026
1.10 Less: Imputed Bank Service Charge	1.4	0.008	3.0	0.008
2. Producers of Government Services	43.6	0.234	77.7	0.212
3. Non Profit Institutions	3.0	0.016	5.5	0.015
4. Domestic Services of Households	0.6	0.003	0.7	0.002
5. Customs Duties	11.3	0.061	40.0	0.109
Total	186.2	1.000	366.2	1.000

Source: National Accounts in Jordan, 1952 - 1976.

3.005 Industrialization is desired from another aspect, namely the balance of payments. The high level of government-to-government cash transfers, combined with high remittances by Jordanian workers abroad and high tourism receipts, have continued to make up for the large trade gap and maintain a strong balance of payments position, as was noted by the "Middle East Annual Review in 1979 (World of Information)." The huge deficit in external trade is surely a major problem for this country. Along with economic growth, consumption of goods has increased year by year and the amount of imports has also increased to a greater degree than the growth of import substitution industries and a greater degree than increase of exports (Figure 3.1). In addition to this gap, growth of domestic production caused an increase in imports of raw materials and capital goods. In 1977, the external trade deficit reached JD 372.3 million (Table 3.5). In connection with this problem, a Study Report by the Royal Scientific Society (RSS) entitled "Composition of Visible Imports and Industrial Development" published in April 1979 gives useful information (Table 3.6). The reduction of the trade deficit has been the top priority among the development plan in Jordan. The promotion of export-oriented industries and import-substitution industries are necessary to reduce this deficit.

Figure 3.1 Imports and Exports in Value at Current Prices in Jordan, 1962 to 1977



Source: Department of Statistics, External Trade Statistics, 1978.

Table 3.5 External Trade in East Bank, 1971 and 1977

	1971		1977		1977/1971	
	Quantity (tons)	Value (JD 1,000)	Quantity (tons)	Value (JD 1,000)	Quantity (tons)	Value (JD 1,000)
Imports	-	76,627	-	458,518	-	5.9316
Exports Total	-	11,441	-	82,100	-	7.1759
(Domestic)	-	(8,817)	-	(60,289)	-	(6.8378)
(Reexports)	-	(2,624)	-	(21,811)	-	(8.3121)
Transit	188	145,697	919	573,571	4.8883	3.9367

Source: Department of Statistics, External Trade Statistics, 1977.

Table 3.6 Composition of Commodity Imports in East Bank, 1971, 1975 and 1977

(Unit: JD million)

	1971	1975	1977
Imports	76.6 (100.0)	234.0 (100.0)	452.5 (100.0)
Consumer Goods	43.9	99.5	147.2
(Relative Importance)	(57.3%)	(42.5%)	(32.4%)
Intermediate Goods	21.3	73.6	121.2
(Relative Importance)	(27.8%)	(31.4%)	(26.7%)
Capital Goods	11.4	60.9	184.1
(Relative Importance)	(14.8%)	(26.0%)	(40.5%)

Source: Composition of Visible Imports = M. Smadi and M. Amerah, An Industrial Development Potential, Economic Department of Royal Scientific Society, April 1979.

3.006 Another aspect of industrialization is the creation or increase of employment. More than 60 percent of the population are members of the younger generation less than 20 years old according to the "Population Census in 1961." Change in the distribution of population by ages since then is not known, but the record of birth and death registration has shown that this issue of relatively large percentage of the younger generation might be almost the same or even higher today. At the same time, they are the major wealth of the country, and proper and adequate employment opportunities for them must be given in order to fully utilize their talents, power and skill for the growth and development of the country. This is one of the reasons why industrialization should be encouraged.

b. Conclusion

3.007 As mentioned above, the promotion of productive activities such as agriculture, mining and particularly manufacturing industries are the most important strategy for the economic development in Jordan. At the same time, instead of increasing the population of the Amman metropolitan region, where population and industries are concentrated to an excessive degree, the development of other local Governorates has to be encouraged. Among the other four Governorates, Irbid Governorate has the most favorable conditions for economic development.

3.008 The development of an industrial estate in the Irbid Governorate particularly in Irbid City, that is considered to be the primary growth center in the Governorate is urgently needed to achieve the objectives of the country's socio-economic development.

3.1.2 Definitions of Industrial Zone, Area and Estate

3.009 An industrial zone, an industrial area and an industrial estate can be used to invite or locate industries, but have different effects on the industrial development. These terms, then, must be defined. The UN's "Guidelines for the Establishment of Industrial Estates in Developing Countries" has defined them as follows:

(1) Industrial Zone:

An industrial zone is merely an area of raw land set aside for industry. In general, it is created by a municipal by-law and is part of an urban renewal or development program. Any promotional effect it may have is dependent on its location in relation to transport and distribution facilities, and the price of land within the zone.

(2) Industrial Area:

An industrial area is a parcel of improved land sub-divided into plots for the accommodation of industrial establishment and offered for sale or for lease.

It can be an effective stimulant to industrial development, especially in the large- and medium-scale sectors. Its size may allow an advantage of economies of scale in the formation of the infrastructure, which may be passed on to the occupants. An attraction for a prospective occupier is the time saved in finding a site and in preparing the land. The industrial area is essentially a piece of real estate promotion.

(3) Industrial Estate:

An industrial area may approximate an industrial estate, but the essential difference is that in the former there is no unified and continuous management and that, beyond land and utilities, it provides no additional incentive to industry. The term "industrial estate" is taken to mean "a tract of land developed and subdivided into plots according to a comprehensive plan with provision for roads, transport and public utilities with or without built-up (Advance) factories, sometimes with common facilities and sometimes without them, for the use of a community of industrialists."

3.010 In Jordan, the Jordan Industrial Estate Corporation (JIEC) is scheduled to be established by law No.3. According to this law, JIEC will develop and manage the industrial estate only outside the boundary of municipalities. This makes it necessary that the industrial estate conception be divided into two different types according to the sponsorship, one being an industrial estate owned and managed by the municipality inside the municipality boundary. In this Report, we designate this type of estate as "Municipality Industrial Park" based on a discussion with officials of the Ministry of Industry and Trade and also the Ministry of Municipal and Rural Affairs. Another type of estate is the one which is owned and managed continuously by JIEC outside a municipality boundary.

3.011 Thus, in this Study Area, industries can locate in any of the following:

(1) Industrial Zone:

This is an area owned by individual private owners inside the municipality boundaries or an area which is classified as an industrial zone by the City Council.

(2) Municipality Industrial Park:

This is an area leased and sold, and to be managed by the Municipality inside the municipality boundaries for the development or promotion of industries.

(3) Industrial Estate:

This is an area owned and managed by the Jordan Industrial Estate Corporation (JIEC) outside municipality boundaries.

(4) Border Free Zone:

This is an area owned and managed by the Syrian Jordanian Industrial Free Zone Company which was created pursuant to the "Economic Cooperation and Regulation of Commercial Exchange Agreements" signed by the Hashemite Kingdom of Jordan and Syrian Arab Republic on April 6, 1976 and in execution of the joint statement issued by the Jordanian Syrian Higher Committee on July 20, 1975. This Free Zone lies on the common boundaries between the two countries. One half of its area is on the Jordanian side (at nearly Jabir) and the other half on the Syrian side (at nearly Nasib). The area of the Zone is 400 hectares.

3.1.3 Definition of This Project to be Studied

3.012 In the Part II, one industrial estate at Irbid was proposed to promote the development of the Study Area, this was taken up by the Jordan Government and was requested to be studied by Japanese Government. Thus, this estate was to be studied by this Phase II Study and it is called the Industrial Estate of Irbid (IEI). Since it was proposed by the Jordan Government to locate IEI in Irbid City, IEI can be called the Irbid Municipality Industrial Park following the definition in Section 3.1.2.

3.013 IEI was originally proposed to have a size of 20 hectares, but in this Study its size was also reexamined. Its location was not previously proposed, and so this too was studied.

3.1.4 Objectives of This Study

a. Objectives of Industrial Estate

3.014 Industrial estate (specially called Municipality Industrial Park in this Study) means the land and infrastructure on which the industrial activities are based. In general, the objectives of industrial estate development are as follows:

(1) Nation-wide Objectives:

1) Promotion of economic growth;
2) Reducing an external trade deficit; and
3) Increasing employment and improvement of productivity.

(2) Region-wide Objectives:

1) Promotion of economic growth;
2) Increasing employment;
3) Utilization and further processing of local resources;
4) Modernization or rationalization of local industries;
5) Nurturing entrepreneurship;
6) Progress of labor skill, technology and management;
7) Rationalization of land use and/or city (town) planning;
8) Protection of the living environment; and
9) Promotion of other industries related to established industries.

b. Objectives of This Project

3.015 Overall objectives for the regional development of the Study Area were already discussed in the Part II. IEI is the one strong measure to achieve those objectives. Thus the general objective of IEI is to contribute to those overall objectives. Based on those objectives, the general objectives described in a. and analysis made in the Part II, it is possible to specify particular objectives for IEI. They are:

(1) IEI should accelerate industrial development in the Irbid Municipality, and consequently, in the Irbid Governorate, in order to reduce its income disparity as compared with the other Governorates;

(2) IEI should support and enhance the urban development of Irbid in order to reduce population outmigration from the Irbid Governorate to the Amman Municipality, through provision of employment opportunities;

(3) At the same time, IEI is expected to help reduce the congestion problem at the city center of Irbid, by relocating industries existing in the city center;

(4) IEI should be designed so that merits of industrial integration and conglomeration could be fully exploited;

(5) Necessary facilities including land plots, roads, water supply and sewerage, electricity, telephones, and access to housing should be fully secured for incoming industries; and

(6) IEI should fully exploit the resource potentialities of the Irbid Governorate such as the relatively abundant and inexpensive manpower, relatively rich agricultural production and good access to the international transportation network.

3.1.5 Method of This Study

3.016 In order to find out which is the best alternative design of IEI and to examine the soundness of IEI as a project, the method used in this Chapter is that of a "pre-feasibility study." Figure 3.2 shows the flow chart of this pre-feasibility study.

3.017 As to the "Long-term Strategy of Industrial Development" in the flow chart, the industrial estate has to be dealt with as an element in integrated regional development projects. Therefore, study must be made of an industrial development strategy for the entire Study Area. This theme is set forth in Section 3.3.

3.018 As to "Identification of Possible Industries," the identification of possible industries might be the most important item in the flow chart. At first, based on nation-wide aspects, candidate industries in the country will be identified and then from among the list of these industries those which might be possible or suitable to conditions in Study Area will be selected. In addition to these industries, a relocation program and a promotional program for existing local industries also will be examined.

3.1.6 Present Situation of Irbid Municipality Industrial Area

3.019 At present, one industrial area exists at the northeast end of the former boundary of Irbid Municipality (see Figure 3.3). This area is divided into two parts. One part having about 8 hectares is owned by the municipality. There are 11 standard sheds in existence and another 4 sheds are under construction. These standard sheds are occupied by 212 workshops, which are leased out to enterprises at the price of JD 150-450/year (depending on the size of module and year built). This rate is determined taking consideration into the current rent of the other buildings within the municipality, the construction cost of the shed, and the business performance or solvency of the occupants. Another area, which covers about 4 hectares, has been sold to private enterprises and there are now seven factories in operation there. These are shown in Figure 3.4 and on Figure 3.5.

3.020 Occupants of standard sheds are mainly auto-repair shops, and one of the sheds is occupied by auto-parts and accessory retailers. Most of them moved from built-up areas of Irbid City to the area. Standard sheds are divided into 50 m^2 units, which seems to be a little narrow as a working space. In the case of auto-repair shops, almost 100 m^2 is necessary, including a garage.

Figure 3.2 Flow Chart of Study

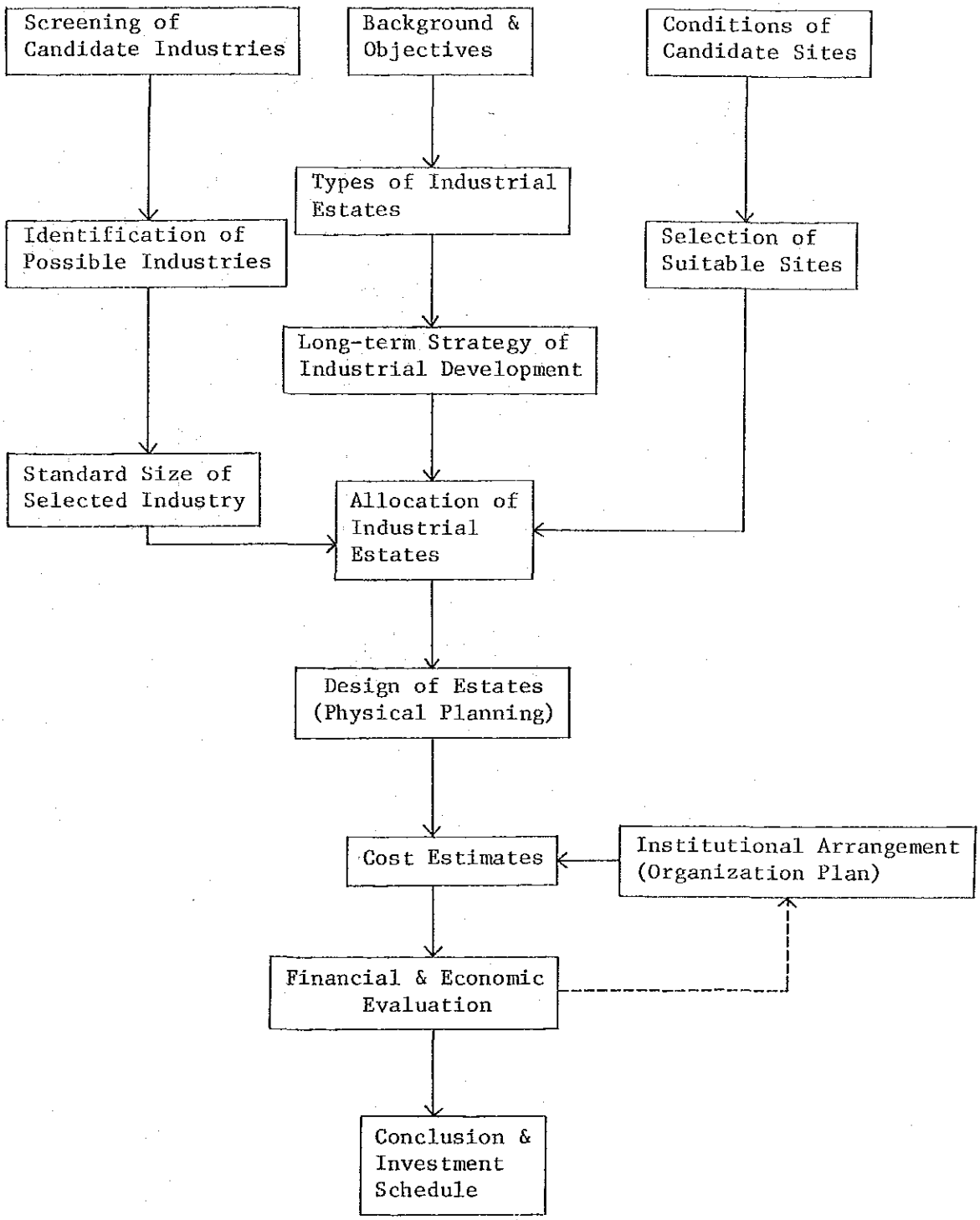
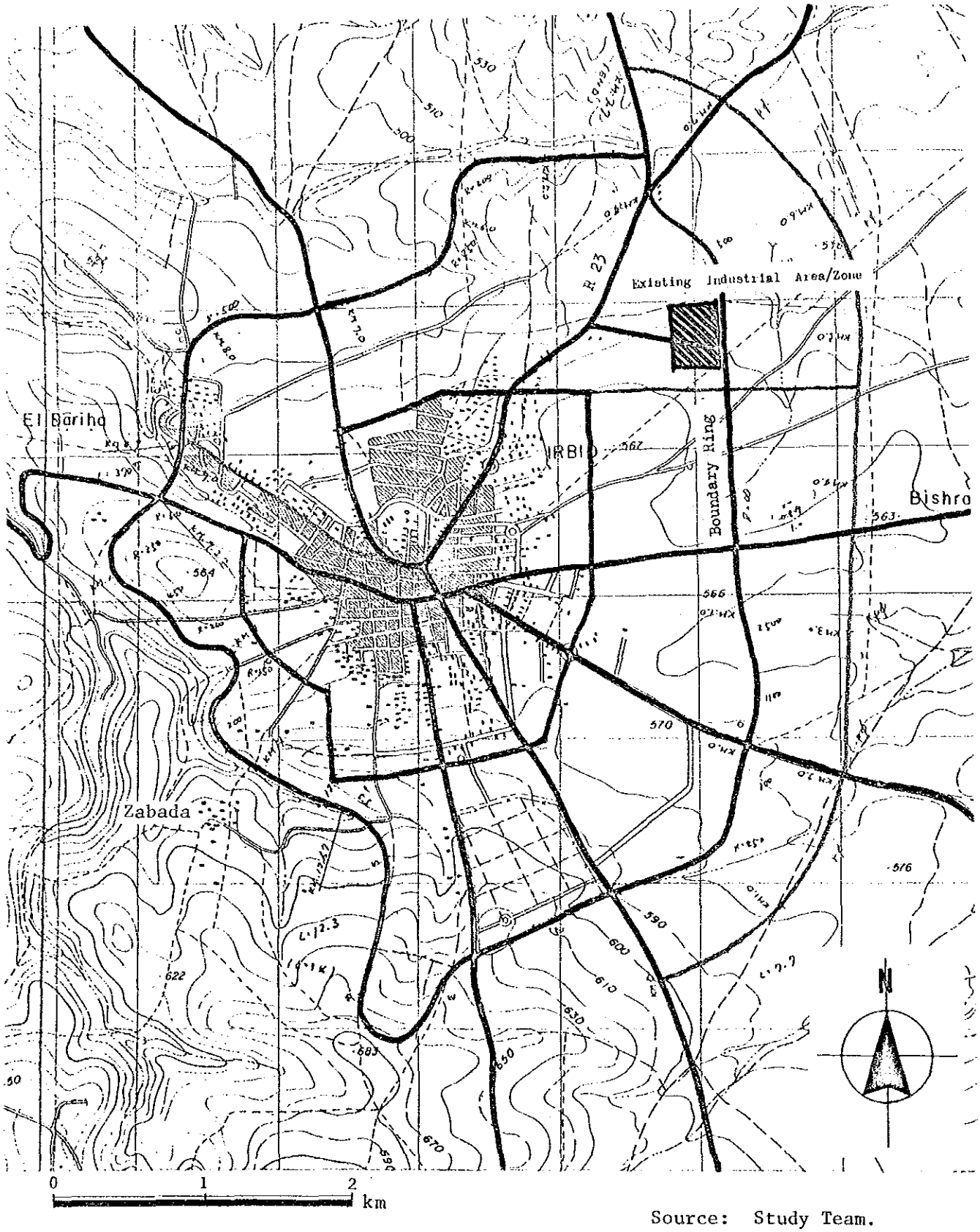
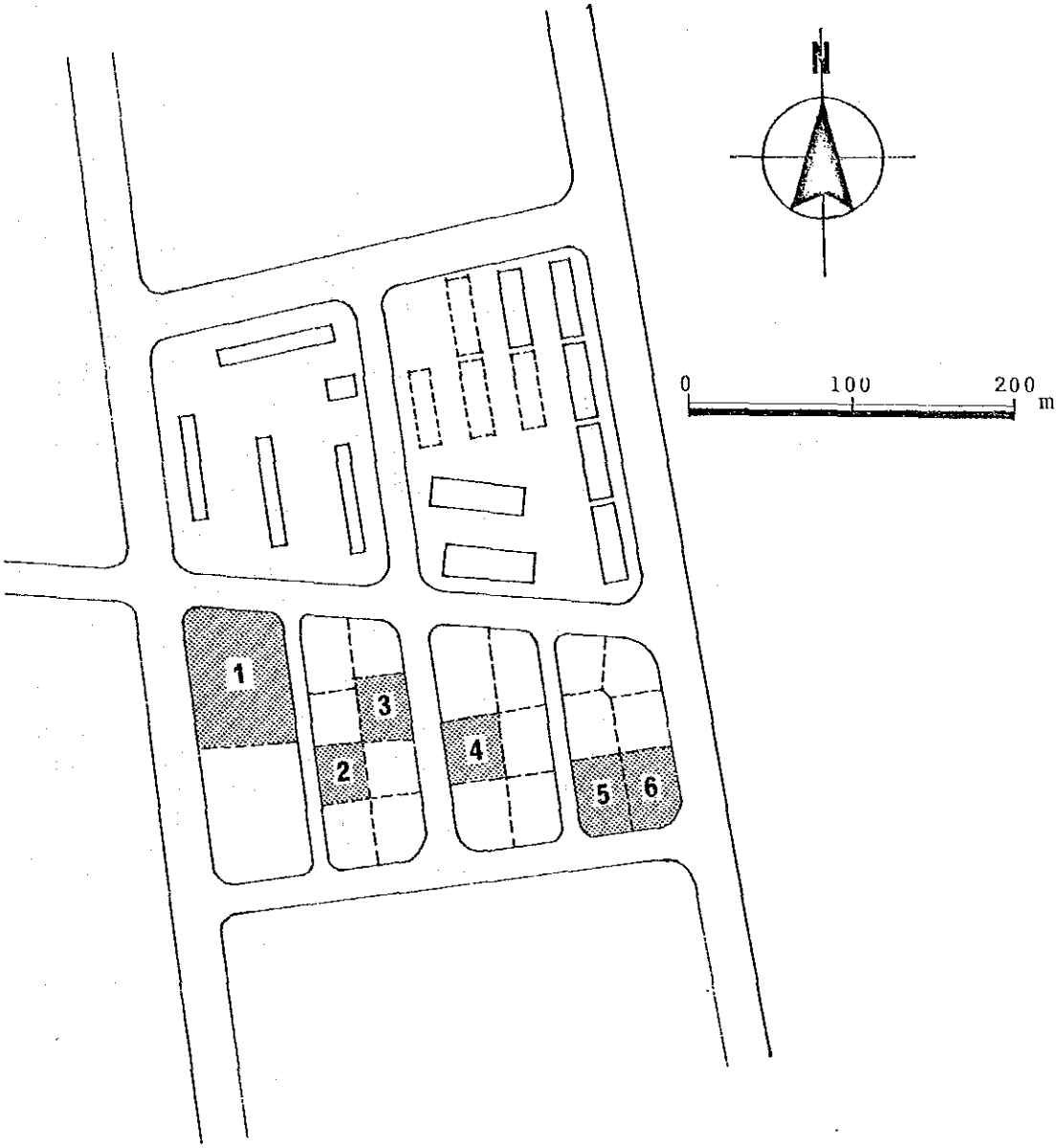


Figure 3.3 Location of Existing Industrial Area in the City of Irbid



Source: Study Team.

Figure 3.4 A Map of Factories Located Inside the Existing Industrial Area (Independent Factories)

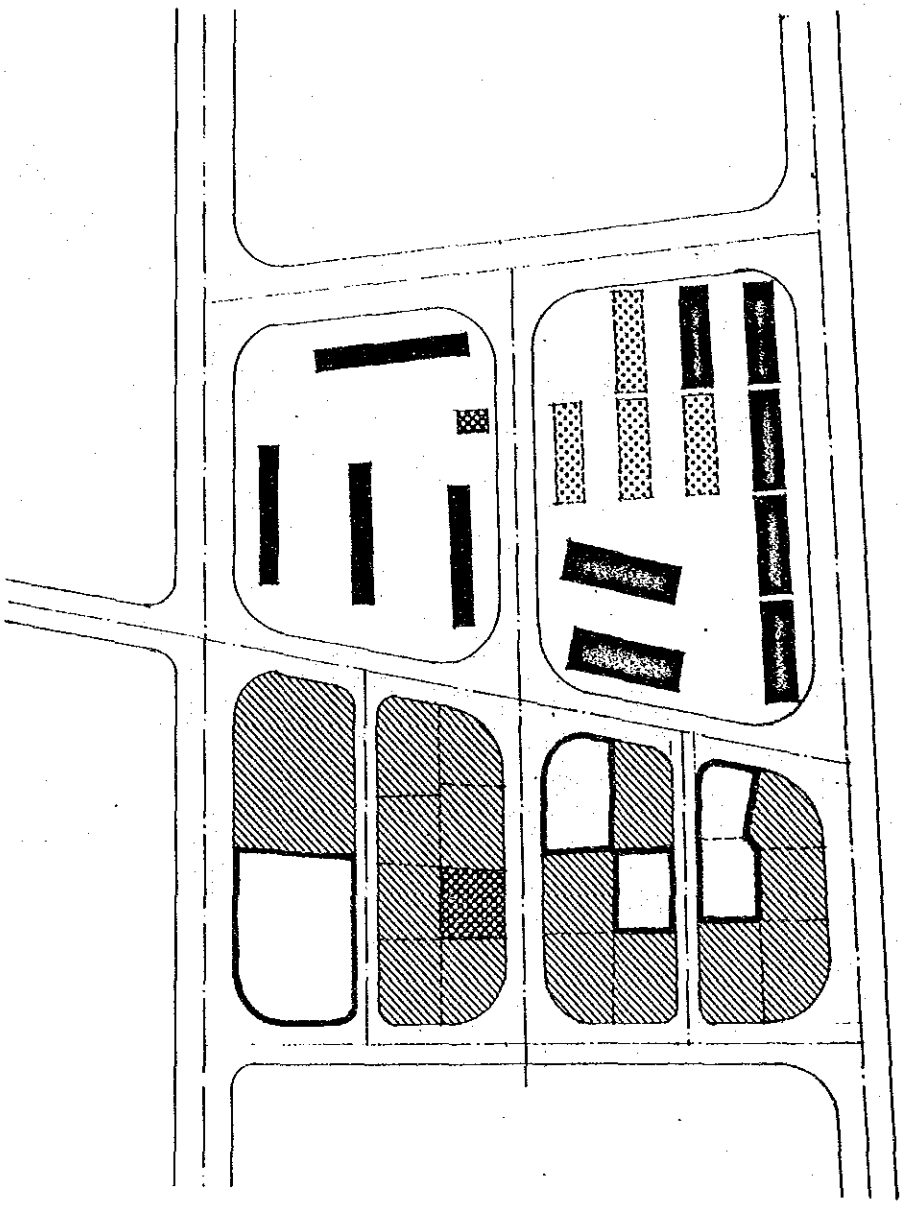


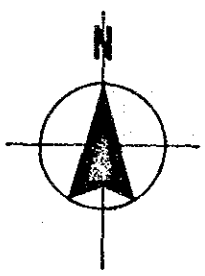
Legend

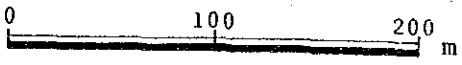
1 Arabic Pencils & Brushes Co., Ltd. (Ballpoint Pen)
2 The Northern Plastic Co., Ltd. (Electrical Materials)
3 Habul Corp. (Beverages)
4 Ma'ani Industrial Corp. (Plastic Materials)
5 Nickel Factory (Nickel Polishing)
6 Abudin Corp. (Furniture)

Source: Study Team.

Figure 3.5 Allocation of Sheds and Factories in the Existing Industrial Area







Legend

- Standard Shed (Existing)
- Standard Shed (Under Construction)
- Common Facilities
- Factories Owned Land
- Irbid Municipality Owned Land

Source: Study Team.

3.021 Among individual factories, there is a ball-point pen factory which is a growing industry. Products of this factory are being distributed throughout the country, and are also exported. Another growing factory in the area is producing plastic products such as electrical globe bases, round covers, square covers, clips for electrical cables and boxes. The most interesting factory inside the existing zone is a newly-established one producing units of furniture, that is to say bed-room, kitchen and dining room units. These units are composed of many kinds of components. Although, at present only wooden furniture is produced, it is expected in the future to produce other kinds of components of which furniture units are made. These new industries show signs of good future possibilities.

3.022 The existing area has not yet been completed. An access road to Route 23 (the road to Hakama) which divides the privately owned zone and the existing industrial area is now under construction. A plan to make another access to Route 16 (Baghdad road) was officially approved by the Municipality of Irbid as the Boundary Ring Road, which is expected to be built in the near future. It is noted that industrial and commercial developments are taking place rapidly within the privately owned zone which has a triangular form, being surrounded by three roads. The built-up area of the Municipality of Irbid is expanding to the south, to the northeast and to the east. The privately owned zone is situated in between the latter two developmental axes.

3.023 Infrastructure of the existing area is by no means sufficient for tenants. A manager of one factory told us that the water supply is too low, that electricity sometimes fluctuates in voltage, that the access road is not yet completed and that the telephone connections with lines outside of the city are poor. It is feared that inadequacies of utility services and infrastructure might interrupt the industrialization in the Study Area.

3.024 Demand for standard sheds seems to be enough for the expansion of the area; demand appears to be particularly high for auto-repair shops which are located downtown. Irbid is suffering from a shortage of space and traffic congestion. These downtown workshops tend to cause environmental problems. Stone-cutting works, brick forming works and metal processing works are in a similar position. At both sides of Faisal Street, the first street in the central part of Irbid City, there are less than 40 of metal processing workshops. These are expected to move into the industrial area.

3.2 Diagnosis and Pre-condition Study

3.2.1 Economic Background

a. General

3.025 For the past three years (since 1976), the Jordanian economy has experienced satisfactory growth in all economic activities,

benefitting from foreign exchange inflows in the forms of worker's remittances, exports and tourism revenues. Gross Domestic Production (GDP) at factor cost increased at an average rate of 9.6 percent and this high growth rate was achieved by the expansion in all sectors of the economy during these years. However, due mainly to the population influx since the June, 1967 war, GDP per capita is still below the 1967 to 1969 level at constant price (=1972) in spite of the Kingdom's sincere development efforts.

3.026 The basic objectives to develop the economy, which have been included in all economic planning, are:

(1) Increasing GNP or GDP and per capita income;
(2) Reducing unemployment;
(3) Reducing trade deficits;
(4) Improvement of income distribution; and
(5) Augmenting of general budget's dependence on domestic revenues.

3.027 These objectives themselves symbolize the problems of Jordan by: the problems of the Jordanian economy under the constraint of limited resources. In solving these problems, much emphasis will have to be put on the role of industrial development as suggested in 3.1.1 "Background."

b. Macro-economic Features of the Kingdom

3.028 Jordan has a total land area of 97,740 km^2, and approximately 2 million people. On account of the limited resources of this country, the country's geographical location and free enterprise policy, an important feature characterizing the economy is heavy reliance on the service sector. Available estimates (Table 3.7), show that 62.8 percent of GDP at factor cost in 1978 is generated by the service-and-tertiary sector which surpasses the manufacturing and mining sector (=26.4 percent), and agricultural sector (=10.8 percent) to a greater extent. But the relative importance of the contribution of the productive sectors to GDP at factor cost during 1973 to 1978 increased gradually year by year. So far as manufacturing and mining are concerned, its share among GDP at factor cost including construction, electricity and water supply rose from 20.8 percent in 1973 to 26.4 percent in 1978 as a result of (1) a two-fold price increase of phosphates in 1974, and (2) other increased production encouraged by the great efforts of both the public and private sectors.

3.029 Regarding the increase in industrial production, the recent growth seems to be brought about particularly by increase in worker's remittances from abroad, tourism income, exports, and to some extent, the gradual rise of capital formation and external public debt as shown in Figure 3.6. According to these statistics, there is no doubt that the recent economic growth depended much on these foreign exchange inflows. As these factors are, by nature, too unstable for the Jordanian economy to be left as a long-term strategy, further effort to mobilize these funds towards industrial investment will be needed in the future.

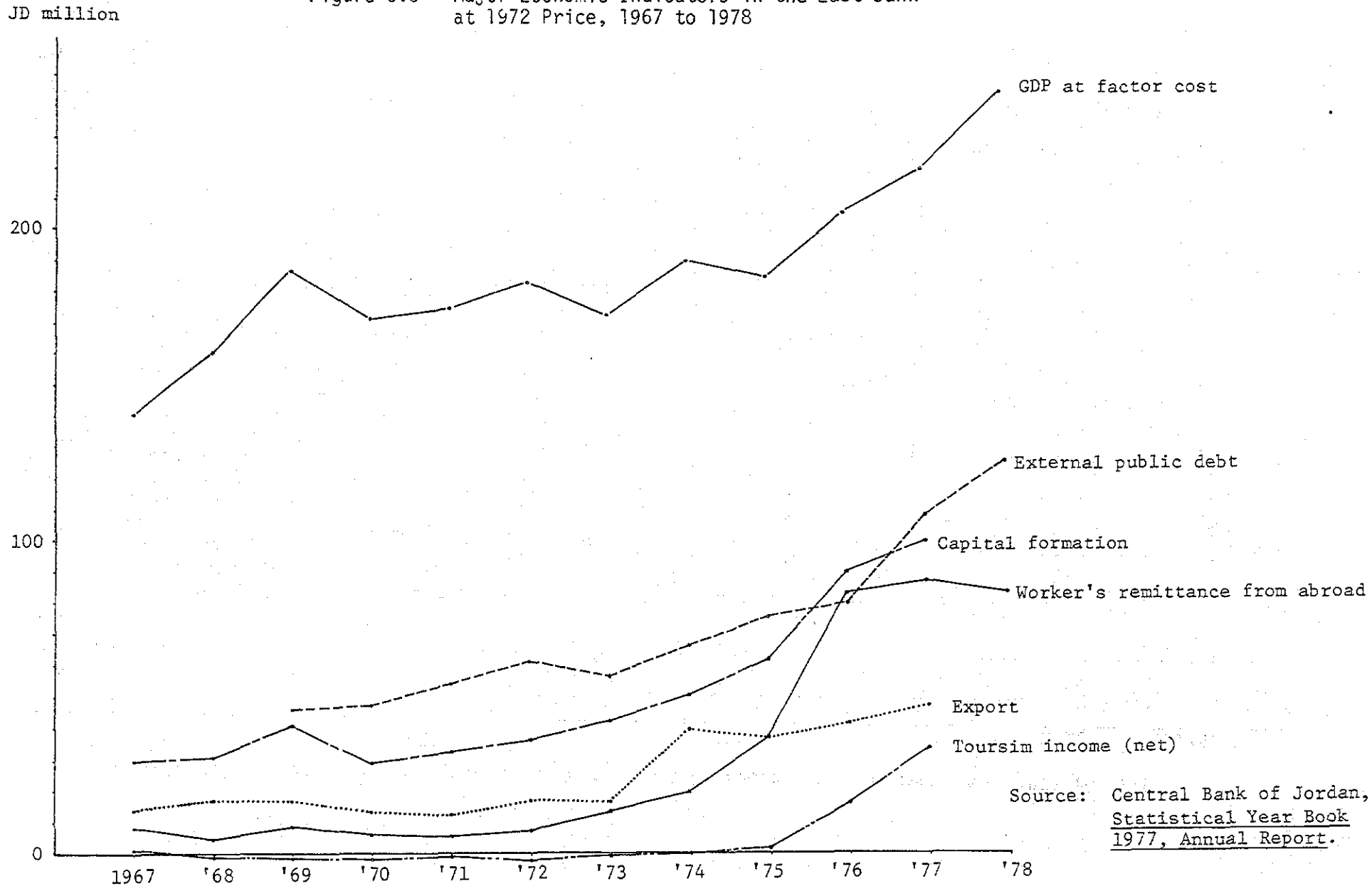
Table 3.7 Gross Domestic Product at Factor Cost by Sectors in the East Bank, 1973 to 1978

(Unit: JD million)

	1973	Share (%)	1974	Share (%)	1975	Share (%)	1976	Share (%)	1977	Share (%)	1978	Share (%)
1. Industries												
1.1 Agriculture, Forestry and Fishing	17.6	9.3	30.3	12.5	26.0	9.7	37.3	10.8	41.7	10.5	51.0	10.8
1.2 Mining and Quarrying	4.0		10.8		16.3		17.8		19.9		22.9	
1.3 Manufacturing	17.2	20.8	29.7	24.9	30.5	24.5	40.3	24.7	51.1	25.7	61.4	26.4
1.4 Electricity and Water Supply	2.8		3.0		3.1		3.6		4.1		5.2	
1.5 Construction	15.2		16.8		16.1		23.3		27.0		35.0	
1.6 Wholesale and Retail Trade, Restaurants and Hotels	38.1		42.3		46.3		61.5		68.6		81.0	
1.7 Transport and Communication	17.9		22.8		24.9		36.5		42.0		49.0	
1.8 Financing, Real Estate and Business Services	22.5		25.2		29.7		33.4		43.6		53.1	
1.9 Community, Social and Personal Services	3.9		4.3		8.5		6.1		8.8		10.2	
1.10 Imputed Bank Service Charge	1.6	69.9	2.7	62.6	2.9	65.8	3.0	64.5	3.4	63.8	4.1	62.8
2. Producers of Government Services	46.7		54.3		65.2		81.7		84.4		95.0	
3. Non Profit Institutions	4.0		4.9		5.0		5.5		9.1		10.5	
4. Domestic Services to Households	0.6		0.7		0.7		0.7		0.8		0.9	
Total GDP at Factor Cost	188.9	100.0	242.4	100.0	269.4	100.0	344.7	100.0	397.7	100.0	471.1	100.0

Source: Fifteenth Annual Report, 1978, Central Bank of Jordan.

Figure 3.6 Major Economic Indicators in the East Bank at 1972 Price, 1967 to 1978



Source: Central Bank of Jordan, Statistical Year Book 1977, Annual Report.

3.030 So far, increments in disposable income have been allocated almost always to the payments to imports as shown in Figure 3.7 which shows a sky-rocketing rise, particularly in the importation of capital goods (Figure 3.8). Even if this phenomenon reflects a process of industrialization, countermeasures to the movement towards higher consumption and imports, partly affected by demonstration effects from other countries in the Gulf, has to be examined. Under these characteristics, Jordan needs to promote balanced growth in all sectors through steady industrialization, taking account of the balance of inter-regional industrialization. The industrial promotion proposed will give a clue to solve the problems from which the Kingdom is now suffering, such as (1) foreign exchange constraint, (2) outflow of scarce skilled labor, (3) low domestic savings, (4) budgetary deficit, (5) dependence on foreign aid and (6) insufficient infrastructure in the economy.

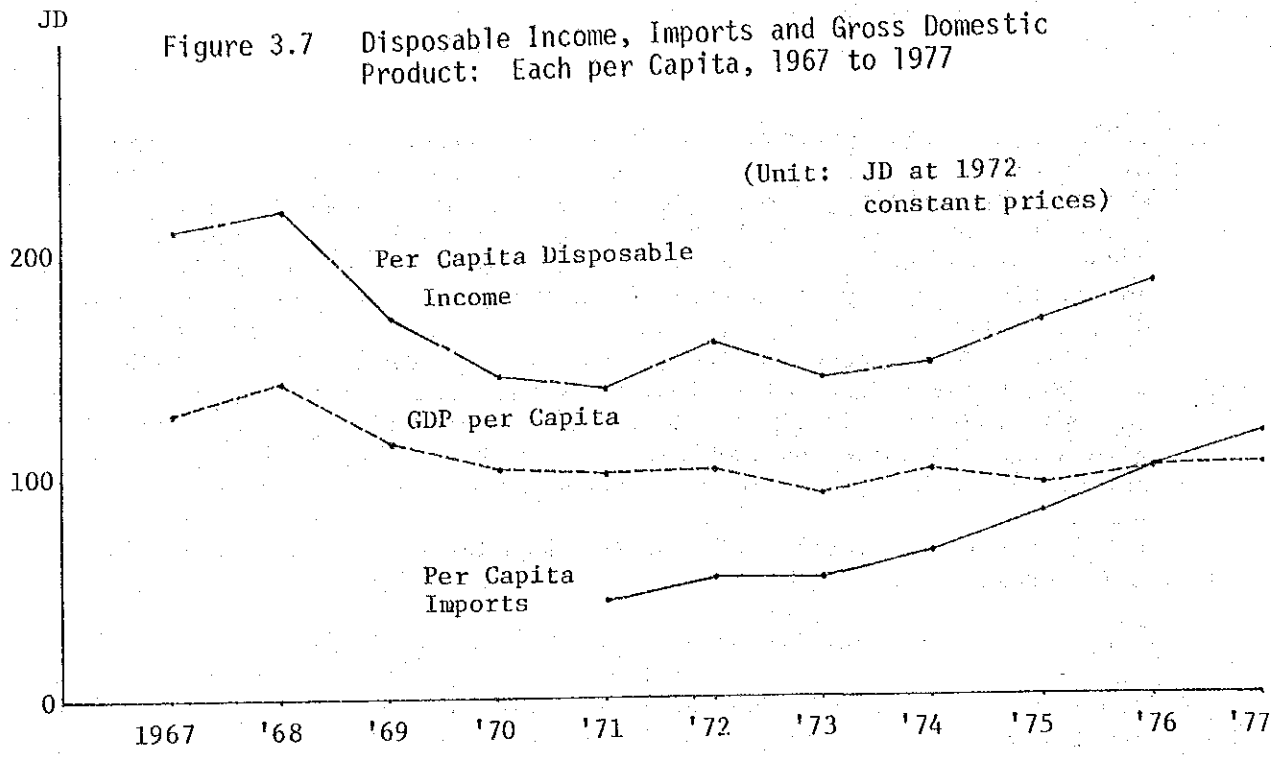
c. Present Situation of the Industrial Sector

3.031 The industrial sector in the Kingdom has been growing rapidly, as aforementioned. The growth pattern of this sector is largely dominated by the performance of a few leading industries such as the phosphate, cement, petroleum refining and iron industries. Table 3.8 shows the trend of the principal industries during the period 1976 to 1978 in index form. During this period, favorable growth of manufacturing has been achieved particularly in the fields of chemicals, phosphate, textiles and clothes. Overall, the index of total industrial production reached 159.2 which means an increase of 27.4 percent during these years. This growth fundamentally resulted from expansion in the production of most industries owing to the rise in domestic consumption and the successful improvement of export trade.

3.032 These tendencies to general expansion in industrial production will be supplemented, during the next few years, by major industrial projects which are to start operation soon, such as potash, chemical fertilizers, phosphates, petroleum refinery, cement, plastics, pharmaceuticals, and other projects.

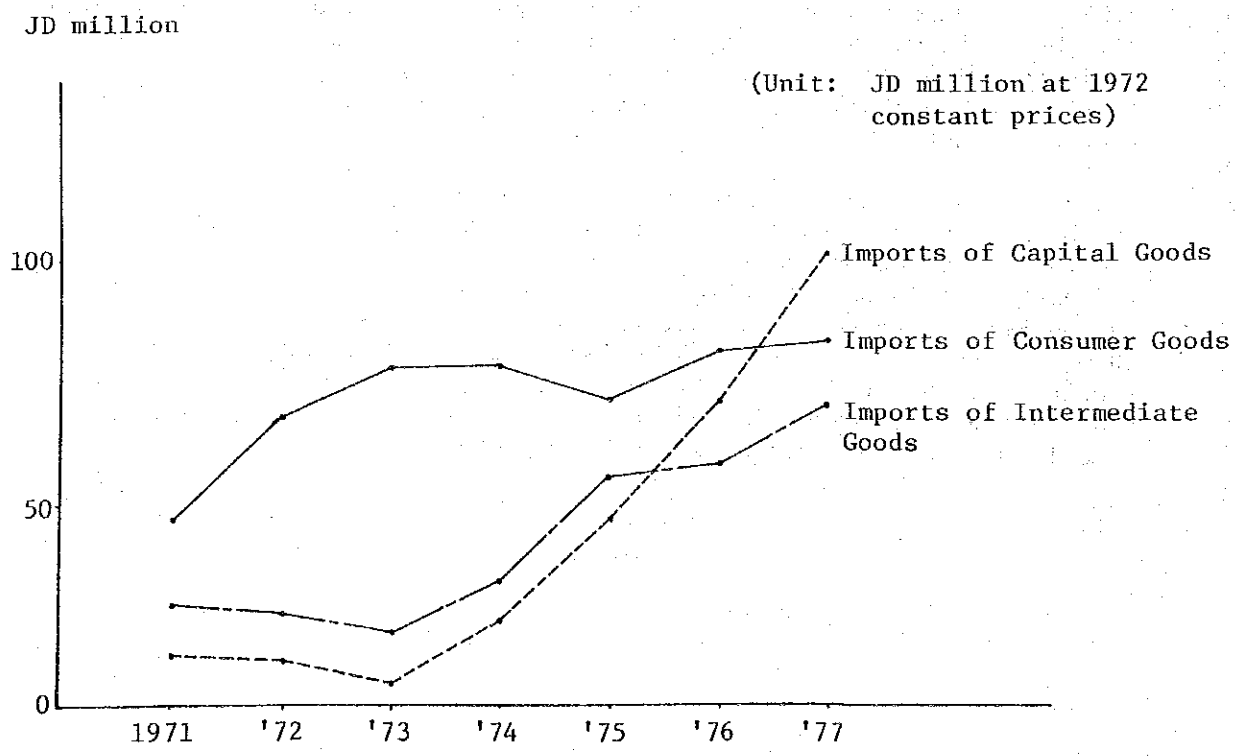
3.033 In any event, overall activities to develop the industries in the Kingdom are about to start, and are deemed to be suitable in regard to development policy given the current situation. Looking at the number of industrial companies newly licensed and the number of new workers in these companies, the figures given below in Table 3.9 show a large increase in 1975 to 1976. It is important that these should have an accelerating trend enough to support the economy, whilst qualitative improvement in the sector, such as technological progress, vocational training, etc., has to be promoted.

Figure 3.7 Disposable Income, Imports and Gross Domestic Product: Each per Capita, 1967 to 1977



Source: National Accounts in Jordan, 1952-1976.

Figure 3.8 Trend of Imports of Consumer Goods, Intermediate Goods, and Capital Goods, 1971 to 1977



Source: R.S.S. Economic Department, Rationalization of Imports in Jordan, 1977.

Table 3.8 Index Numbers of Industrial Production in East Bank, 1976 to 1978

Industry	1976	1977	1978	Percentage Change in 1978
Overall Index of Industrial Production 1975=100	125.0	129.7	159.2	+22.9
Food, Drinks and Tobacco	118.8	133.5	141.8	+6.2
Textiles and Clothes	96.1	91.3	119.8	+31.2
Construction Materials	112.8	111.5	114.2	+2.4
Chemicals	173.5	175.6	275.3	+56.8
Petrol Refining	139.9	143.0	172.9	+20.9
Phosphate	126.2	131.2	172.1	+31.2
Electricity and Batteries	103.1	122.8	141.7	+15.4
Fodder	122.8	101.3	124.9	+23.3
Paper and Cardboard	128.1	124.9	110.3	-11.7
Leather	78.1	84.0	94.7	+12.7

Source: Central Bank of Jordan, Annual Report, 1978.

Table 3.9 Registration of New Industrial Companies and New Workers

	1973	1974	1975	1976	1977	1978
The Number of Companies Newly Licensed	68	82	202	433	252	246
The Number of New Workers	3,394	2,300	2,424	6,183	n.a.	n.a.

Source: Central Bank of Jordan, Annual Report, 1978.

d. Regional Economic Idiosyncrasy of the Study Area

i. Economic Position and Structure

3.034 The Irbid-Ramtha area is the second largest urban area in the Kingdom and it is in the center of a very important agricultural production zone. The area's Gross Regional Domestic Product (GRDP) at market prices in 1977, was estimated by the Study Team at JD 99 million which accounts for 21 percent of the GDP and occupies the second position in the whole country after the Amman region. But the per capita GRDP is the lowest because of the low productivity in agriculture, limited natural resources and the large population, as stated in the Part II (see Table 3.10).

Table 3.10 GRDP by Governorate, East Bank, 1977

Indicator	Unit	East Bank	Irbid	Amman	Balqa	Karak	Ma'an
GRDP at Market Prices	JD million (percent)	471 (100)	99 (21)	299 (64)	24 (6)	31 (7)	12 (2)
Population	Thousand persons	2,127	600	1,219	138	114	56
Per Capita GRDP at Market Prices	JD	221	165	245	174	272	214

Sources: 1. Study Team's estimation.
2. Unpublished mimeo from the Department of Statistic, "Industrial Survey, in Establishments Engaging 5 Persons or More",

3.035 As for the economic structure of the Irbid Governorate, the economy of the Governorate is biased in the direction of agricultural production and to a lesser extent, public administration in terms of value-added for both. On the other hand, the manufacturing and mining sector, whose share of value-added is only 1.4 percent, is far behind the agricultural sector, which seems to be a constraint to the regional development.

3.036 From the viewpoint of employment by sector, agriculture has also quite a big share among the total employment; it accounts for 76.0 percent. Table 3.11 gives the estimation of the labor productivity by each sector, using the estimated employment given by the 1975 labor force census. In this estimation, it is also recognized that the low

labor productivity in the Governorate is caused by the high dependence on the agricultural sector whose labor productivity is only JD 251 per worker. This is a low figure, when compared with the average agricultural productivity per worker (JD 313) for the whole country. So, there are two ways to increase the GRDP in the Irbid Governorate: (1) to shift the regional economic structure towards manufacturing industries which will show high productivity, and (2) to augment the labor productivity of agriculture itself through mechanization and improved farm management. We suppose, in the end, that a combination of the two will be used to accelerate regional economic development. In doing so, the relatively dense-population and cheap labor will help in the process of regional take-off in the course of the industrial development, viewed from the large potentiality of both the commodity market and the labor market. Therefore, from this regard the economic prospect of the area relies much on the government initiatives in arranging the investment environment such as forming industrial estates.

Table 3.11 Labor Productivity by Sector, Irbid Governorate, 1977

	Value-Added		Employment		Labor Productivity	
	(JD 1,000)	(%)	(1,000 Persons)	(%)	Irbid Governorate (JD)	The Whole Country (JD)
Agriculture	18,200	19.7	72.6	76.9	251	313
Mining & Manufacturing	1,300	1.4	1.4	1.5	963	2,929
Construction	7,900	8.6	1.4	1.5	5,643	3,034
Electricity, Water & Gas	500	0.5	0.3	0.3	1,667	1,864
Transportation	9,200	10.0	2.5	2.7	3,680	2,838
Wholesale & Retail	14,400	15.6	4.8	5.1	3,000	2,363
Banking & Insurance	1,100	1.2	0.2	0.2	5,500	2,121
Public Administration	20,100	21.8	11.1	11.8	2,973	2,496
Other Services	12,900	14.0				
GDP at Factor Cost	92,200	100.0	88.9 1/	100.0	1,037	1,470

Sources: 1. Water Master Plan.
2. Department of Statistics, Labor Force Census, 1975.

Note: 1/ Excluded from this figure are the Armed Forces, Public Security, and Civil Defense.

ii. Manufacturing Activities of the Study Area

3.037 Geographical distribution of the industries in the Study Area shows a concentration in Irbid City, which accounts for 73 percent of the total value-added in the industrial sector according to the Industrial Census of 1974, but the municipality intends to promote relocation of industry to the outskirts of the city.

3.038 Until quite recently, manufacturing in the Study Area was meager and scanty in terms of value-added and employment opportunities, and representative industries of the Study Area were food, beverages, and textiles. The meager industrial structure, although still underdeveloped, is now beginning to change for the better industrial development in the region, and is about to grow out of the existing industrial area. In the process, the export-oriented industries such as ballpoint pen factory and sanitary ware factory have been established although the sizes of the two factories are very small.

3.039 The major existing factories which the Irbid Chamber of Commerce listed for us are shown in Table 3.12.

Table 3.12 List of Existing Factories, 1979

Name	Place	Type of Production
1. Habul Corporation	Existing industrial area	Beverage
2. Abudin Corporation	"	Furniture
3. The Northern Plastic Co., Ltd.	"	Electrical Materials
4. Arabic Pencils & Brushes Co., Ltd.	"	Ballpoint Pens
5. Ma'ani Industrial Corp.	"	Plastic Materials
6. Jordanian-Lebanese Casting Co., Ltd.	El Bariha	Sanitary Ware
7. Yarmouk Dairy Co., Ltd.	"	Dairy Products
8. Irbid Flour Mills Co., Ltd.	Hawara	Milling
9. Protina Fodders Co., Ltd.	"	Fodder

(to continue)

Name	Place	Type of Production
10. Irbid District Electric Co.	Irbid (Baghdad St.)	Generation & Distribution of Electricity
11. Tayyan Tile Co., Ltd.	"	Tile
12. Shabib & Hijazi Tile Factory	Hakama	Tile
13. Abu-baka Brothers Factory	"	Tile
14. Nickel Factory	Existing industrial area	Nickel Polishing
15. Shnaq Tricot-knitting Factory	Irbid (Aidun St.)	Undergarments
16. Kaufha Tricot-knitting Factory	Irbid (Baharia Mkt.)	Undergarments

Source: Hearing from Irbid Chamber of Commerce.

3.2.2 Policy and Legislative Aspect in Industrial Development

a. Industrial Promotion Policy

i. The Current Five Year Plan

3.040 The plan puts a high priority on the commodity producing sector, at one level by expanding the exploitation and processing of existing minerals, and at another level by prospecting and exploring for other potential minerals. The plan is also aiming at achieving a 220 percent growth rate in mining and manufacturing sector during the planned period. If this goal is to be achieved, the relative importance of the mining and manufacturing sector in the GDP should increase to 28.3 percent in 1980 from 15.6 percent in 1975. But judging from the actual trend of the economy, it may be difficult to achieve this goal due to the delays in the start of operation of huge mineral-based industries. Gradual though the speed is, it is obvious that the industrial production has increased at a substantial rate because of high rates of genuine growth in the national income experienced particularly in recent times.

ii. Legislative Arrangements for Industrialization

(a) Encouragement of Investment Law

3.041 In the case of the industrial sector, this law can be applied to a project of more than JD 5,000 in terms of the value of its machinery, tools and equipment. Under this law, the Encouragement of Investment Committee was established and has exercised functions and powers such as (1) the creation and surveying of investment opportunities, (2) the publicizing of available opportunities, (3) decisions in granting exemption, and (4) permission for foreign capital investment in the Kingdom. This law is especially intended to expedite the location of industrial projects outside the capital region, and qualified investors will benefit from this law because of the policy of exemption from various taxes, fees and other charges if they locate outside the capital region.

(b) Free Zone Corporation Law

3.042 On the basis of this law, enacted in 1976, the Free Zone Corporation was established, its function and duty being to create and manage two Free Zones, i.e., at Aqaba and Zarqa, in order to promote international trade and export-oriented industries. The Free Zone at Aqaba, in both the industrial and commercial areas, is already in full operation. The Zarqa Free Zone (still in the planning stage, but soon to be implemented) will be situated 30 km from Amman, and it too will be a big project. Qualified firms, by using the storage yards, sheds or warehouses of the Free Zone Corporation, can enjoy some kinds of exemptions from taxes, fees and other charges.

3.043 It should be noted here that the Jordanian-Syrian Industrial Free Zone is not administered by Free Zone Corporation, but by the Syrian-Jordanian Industrial Free Zone Company. The Zone is connected with the Syrian and Lebanese ports and with Aqaba port by means of communication and highway systems. This Free Zone will start functioning in due course, and will have some impact on the Study Area.

(c) The Jordan Industrial Estates Corporation Law (Draft)

3.044 This law shall come into force during 1979. According to this law, an industrial estate is defined as an area located within the Kingdom outside the municipal boundaries. The objectives and the powers of the Corporation are summed up as follows:

(1) Objectives:

1) Planning, establishment and management of industrial estates in the Kingdom;
2) Promotion of industrial projects within the estate; and
3) Encouragement of relocation of existing industries from the cities to the estate.

(2) Powers:

1) Acquisition and purchase of the required lands to establish the estate;
2) Supervision and management of industrial estate;
3) Performance of all required construction works;
4) Management and operation of the water, power system distribution, and other common facilities; and
5) Giving managerial, financial and technical advice and services for the tenants.

3.045 Besides these items, the corporation has various kind of powers and duties. The tenants allowed into the industrial estates shall enjoy the same type of exemptions and privileges as provided in the Encouragement of Investment Law, this draft still awaiting approval from the Council of Ministers.

b. Investment Environments

3.046 The aforementioned Encouragement of Investment Law has provided generous incentives and benefits, particularly for approved industrial projects, and through the various kinds of exemptions offered, it is encouraging local and foreign investment into industry. Besides, the Free Zone Corporation Law and Jordan Industrial Estate Law supplement more systematically the arrangement of investment environments in the Kingdom. In addition to this legislative encouragement for industrial development, there have also been other influential factors working to promote investment in the Kingdom, such as prosperous aspect in the neighboring economies. Owing to the political efforts and favorable conditions in terms of industrial investment, gross capital formation showed an increase in every type of expenditure, to say nothing of the total figure, except for dwellings and buildings in 1974, and transport equipment in 1975 as shown in Table 3.13.

3.047 Also, a number of large industries have been established to the northeast of Zarqa concurrently with the agglomeration of small-scale handicraft industries. Other municipalities such as Irbid, Aqaba, etc., have tried to execute a similar policy as part of their overall development efforts. This trend will surely generate investment opportunities in the field of manufacturing, and contribute to the improvement of infrastructure, creating external effects around the industrial facilities.

Table 3.13 Gross Capital Formation by Type of Expenditure, East Bank, 1973 to 1975

(Unit: JD million)

Type of Expenditure	1973	1974	1975
Dwellings & Buildings	16	14	19
Public Construction	28	31	40
Other Construction	1.5	2	2
Total Buildings & Construction	45.5	47	61
Transport Equipment	5.5	14	7
Other Machinery	4.0	19	26
Total	55	80	94

Source: Ministry of Information, Economic Development in Jordan,

c. Financial System for Industrialization

3.048 In the Kingdom, commercial banks have not been playing an important role in lending funds to the industrial sector because of the early stages of development of the sector. It is only a recent tendency that they have given attention to this sector, and on the basis of government policies to promote industrial development, requests have been made by the Central Bank of Jordan to commercial banks to allocate their loans so as to give more priority to industrial projects. With the objective of complementing banking activities to benefit the industrial sector, the Industrial Development Bank (IDB) was established in July 1975 to function in the following manner:

(1) To encourage and develop industrial projects, particularly small-scale local industries;
(2) To extend industrial loans; and
(3) To increase job opportunities in the manufacturing sector.

3.049 The structure of IDB loans to the industrial sector has experienced change; among the industries granted credit in 1974 and 1978, as can be seen in Table 3.14, loans to industry for non-metallic mineral products, chemical and plastic products, and food and beverages, increased sharply. On the other hand, however, we can see a reduction in IDB loans for textiles, leather and shoe production firms. It might

be true to say that the allocation of IDB loans will correspond to the shift of industrial structure.

3.050 Nevertheless, the loan system, in coordination with the Jordan Industrial Estate Corporation and other promoting agencies, should be organized in such a manner that it can quickly compensate for the insufficiency of funds whenever a sector lacks funds because of drastic shift in industrial structure which might happen in the future. As its pre-requisite, domestic savings should be mobilized by a more efficient and competitive financial system.

Table 3.14 IDB Loans Classified by Industry, East Bank, 1974, 1977 and 1978

(Unit: JD 1,000)

Industry	1974	%	1977	%	1978	%
Metal Products	670	43.1	368	9.4	1,100	28.4
Non-Metallic Mineral Products	100	6.4	1,046	26.6	950	24.5
Chemical and Plastic Products	10	0.6	1,352	34.4	582	15.0
Paper and Products	280	18.0	338	8.6	555	14.3
Food and Beverages	60	3.9	599	15.3	485	12.5
Textiles, Leather and Shoes	365	23.4	182	4.6	113	2.9
Others	70	4.5	41	1.0	93	2.4
Total (Industrial Projects)	1,555	100.0	3,926	100.0	3,878	100.0

Source: Industrial Development Bank, Annual Report, 1978.

3.2.3 Socio-Economic Conditions for IEI

a. Natural Conditions of the Irbid Municipality

i. Topography

3.051 The eastern part of the Irbid Municipality is an almost flat area, which has a gradient of about 0 to 3 percent whilst the western part has a gradient of about 3 to 8 percent. Particularly in the

western part of the Municipality, there is a lengthy valley area along the municipality boundary which hinders any expansion of the urban area to the western direction. Taking note of this topography, the eastern part of the municipality is more favorable for the construction of an industrial estate.

ii. Wind Direction

3.052 Beside this, wind direction will be a somewhat determinant factor for site selection of the IEI. In this area, the wind blows eastwards due mainly to prevailing westerlies. Therefore, some industries which bring pollution, such as smoke, bad smells, dust, etc., have to be dealt with carefully when considering selection of site locations.

iii. Rainfall

3.053 In terms of precipitation, the annual rainfall of this region ranges from 400 mm to 600 mm per annum. This level of rainfall, although above the critical minimum level for agriculture, is not sufficient for full operation in agriculture.

iv. Soil

3.054 Red Mediterranean soil covers extensive areas in the Irbid-Ramtha depression. It is said that the formation of this soil depends to a large extent on the specific conditions of the Mediterranean climate. Judging from a pile of large basaltic rocks found during earthwork for a building site at the existing industrial area, red soil might be derived not only from carbonate rocks but also from basaltic rocks. Though SPT (Standard Penetration Test) data in the Municipality are not available, it seemed to be pretty sure that no piling was required for foundation work of the factory building, after the field survey.

b. Resources of The Study Area

i. Mineral Resources

3.055 The Kingdom is endowed with some mineral resources, of which phosphate deposits are the most abundant; natural phosphate stone from the Kingdom is supplied to world markets. On the contrary, the Irbid Governorate is not blessed with abundant natural resources, except for limestone used in white cement production. Setting aside the financial feasibility of exploitation, the existing natural resources in the Study Area are as follows:

(1) Oil Shale (bituminous marl) on the Yarmouk River;

(2) Iron Ore (Hematite) in the Ajlun Area;

(3) Limestone,

1) High grade limestone in Khaldiya district suitable for white cement; and
2) Limestone for building materials in the Ajlun area (Ishtafina);

(4) Basalt and tuff (pumice) which are suitable materials for light concrete;

(5) Clays and sandstone in Jerash and the Zarqa River area, suitable for the production of building materials such as tiles, sanitary ware, bricks, etc; and

(6) Gypsum in the Zarqa River area suitable for the cement industry.

ii. Agriculture

3.056 As stated earlier, the dominant economy in the Study Area is agriculture, and its main crops are wheat, barley and lentils because of the relatively scarce endowments of rainfall. At present, 80.1 percent of the total arable area of 172,115 hectares is being used, accounting for 137,829 hectares, of which only 0.1 percent is irrigated. In terms of the modernization of agriculture, sufficient progress is not being made as yet, in spite of great efforts. For example, the application of fertilizers, just started recently on some of the land, is not widely diffused yet. Therefore, necessary conditions relating to the agricultural development in the Study Area will be as follows:

(1) Lowering of the price of fertilizer and promoting its technological diffusion;

(2) Progress in adoption of improved tools for cultivating dryland crops; and

(3) Industrial production using agricultural resources, such as tomatoes, oranges, and other vegetables.

3.057 Especially by the promotion of (3), it will be possible to bring about a developmental linkage or multiplier effect between manufacturing and agriculture in the Study Area.

3.058 In the area at present olive tree cultivation, fruit tree cultivation, and animal husbandry, are being promoted. The products of these activities, will also give potentiality for agro-industries such as cheese, meat-processing, and beverages, etc., to the area.

c. Human Resources

i. Population

3.059 The population of the Kingdom has grown rapidly as a result of high natural growth rate and the refugee influx since 1948. The Irbid Governorate in particular is a growing one, coming next to the

Amman Governorate in terms of population growth. The current population of the Irbid Governorate is the second largest in the nation, accounting for a 28.9 percent share among the total population of the Kingdom. If the present trend continues, the population in the Governorate can be estimated at more than 1 million people by the year 2000. The estimated population for 1985 was given at 700,000 in the Phase I Report.

ii. Labor Force and Employment Opportunities

3.060 The labor force in the Kingdom is estimated at 19.2 percent of the total population, whilst that of the Irbid Governorate is reckoned to be a little less than this figure, as shown in Table 3.15. These overall participation rates are low, when compared to those of other neighboring countries, due mainly to the low rate of female participation in this country generally, e.g., 3.8 percent in 1975 as against 9.5 percent in Lebanon in 1970 and 10.7 percent in Syria in 1970. But to date, this situation has been rectified somewhat, and the female employment situation has been improved to some extent.

Table 3.15 Sectoral Distribution of the Labor Force in East Bank and Irbid Governorate, 1975

(Unit: 1,000 persons)

	Population	Employment	Primary	Secondary	Tertiary	Others[1]
East Bank	1,952 (100)	374(100) (19.2)	125(33.4)	33(8.8)	42(11.2)	174(46.6)
Irbid Gov.	564 (100)	107(100) (18.9)	68(63.6)	3(2.8)	7(6.5)	29(27.1)

Sources: Labor Force Census, 1975 and Part II.

Notes: ( ): Percent
1/ In this classification, "others" means public administration, community services, armed forces, public security and civil defense.

3.061 As to the unemployment, the overall unemployment rate declined from 7.14 percent in 1961 to 2.15 percent in 1975. The market for skilled labor has become increasingly tight as a result of the growing demand for skilled manpower in neighboring oil-rich countries.

3.062 The labor force distribution by economic activities in the Kingdom shows a high proportion in the tertiary and public service sector, which amounts to 57.8 percent of the total employment. An unbalanced distribution can also be seen in the Irbid Governorate, in a different way, namely, the high rate of employment in the agricultural sector and the very low rate of employment in the manufacturing sector. The underdevelopment of the manufacturing sector in the Governorate can be conjectured not only from the small share of the sector labor force but also from the size and kinds of the sub-sectors in manufacturing, as indicated in the following Table 3.16.

Table 3.16 Employment of Sub-sectors of Manufacturing in the Irbid Governorate, 1975

Manufacturing Activities	No. of Employees (persons)	No. of Establish-ments	No. of Average Employees per Establishment (persons)
Food, Beverage and Tobacco	356	220	1.6
Textile, Clothing and Tanning	458	425	1.1
Wood and Wood Products	152	92	1.7
Paper and Paper Products	8	3	2.7
Chemicals, Petroleum and Plastics	8	1	8.0
Metal and Non-Metal Products	86	33	2.6
Basic Metal Product	2	2	1.0
Fabricated Metal Products	142	80	1.8
Total	1,212	856	1.4

Source: Labor Force Census, 1975.

3.063 The potentiality of the work force to be mobilized for industrial development seems to be adequate; a substantial shift in the work force from the primary and tertiary sectors can be accomplished. In addition, new entrants join the work force year by year. The problem will be the quality of the available work force which largely depends on a program of institutional support from vocational and industrial training institutions.

iii. Education and Training

3.064 Although education in Jordan is compulsory for the first nine years, the school enrolment percentage is not at an acceptably high level, particularly in the case of secondary schools. In the process of industrialization, it is necessary for industrialists to procure a great number of skilled workers, and some entrepreneurs in Jordan are beginning to favor the use of in-house training in their factories. In this context, the goal of the Five Year Plan in terms of the percentage of attendance in vocational secondary schools out of primary school graduates is to reach 30 percent by 1980 as compared to only 8 percent out of primary school graduates in 1972. As an example of increased emphasis on vocational training, the following industrial and manufacturing training institutions have been established so far:

(1) Technical and Engineering Institutes;
(2) Secondary Industrial Schools;
(3) Trade and Training Center;
(4) Apprenticeship Centers;
(5) Vocational Adult Education Centers; and
(6) Labor Up-grading Centers.

3.065 Of these supporting institutions for industrial development, there is at present no Technical and Engineering Institute and no Apprenticeship Center in the Study Area. However, this situation will be rectified soon, when the Engineering Department of Yarmouk University opens in the near future. The World Bank has financed the Poly-Technic Institute at Husn, which is designed to specialize in chemical and textile engineering and food technology, and which is presently under construction. Furthermore, a Vocational Training Center is scheduled to be built in Hakama with USSR aid, and it will be managed and operated by the Vocational Training Corporation (VTC). The courses to be provided by VTC are metal fabrication, industrial electricity, central heating, auto repairs, woodworking and building.

d. Infrastructure Conditions

i. Power Supply

3.066 Electricity in the Study Area is supplied (1) by a diesel turbine generator at the Irbid District Electric Company (IDECO), whose total generating capacity is 11 MW, and (2) by the Jordan Electric Authority (JEA) which purchases power from Syria by a 66 kV transmission line through a 10 MVA 66/33 kV transformer. In addition, a 132 kV double-circuit transmission line from the Hussein Thermal Power Station (JEA) at Zarqa supplies electricity to Irbid.

3.067 At present, power demand in Irbid Municipality is 8.5 MW at peak periods whilst generating capacity is 11 MW. Future supply is examined in Section 3.6.6.

ii. Water Supply

3.068 Water is one of the major development issues in this country, since water resources are scarce and supply is limited. The Study Area is not exempted from this problem but it is expected that this situation will be improved by the water resource development project on the Yarmouk River, i.e., the Maqarin Dam Project.

3.069 Irbid Municipality is, at present, supplied with water from Azraq, and the capacity of supply is 8,000 m^3 per day, which is two-thirds of the demand.

3.070 According to the plan for water supply and sewage of Irbid Municipality up to year 2000, which has just been prepared by an American consultant, Weston International, allocation of water for industrial and commercial use is as follows:

1985	2,300 m^3
1990	5,200 m^3
2000	9,100 m^3

It is also said that water from the Maqarin Dam will become available in 1984.

iii. Telecommunications

3.071 The total line capacity of telephone exchanges in the Irbid Municipality is not sufficient for the service area, and only approximately 4,000 subscriber lines are in existence. Early in 1980, the extension of the switching service will be completed by the state-owned Telecommunications Corporation, adding a further 5,000 subscriber lines, and further extensions will be also possible by the PCM system to and around the periphery of the Municipality.

3.072 At present, only limited Direct Distance Dialing (DDD) facilities are available between Amman and Irbid, whose capacity is only 60 circuit lines owing to the outdated equipment. To improve this situation, the construction of a National and International Switching Center in the Irbid Municipality is planned and scheduled to be completed in 1982. With this extension, 350 circuit lines will be added and the trunk line from Aqaba to Irbid will be improved. Such a wide range of improvements will bring telecommunications within the reach of more people in Irbid Municipality as well as in the rural areas.

iv. Transportation System

3.073 At present, one of the most serious problems of the road network in the Municipality is caused by the fact that all trunk roads pass through the CBD area without there being any complete ring road to divert through-traffic from CBD. In a plan of the Irbid Municipality, a ring road project adjacent to the existing industrial area was planned, and partly executed. Even with the inclusion of this road, it is true to say that this area urgently requires sufficient road facilities for

industrial activities. To satisfy these needs and solve the problem, the Ring Roads project will have to be urged on with the objective of (1) bringing about the smooth transportation of products and raw materials of and for the IEI to be proposed, and (2) mitigating traffic congestion.

3.074 For the time being, the related roads to the proposed IEI will be expected to be linked with Route 16 or Route 11 which are at present main trunk roads to the Amman district, Syria through Ramtha and Iraq through Mafraq.

e. Urbanization

3.075 Land use and urban expansion of Irbid urban area have been assessed on the basis of a search for suitable land for industrial development, particularly for an industrial estate. The locational assessment has been done on the criteria of topography, land use, land price and wind direction.

3.076 Topographically, the urban area is surrounded by moderate slopes in the north, south and west, whilst almost flat land stretches towards the east. In the west, deep wadis prevent the urban area from expanding and much difficulty is expected in implementing and operating any large/medium scale project.

3.077 As for land use, the central part which was built up before the 1960's, is very dense with an average population density estimated at more than 200 persons per hectare. Many small industries in the area are suffering from limited space for expansion, traffic congestion and other problems related to overcrowding in the city center. The urban area has been expanding mainly towards the south and north. The southern part is said to be residential area for middle and high income people, while the northern part is for lower income people. Aside from technical judgement, it is easily foreseeable that industrial development in good residential areas is not socially acceptable.

3.078 Land values have been rapidly increasing, especially in the peripheral part of the municipality, reflecting the strong preference of people to buy cheap land which is available in the peripheral areas and is in demand because of increasing car ownership. Land value is increasing especially in the northern and southern part of the municipality, but in the west, the increase in land values has not been so rapid, due to the limited possibility of urban expansion. In the east, land values are static at present, except for the area adjacent to Baghdad Street, presumably because of inadequate access roads and low productivity agricultural land. However, with the completion of the Ring Roads, rapid land price spirals are expected in the near future.

3.079 Use of the northeastern part of the municipality for industrial purposes is justifiable from the viewpoint of wind direction, which is from southwest to north over the municipality.

3.080 To summarize, the availability of flat land, the non-existence of good residential area, the relatively low level of land prices at present and the wind direction from the southwest to the north seem to be a set of sufficient conditions to justify industrial development in the northeastern part of the municipality, rather than elsewhere. This will be further examined in Section 3.5.

f. Market Potential

3.081 The neighboring Arab countries have large markets both in terms of population and high income level due to the endowment of abundant oil resources in their countries, which are providing them with a great deal of purchasing power (see Table 3.17). On the basis of the geographical advantage of the Study Area, those industries to be located there would reap large benefits, if they would tap neighboring export markets.

Table 3.17 Population and GNP per Capita of Potential Markets, 1976

Country	Population (millions)		GNP per Capita (US$)
Irbid Municipality	0.13	(1975)	n.a.
Study Area	0.33	(1975)	n.a.
Irbid Governorate	0.56	(1975)	550
Jordan (East Bank)	1.95	(1975)	736
Bahrain	0.26		n.a.
Egypt	37.87		280
Iraq	11.51		1,390
Kuwait	1.06		15,480
Lebanon	2.87		n.a.
Libya	2.53		6,310
Oman	0.79		300
Qatar	0.18		n.a.
Saudi Arabia	7.40		4,480
Syria	7.60		780
United Arab Emirates	0.69		n.a.
Yemen	5.40		250
Yemen, PDR	1.75		280

Sources: 1. IMF, International Financial Statistics, Oct. 1979.
2. The World Bank, World Development Report, 1978.
3. Part II.

3.082 As for the domestic market, the Study Area has the second largest market in the country, though its size is only about half of that of Amman. In short, those industries going to be located in the Study Area will have easy access to both domestic and export markets.

3.3 Project Scheme and Development Frame

3.3.1 General

3.083 In this section, first, types of industrial areas which can be developed in the Study Area are identified. Second, land demand for industrial uses in 1985 and 2000 is estimated. Finally, based on both the types of area and the land demand, long-term locational strategy of industrial development in the Study Area is proposed.

3.3.2 Possible Types of Industrial Areas in the Study Area

a. General

3.084 The industrial estate in the Irbid Municipality (IEI) has been given top priority among integrated regional development projects in the Study Area. In the initial stages of industrial development, it is more convenient to have the industrial area within the boundary of the Irbid Municipality. Irbid has played the role of a primary growth center in the Study Area and its position must be further strengthened in line with the development strategy as set forth in the Phase I Study. The industrial scene of Irbid has been changing rapidly and new industries such as foundry, ballpoint pens and dairy farming seem to be successful ventures which will definitely stimulate the interest of other investors in modern manufacturing industries. It therefore may be a good time to develop a well planned and well organized industrial park to attract both local and foreign investors.

3.085 Toward the year 2000, the socio-economic condition of the Study Area will change. For example, the road network system will be expanded; water supply, electricity and telecommunications will be improved, and the new campus of Yarmouk University will be completed. These changes will bring more possibilities of growth to the Study Area. The long-term strategy which is presented in Section 3.3.4 aims at programming of industrial development activities in response to these changes.

3.086 So far as industrial space is concerned, there are several different types of industrial areas (IA), which seem possible to be developed in the Study Area, as follows:

(1) IA for relocated industries;
(2) IA for new industries;
(3) IA for distribution industries;
(4) IA for research and development industries;

(5) Rural industrial zone; and
(6) Industrial Free Zone.

b. Industrial Area for Relocation of Small-scale Industries

3.087 The objective of this type of industrial area is to provide infrastructure for industries existing in the built-up area of the city, and which are relocated and accommodated under more favorable conditions. Infrastructure such as standard sheds, water supply, electricity, transportation, car parking, public social welfare facilities and convenient facilities for workers as well as operators, are required. In order to promote these small-scale industries, common workshop or technical service/training facilities are usually provided within the area. This kind of space might be constructed and managed continuously by a public organization.

c. Industrial Area for New and Medium-scale Industries

3.088 As mentioned the Study Area is a growing region. New industries not yet in existence in Jordan or in the Study Area and being suited to regional development could possibly be introduced to the Study Area. In general, this type of industrial estate is larger in size than the above-mentioned type and consequently must have its own management as a comprehensive venture.

d. Industrial Area for Distribution Industries

3.089 Important trunk connections between Jordan and Syria, Iraq and Saudi Arabia are situated in the Study Area and important inland transportation lines are connected with or run through this region. Therefore, well organized loading and unloading facilities, storage facilities (warehouses), packaging and unpackaging services, and related industries are required, together with the office space for wholesale and commercial agents. This kind of estate should be located at the nodal point of transportation.

e. Industrial Area for Research and Development Industries

3.090 The Yarmouk University Project is one of the largest national projects planned for the Study Area and is expected to be implemented soon at its permanent site, and is designed to be fully operational by 1990. Accordingly, the area will definitely become a center for education, research and development for not only the Study Area but also for the country and all neighboring Arab countries. Utilization of solar energy, development and the most rationalized utilization of water resources, promotion of agriculture in the desert areas and other projects will be closely connected with industrial activities. Then it will be necessary to prepare the site in order to invite research-oriented or technology-oriented industries for the future. Close links between industry and universities is commonly practiced in the world, particularly for research and development activities, to economize the investments required and to achieve better results.

f. Rural Industrial Zone or Satellite Industrial Promotion Center

3.091 One of the important objectives when developing an industrial estate is that it should play the role of a leading stimulant to encourage the industrial activities in a rural region. Besides the estate, which is mentioned above, it is necessary to establish some kind of promotion center which should be located in rural communities, separate from the regional center. Industries which are located in these rural communities are very small in size and most of them are local-market-oriented industries or handicraft industries using marginal manpower and locally produced materials. They are very necessary activities for rural communities, and the industrial development strategy should pay much heed to the promotion of these industries. As an extension service of the promotion center, the development of a technical managerial training center or advisory service center should be considered. In this center common machinery and equipment, suitable for each local situation, is desired to be installed. With such services, rural industries can be updated and become profitable. It is supposed that among these rural industries, the handicraft industry will be a promising one, in parallel with the growth of tourism industry in the country. Furthermore, even in these rural community centers, sometimes it is possible to develop an industrial estate.

g. Industrial Free Zone or Border Free Zone

3.092 The Industrial Free Zone at the border between Syria and Jordan is now being developed. The total area is 400 hectares, of which 200 hectares will be situated inside the Jordan boundary. The Industrial Free Zone, in which export-oriented industries will be located, will have an effect on the industrial development of the Study Area. From the stage of construction, through the stage of the operation of the zone, there will be a substantial demand for building materials and other materials needed for construction, a large part of which can be supplied by the Study Area, together with the necessary services. According to the transportation plan, the trunk road (called an Autostrada) linking the Free Zone and the Amman metropolitan region, will run through the eastern part of the Study Area. Therefore, Mafraq and its surrounding area, where the Autostrada and the eastwest trunk road cross each other, will be influenced by this Free Zone.

3.3.3 Reclassification of the Six Types of Industrial Areas

3.093 These six types of industrial areas (b to g) are components of the long-term strategy for industrial development in the Study Area. In connection with the defined terms in Section 3.1.2, these six types of areas can be reclassified as follows.

(1) Type A: Industrial zone for relocation or promotion of small-scale industries (including the extension promotion center): b and/or f in the previous definition;

(2) Type B: Municipality Industrial Park: b in the previous definition;

(3) Type C: Industrial estate,
C-1: Industrial estate for manufacturing industries: b in the previous definition;
C-2: Distribution center: c in the previous definition;
C-3: Research and development estate: d in the previous definition;

(4) Type D: Border Free Zone: f and (b+c) in the previous definition.

3.3.4 Industrial Land Demand

3.094 In order to make a long-term strategy for industrial development of the Study Area, the land demands by the industrial sector in the Study Area until 1985, 1990 and 2000, respectively were projected. Based on macro-economic projection, land demands by manufacturing industries were roughly estimated according to the procedure as shown in Figure 3.9.

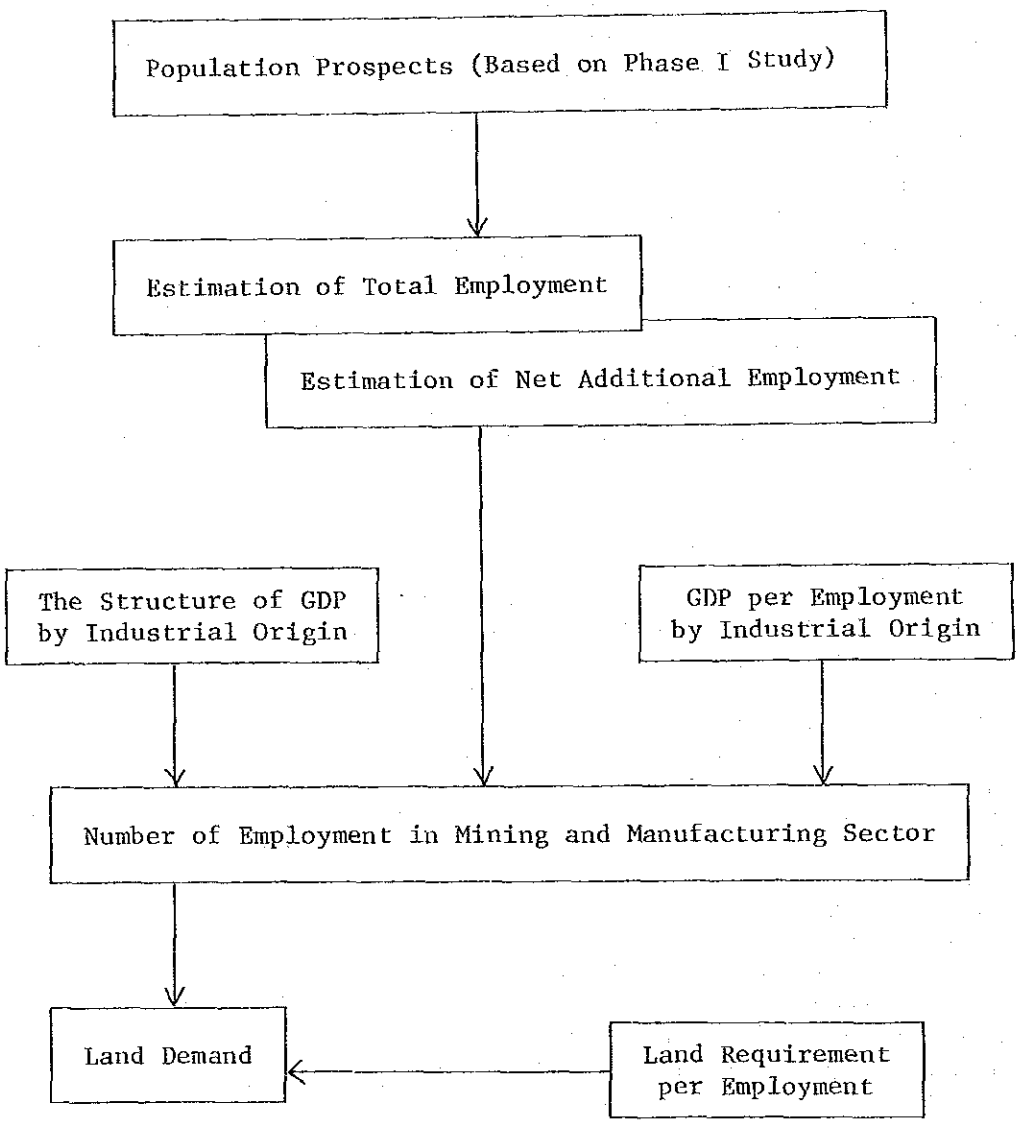
a. Labor Force

3.095 The population of Irbid Governorate and Study Area has been estimated at 732,000 and 660,000 in 1985, at 1,140,000 and 1,020,000 in 2000, respectively, in the Phase I Study. Based on these figures the level of employment is estimated at 140,000 in the Governorate and 138,600 in the Study Area in 1985 and at 338,600 in the Governorate and 335,200 in the Study Area in the year 2000. The net increase in employment is estimated at 13,600 from 1980 to 1985 in the Part II. Then, it should increase to 196,600 employees from 1985 to 2000 (Table 3.18) in the Study Area.

b. GDP

3.096 The structure of GDP by industrial origin in the East Bank and each Governorate, was estimated as shown in Table 3.19. In the Irbid Governorate, the relative importance of the mining and manufacturing sector, in the GRDP, is extremely low and is 1.40 percent as compared with the average of the East Bank at 17.7 percent. Though this Governorate has favorable conditions for agriculture and relative importance of this sector is high, this low percentage for the mining and manufacturing sector shows that this Governorate lags far behind in terms of industrial development. In considering the encouragement of industrialization, an assumption was made that the relative importance of the mining and manufacturing sector among the GRDP should be 3.0 percent in 1985, 5.0 percent in 1990 and 9.0 percent in the year 2000 in the Study Area.

Figure 3.9 Estimation Procedure of Land Demand for Industry in the Study Area



Source: Study Team.

Table 3.18 Projection of Population and Employment, 1975, 1977, 1985 and 2000

	1975	1977	1985	2000
Population				
(Governorate)	563,000	600,000	732,000	1,140,000
(Study Area)	519,000	(553,000)	600,000	1,020,000
Labor Force				
(Governorate)	108,762	(115,800)	141,300	342,000
(Study Area)	100,000	(106,000)	127,000	(306,000)
Employment				
(Governorate)	106,870	(114,000)	(140,000)	(338,600)
(Study Area)	(98,300)	(104,400)	(125,700) 1/	(302,900)
Unemployment Rate (%)				
(Governorate)	1.74	(1.50)	(1.00)	(1.00)
(Study Area)	(1.70)	(1.50)	(1.00)	(1.00)

Source: Part II.

Notes: ( ) Estimated in this study.
1/ Net additional employment has been estimated at 13,600 from 1980 to 1985.

Table 3.19 Gross Domestic Product by Industrial Origin, 1977

(Unit: JD 1,000 at Current Prices)

	East Bank	Governorate				
		Irbid	Amman	Balqa	Karaq	Ma'an
1. Agriculture	41,700 (0.105)	18,200 (0.197)	9,200 (0.039)	8,500 (0.306)	5,200 (0.181)	600 (0.053)
2. Mining and Manufacturing	70,000 (0.177)	1,300 (0.014)	53,300 (0.225)	5,200 (0.187)	9,000 (0.312)	1,200 (0.106)
3. Construction	27,000 (0.068)	7,900 (0.086)	15,700 (0.067)	1,000 (0.036)	1,600 (0.056)	800 (0.071)
4. Electricity and Water Supply	4,100 (0.011)	500 (0.005)	2,700 (0.011)	400 (0.014)	200 (0.007)	300 (0.027)
5. Transport	42,000 (0.106)	9,200 (0.100)	26,300 (0.112)	2,000 (0.072)	2,000 (0.069)	2,500 (0.221)
6. Wholesale and Retail Trade	63,100 (0.159)	14,400 (0.156)	42,600 (0.181)	2,000 (0.083)	1,900 (0.066)	1,900 (0.168)
7. Banking and Finance	7,000 (0.018)	1,100 (0.012)	5,500 (0.023)	200 (0.007)	0 (0.000)	200 (0.018)
8. Ownership of Dwelling	23,000 (0.058)	6,600 (0.072)	13,000 (0.055)	1,500 (0.054)	1,300 (0.045)	600 (0.053)
9. Public Administration	73,000 (0.184)	20,100 (0.218)	42,100 (0.179)	3,700 (0.133)	5,100 (0.177)	2,000 (0.177)
10. Services	45,000 (0.114)	12,900 (0.140)	25,400 (0.108)	3,000 (0.108)	2,500 (0.087)	1,200 (0.106)
11. GDP at Factor Cost	395,900 (1.000)	92,200 (1.000)	235,800 (1.000)	27,800 (1.000)	28,800 (1.000)	11,300 (1.000)

Source: Department of Statistics, Statistical Yearbook, 1977.

Note: ( ) Share among total GDP at factor cost.

3.097 If the economic conditions since 1976 continue and industrialization in the Study Area is reinforced, it seems to be possible to assume that the annual growth rate of GRDP will be 10 percent and subsequently 8 percent after 1985. Under this assumption, the future GRDP of the Study Area is projected as JD 184 million in 1985, JD 271 million in 1990 and JD 585 million in 2000 at 1977 constant price (see Table 3.20). Then the value added of the mining and manufacturing sector in 1985, 1990 and the year 2000 will be JD 5.52 million, JD 13.55 million and JD 52.65 million respectively.

Table 3.20 Projected GRDP of the Study Area, 1977, 1985 and 2000

	1977	1985	2000	
A. Estimated GRDP	86	184	585	JD million
B. Employment	104.4	125.7	302.9	thousand persons
C. A/B (JD/person)	824	1,463	1,931	JD

Source: Estimated in this Study.

c. Labor Productivity and Employment

3.098 According to the "labor Force Census in 1975," employment in manufacturing and mining amounted to 1,277 employees in the Irbid Governorate. Based on this figure, taking into account the 3.0 percent per annum population growth rate, the estimated employment figure for 1977 was given as 1,350 for the manufacturing and mining sector. On this estimation, labor productivity in 1977 was calculated approximately at JD 963. The employment for manufacturing and mining in the future, which is our first goal, can be estimated at 3,879 employees in 1985, 7,461 in 1990 and 17,799 in the year 2000, if the 5 percent growth rate in productivity is assumed. The growth rate implies an advance of capital-intensive industries.

3.099 Then, we can estimate the employment in manufacturing to be 3,685 employees in 1985, 7,088 in 1990 and 16,909 in the year 2000, assuming no change after 1975 in the proportion between the manufacturing employees and mining employees. The proportion between the two in 1975 were obtained from "Labor Force Census in 1975" (see Table 3.21).

Table 3.21 Estimation of Employment for Manufacturing and Mining, Study Area, 1977, 1985, 1990 and 2000

	1977	1985	1990	2000
A. Value Added of Mfg. and Mining Among GRDP	JD 1.3 million (1.4% of GRDP)	JD 5.52 million (3% of GRDP)	JD 13.55 million (5% of GRDP)	JD 52.65 million (9% of GRDP)
B. Labor Productivity of Mfg. and Mining	JD 963	JD 1,423	JD 1,816	JD 2,958
C. Employment for Mfg. and Mining (A/B)	1,350 workers 1/	3,879 workers	7,461 workers	17,799 workers
D. Employment for Manufacturing (cx .95)	1,282 workers	3,685 workers	7,088 workers	16,909 workers
E. Share of Employees of Mfg. Among Total Employment	1.3%	3.1%	n.a.	5.9%

Source: Part II and estimated by the Study Team.

Note: 1/ Our estimates by Labor Force Census, 1975.

d. Land Demand

3.100 Land demand for manufacturing in the Study Area, which is our final objective, can be estimated as follows:

(1) 1985 Net Land Demand:

(3,685 - 1,282 employees) x 70 m^2 = 16.8 hectares
Gross Land Demand (include public space within estates)
(3,685 - 1,282 employees) x 100 m^2 = 24.0 hectares

(2) 1986 to 1990 Net Land Demand:

(7,088 - 3,685 employees) x 77 m^2 = 26.2 hectares
Gross Land Demand
(7,088 - 3,685 employees) x 110 m^2 = 37.4 hectares

(3) 1991 to 2000 Net Land Demand:

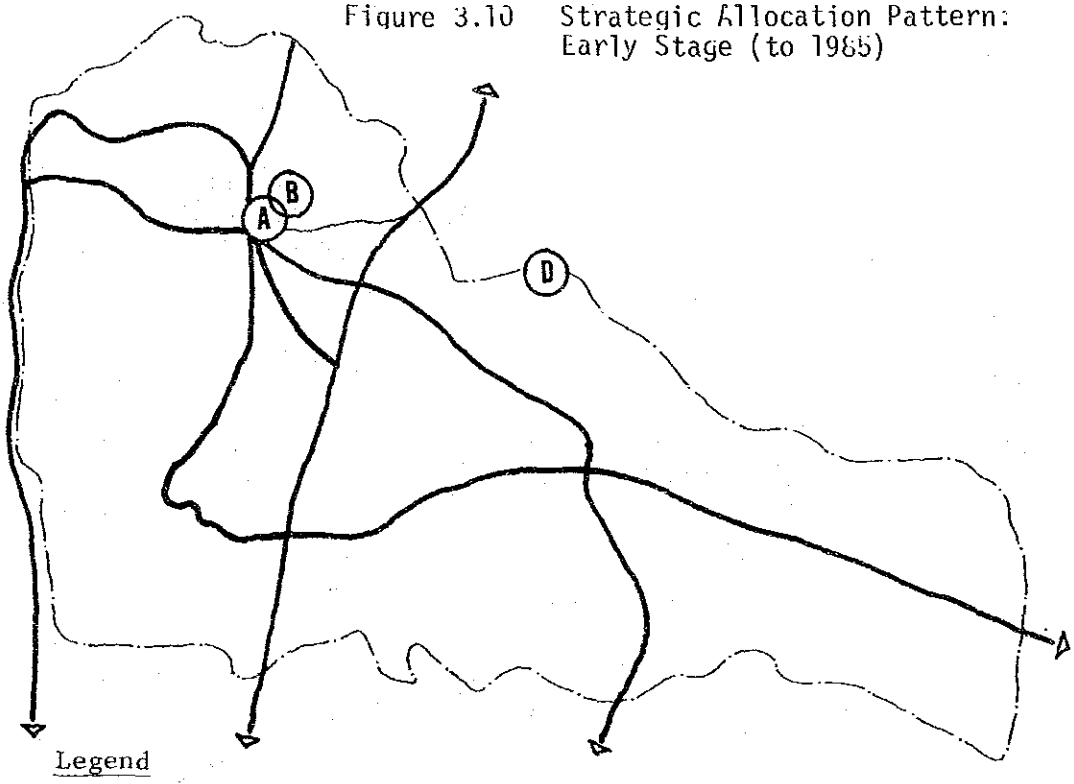
(16,909 - 7,088 employees) x 84 m^2 = 82.5 hectares
Gross Land Demand
(16,909 - 7,088 employees) x 120 m^2 = 117.9 hectares

3.101 Accordingly, new land demand required for the future industrial development in the Study Area up to year 2000 would become around 180 hectares excluding 200 hectares of the proposed Border Free Zone, for industrial activities at Border Free Zone would not be able to be directly counted into the account of the GRDP of the Study Area.

3.102 It was assumed that the per worker industrial land requirement would increase from 100 m^2/worker in 1985 to 120 m^2/worker in 2000 in the span of 15 years due to the structural change of industry such as capital deepening.

3.103 Figures 3.10, 3.11 and 3.12 show a diagrammatic view of the long-term locational strategy.

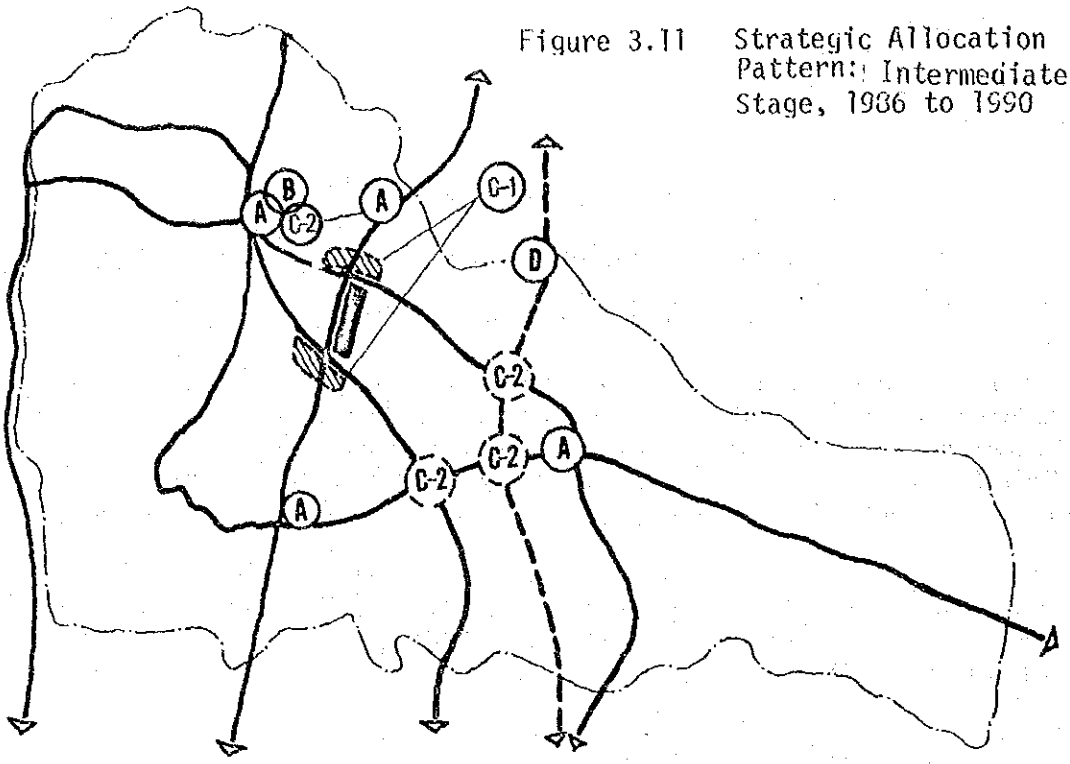
Figure 3.10 Strategic Allocation Pattern: Early Stage (to 1985)



(A) (B) (D) See "Type of Projects" in Section 3.3.3 of this Chapter.

Source: Study Team.

Figure 3.11 Strategic Allocation Pattern: Intermediate Stage, 1986 to 1990



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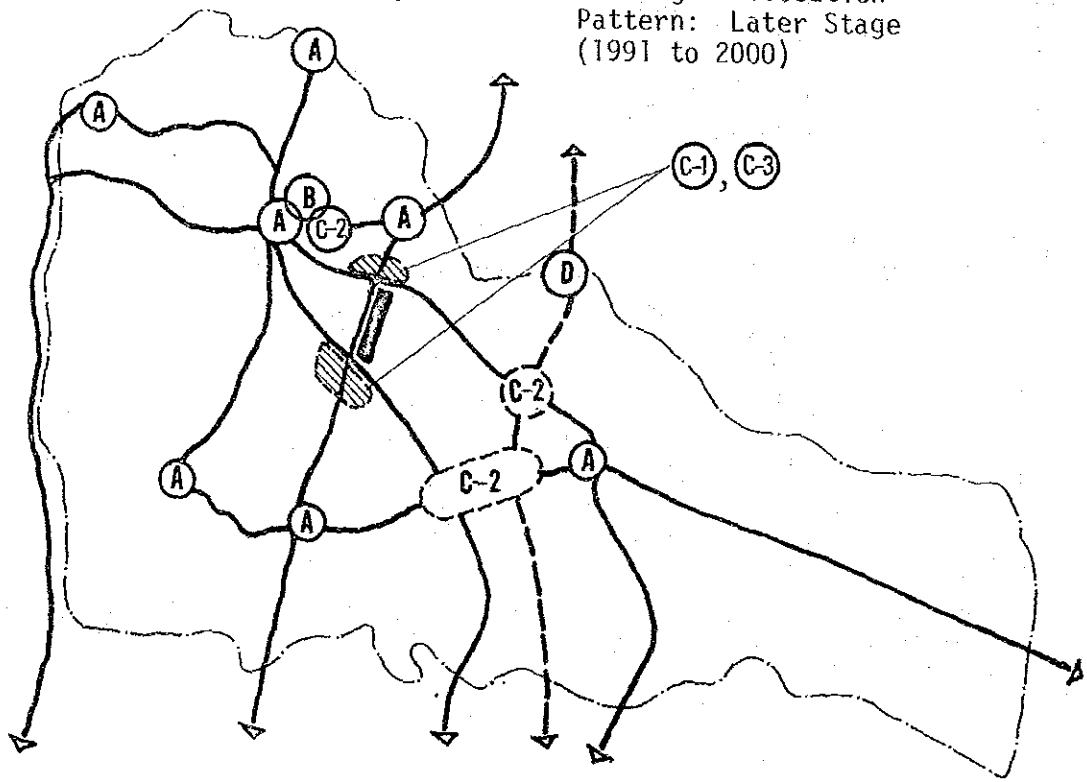
Legend

As in Figure 3.10

Yarmouk University

Site for C-1 Type of Projects Source: Study Team.

Figure 3.12 Strategic Allocation Pattern: Later Stage (1991 to 2000)



Legend

As in Figure 3.11. Source: Study Team.

3.3.5 Long-term Locational Strategy of Industrial Development in the Study Area

3.104 By following the industrial land demand discussed in Section 3.3.4, an attempt was made to spatially allocate the required 180 hectares of industrial land to priority areas as shown in Table 3.22.

Table 3.22 Long-term Locational Strategy of Industrial Development in the Study Area

Development Stage	Type of Projects[1/]	Size (Gross) Covered Areas	Location	Sponsorship
Early Stage	A (Municipality Industrial Park - Relocation)	4.0 ha	Inside the Municipality Boundary of Irbid	Municipality or Public Corporation
	B (Municipality Industrial Park)	20.0 ha	Inside the Boundary of Irbid	"
	D (Border Free Zone)	a part of 200 ha	Jabir	Syrian-Jordanian Industrial Free Zone Company
Intermediate Stage	C-1 (Industrial Estate)	20.0 ha	Outside the Municipality Boundary	Industrial Estate Corporation (JIEC)
	C-2 (Distribution Center)	1.4 ha	Interconnection Trunk Roads	Industrial Estate Corporation (JIEC)
	D (Border Free Zone)	a part of 200 ha	Jabir	Syrian-Jordanian Industrial Free Zone Company
	A (Industrial Zone)	small size	Local Communities	Municipality or JIEC

(to continue)

Development Stage	Type of Projects	Size (Gross) Covered Areas	Location	Sponsorship
Later Stage	C-1 (Industrial Estate)	80.0 ha	Expansion of the former stage	Industrial Estate Corporation (JIEC)
	C-2 (Distribution Center)	7.9 ha		
	C-3 (Research & Development Estate)	30.0 ha		
	D (Border Free Zone)	a part of 200 ha	Jabir	Syrian-Jordanian Industrial Free Zone Company
	A (Industrial Zone)	small size	Local Communities	Municipality or JIEC

Source: Study Team.

Note: 1/ For definitions of types, see Section 3.3.3.

3.4 Industry Selection and Size

3.4.1 Identification of Expected and Potential Industrial Sub-sectors in the Study Area

a. Introduction

3.105 In this Section of 3.4.1, the potential industries to be located in the Irbid Municipality Industrial Park are identified. They are specified in terms of ISIC industrial sub-sectors at the four-digit level. In the following Section of 3.4.2, they are transformed into individual factories with the most appropriate size per factory.

3.106 In order to identify potential industries of the Study Area which are likely to be located in the proposed Municipality Industrial Park, the following steps were adopted:

(1) First Step (at national level):

Identification of candidate industrial products and services in the country in terms of three bases, that is to say, 1) utilization of locally available resources, 2) contribution to import substitution or 3) export orientation.

(2) Second Step (at Study Area level):

Evaluation and selection of the candidate products and services in terms of 1) availability of raw materials, 2) market potentiality, 3) industrial linkage and 4) level of technology in the Study Area.

(3) Third Step (at Study Area level):

Investigation of the existing industries to see if expansion and/or relocation are needed, and identification of non-manufacturing industries such as service industries, trade and distribution industries (transportation, warehouse, and packaging industries) which are required to support manufacturers.

(4) Fourth Step:

Reorganization and integration of the selected candidate products and services into sub-sectors of industry at ISIC four-digits level to avoid overlapping; and re-examination of suitability of sub-sectors to the Study Area.

(5) Fifth Step:

Identification of the suitable sub-sectors in the proposed Municipality Industrial Park through evaluation of the local conditions in terms of 1) materials, 2) market, 3) economic effect, 4) technological level and 5) physical environment.

(6) Sixth Step:

The size of those sub-sectors and their allocation should be considered. That is to say, selected sub-sectors will be classified and reorganized into the individual factories with standard sizes.

b. First and Second Steps: Identification and Selection of Candidate Products and Services

i. Bases for Identification of Candidate Products and Services

3.107 Industrialization is, in general, viewed for present purposes as being based on the (1) utilization of available resources, (2) import substitution or domestic market orientation or (3) export promotion or export market orientation. As a first step of identification of candidate products and services, these three bases should be utilized.

3.108 In this country, the export market is primarily the neighboring countries, and in most cases even import substitution industries have been and are required to have potentiality to become exporting industries, partly because of Jordan's locational advantage among Arab countries and partly because of the fact that Jordan's domestic market is too small to achieve economy of scale in industrial production.

3.109 In other words, most of the viable industrial projects will have the dual effects of dollar saving and earning into the country, even though at the initial stages of industrialization they require foreign exchange for the payment for capital goods. Thus, the Study Team has examined only the import substitution potentialities, but this also covers the potentialities of export promotion.

3.110 In the following Section ii, the Study Team presents the identification and selection on the basis of mineral resources, i.e., or Base 1. Section iii. presents only the identification using Base 2, and Section iv, presents the identification and selection by using agricultural resources, i.e., Base 1.

ii. Identification and Selection Based on Mineral Resources

3.111 Jordan is not favored with mineral resources when compared to the oil producing nations of the Middle East. Petroleum or natural gas fields have not been discovered, and relatively few minerals have been exploited and exported or utilized. The few minerals existing in Jordan in appreciable quantity are discussed hereunder.

(a) Phosphates

3.112 Jordan has a large amount of reserves of natural phosphates totalling approximately 330 million tons. The phosphate industry is the major industry in this country, accounting for a quarter of the national output and about 29 percent of the value of domestic exports in 1977. The Jordan Phosphate Mine Company is the only enterprise in this industry.

3.113 According to the "Middle East Annual Review, 1979," work is proceeding on expanding phosphate production capacity mainly at the Hasa and Wadi al Abyad mine sites in central Jordan with the aim of attaining a production capacity of six million tons per year by 1980. The entry into service of two new automated storage and loading units at the port of Aqaba, and the continued improvement of the phosphate railway between Hasa and Aqaba, with the present capacity of four trains per day on the single-track line, means that when production reaches six million tons a year the facilities will be there to handle it all.

3.114 Regarding the utilization or export substitution of phosphates, the Aqaba chemical fertilizer plant is now under construction, and is expected to start production by mid 1980. Its capacity will be 1,250 tons daily of phosphoric acid, 3,600 tons of sulphuric acid and 2,400 tons of monoammonium and diammonium phosphate fertilizer. This project

is expected to enlarge the market for phosphate and potash, and will mix fertilizers at Aqaba, enabling buyers to specify the combination of compound fertilizers they require. It will also contribute to the improvement of agricultural production. In the future, the production of sodium tripoliphosphate is expected to be carried out on a large scale.

(b) Selection

3.115 As the area where natural phosphates are located is in the central region of Jordan, it is not feasible to establish a project for utilization of phosphates in the Study Area, but it may be desirable to establish a distribution center for the fertilizer in the Study Area. In such a case, the fertilizers would be transported from Aqaba to the distribution center by large trucks, divided into small lots and distributed to wholesalers, retailers and/or farmers.

(c) Salt, Potash and Bromine

3.116 The Dead Sea is recognized as having the largest reserves of potassium, sodium, magnesium and bromine in the World. The salt of the Dead Sea is believed to have the following content:

	Concentration	Estimated Total Reserves
Potassium chloride	9.96 gram/liter	2,000 million tons
Sodium chloride	20.96 gram/liter	11,000
Magnesium chloride	109.50 gram/liter	22,000
Magnesium bromine	4.45 gram/liter	980

3.117 The Dead Sea potash project is expected to produce 1.2 million tons of potash annually by the end of 1981, and this figure will rise gradually to 1.7 million tons annually by the 1990's. Besides the production of bromine, there will be the possibility to obtain by-products such as caustic soda, hydrogen, and magnesium and potassium salts. Also, if bromine production is combined with a naphtha cracking plant, a complete chemical complex can be established producing vinyl chloride monomer and polyvinyl chloride from chlorine. This complex is expected to serve the industrial needs of the country, supplying materials to other industries.

(d) Selection

3.118 This project is also not suitable for the Study Area, because it is a resource-oriented type of industry.

(e) Limestone

3.119 Jordan has rich deposits of limestone, the basic material for another type of industry, such as the production of burnt limestone or quick lime. Regarding lime, "It is used as a general alkali, used as a mortar, plaster, and insecticide and, perhaps most important as hydrated lime for agricultural purposes. It is an ingredient in glass

manufacturing, and it is used for water treatment, in the manufacture of sandlime bricks, and as a dehydrant in the treatment of animal hides." (W.D. Scott and Company Pty., Ltd., "Mineral Resources," Department of Industrial Studies and Encouragement of Investment, Ministry of Industry and Trade, April 1976)

(f) Selection

3.120 It is hoped that this chemical complex based on limestone, will be established in the Study Area, and it should be established near the limestone deposits. Some kind of productive activity based on limestone may possibly be located in the industrial estate.

(g) Other Non-Metallic Minerals

3.121 Among other non-metallic mineral resources, gypsum, glass sand, feldspar and clay are useful materials for industries. Gypsum is being used by the cement factory in its amorphous form and it is also useful as the basic material for a plaster wall board manufacturing industry. In Jordan there are large amounts of high quality glass sand, and the establishment of a glass manufacturing plant is about to be started. Feldspar is a material for ceramic and glass products and this project is also about to be completed and start operation. As far as clay is concerned there are large reserves of good quality kaolinitic clays in Jordan. "They are suitable in the production of wall tiles and high quality sanitary ware as well as for floor and roof tiles and refractory bricks" (Scott and Company, "Mineral Resources").

(h) Selection

3.122 The Study Area also has good quality kaolinitic clays, and thus the above types of products are suitable to be made in the Study Area.

(i) Oilshale

3.123 "Oilshale measures are common in Jordan, and the amount of prospective reserves are estimated to be as high as 10 billion tons, placing it amongst the World's leading oilshale deposits. Provided that the large amount of sulphur in the shale can be removed, oil could probably be produced at about JD 9 ...." per barrel at 1975 prices (Scott and Company, "Mineral Resources").

3.124 Although the utilization of Karak oilshale deposits will require considerable electric power, it could be worthwhile to review the situation, especially in keeping with improvement in oilshale processing technology and in view of the changing economics of oil production from shale.

(j) Selection

3.125 Though the Study Area has a deposit of oilshale, its quality is not so high as the deposit in the south. So, oilshale processing is not at present suitable as a project for the Study Area.

(k) Copper and Manganese

3.126 Utilization of copper has also been considered and it is said that a pilot plant will start operation soon. The proven reserves of copper are about 25 million tons with a copper content of 1.36 percent. The proven reserves of manganese ore with 36 percent Mn and 1.4 percent Cu are about 750,000 tons.

(l) Selection

3.127 These are useful resources in Jordan, but are not suitable for project development in the Study Area.

(m) Conclusion

3.128 In the Study Area, based on local mineral resources, limestone mining and its related products should be given further study and consideration, and industries based on clay resources should also be possible. Candidate products based on these local mineral resources are as follows (See Table 3.23). The figures in parentheses show the number in the International Standard of Industrial Classification (ISIC).

Table 3.23 Selected Candidate Products

Product	ISIC	Product Code
A. Limestone and Cement Based Products		
1. Materials for construction works		
1-1 White cement	(3692)	1
1-2 Mortar	(3699)	2
1-3 Plaster	(3699)	3
1-4 Tile	(3699)	4
1-5 Mixed concrete		5
1-6 Bricks	(3691)	6
2. Products for agricultural use		
2-1 Insecticide	(3512)	7
2-2 Hydrated lime	(3512)	8
3. Material for glass manufacture	(3620)	9

(to continue)

Product	ISIC	Product Code
B. Clay (Kaolinitic Clay) Based Products		
1. Ceramics	(3610)	10
2. Material for glass manufacture		11
3. Wall and floor tiles	(3691)	12
4. Bricks		13
5. Sanitary ware	(3610)	14
6. Ceramic products for souvenirs	(3610)	15

Source: Study Team.

iii. Identification Based on Import Substitution

3.129 Along with economic growth and increases in income, domestic consumption is increasing year by year, and, as a result, the deficit from external trade is also increasing. One of the objectives of accelerating industrial development will be to reduce this trade deficit. Thus, import substituting industries deserve higher priorities than others. Of course, the growth in domestic consumption stimulates the expansion of domestic production. In fact, it is found that domestic production is growing steadily resulting in an increased demand for imported capital goods and intermediate goods.

3.130 A RSS study report entitled "Composition of Visible Imports; An Industrial Development Potential, (April, 1979) gives us sufficient information about the possibility of import substitution industries. It says, "Jordan's situation is similar to that of a typical developing country, as its marginal propensity to import capital goods, 0.40, is greater than that to import consumer goods, 0.21. In addition, the average annual growth rate of imported capital goods, 101.6 percent, and their volume index (1971=100), 1,614.9, are higher than those of consumer goods, which are 21.1 percent and 335.3 respectively. In spite of the fact that consumer goods constitute, on the average, 54.6 percent of Jordan's total imports, while that of capital goods is 20.8 percent, it could be concluded from the above analysis that favorable structural changes are taking place within the composition of Jordan's imports in connection with the country's pace of economic development."

3.131 Potential import substitution industries identified by the RSS Study are in Table 3.24.

Table 3.24 Candidate Industries Based on Import Substitution

Candidate Industries	ISIC	Product Code
A. First Priority Group		
1. Electricity, Gas and Liquid meters	(3825,3829)	16
2. Locks and Padlocks	(3819)	17
3. Printing ink	(3521)	18
4. Lamps and Light fittings	(3839)	19
5. Furniture and Parts	(3833)	20
6. Clothing	(3220)	21
7. Travel Goods	(3220)	22
8. Tubes, Pipes and Their fittings	(3819)	23
9. Taps, Valves and Cocks	(3819)	24
10. Bolts, Nuts, Nails and Springs	(3819)	25
B. Secondary Priority Group		
1. Houseware and Kitchenware of Aluminum	(3811)	26
2. Knives and Cutting blades	(3811)	27
3. Spoons, Forks and Related items	(3811)	28
4. Electrical and Electronic products	(3832)	29
5. Angles and Shapes of iron or steel	(3811)	30
6. Sugar	(3811)	31
7. Woven fabrics and Textiles	(3211)	32
8. Bed and table line, Shawls, Scarves and Mufflers	(3220)	33
9. Lubricating oil and Greases	(3521)	34
10. Brassieres	(3220)	35

(to continue)

Candidate Industries	ISIC	Product Code
11. Paper and paperboard	(3411,3419)	36
12. Plastic Products	(3560)	37
13. Biscuits, Cake and pastry	(3117)	38
14. Chemical and Biochemical Products		
14-1 Synthetic dye-stuffs	(3511)	39
14-2 Prepared glues	(3529)	40
14-3 Titanium dioxide	(3511)	41
14-4 Monoacids and Tartaric acid	(3511)	42
14-5 Polishes	(3523)	43
14-6 Varnishes	(3521)	44
14-7 Commercial glycerol	(3523)	45
15. Pencils, Pens and Ballpoint pens	(3909)	47
16. Notebooks, Order books and stationery	(3420)	48
17. Chalks	(3699)	49
C. Third Priority Group		
1. Car Parts		
1-1 Rubber tyres (made of reclaimed rubber)	(3559)	50
1-2 Fuel pumps	(3829)	51
1-3 Generators	(3831)	52
1-4 Starters	(3843)	53
1-5 Carburetters	(3843)	54
1-6 Exhaust mufflers	(3843)	55
1-7 Distributors	(3843)	56
2. Pharmaceutical products	(3522)	57
3. Cement	(3692)	58
4. Rugs and Blankets	(3212)	59
5. Undergarments	(3220)	60
6. Wooden packing cases, Boxes and Drums	(3312)	61
7. Refrigerators and Stove	(3833)	62

(to continue)

	Candidate Industries	ISIC	Product Code
8.	Live goats, Sheep and Related products	(3111)	63
9.	Eggs and Chickens	(3111)	64
10.	Animal feed	(3122)	65
11.	Glass and Glassware	(3620)	66
12.	Fish	(3114)	67
13.	Toys and Working models for recreation	(3909)	68
14.	Footwear	(3909)	69
15.	Ceramics	(3610)	70
16.	Canned Juices, Vegetables, Fruits	(3113)	71
17.	Matches	(3909)	72
18.	Imitation jewelry	(3699)	73
19.	Toilet soap	(3523)	74
20.	Carpets	(3214)	75

Source: RSS, Economic Department, Composition of Visible Imports: An Industrial Development Potential.

iv. Identification and Selection Based on Agricultural Resources

3.132 In this section, agro-based and agro-oriented products are identified based on the agricultural produce and on needs of agricultural activities in the Study Area.

3.133 The Irbid Governorate has the most favorable potential to develop agricultural production among the five Governorates in this country. The development of the water reservoir on the Yarmouk River will bring to the Governorate the possibility to develop agricultural industry further.

3.134 Candidate products based on agricultural produce or candidate products which will support agricultural production were selected as shown in Table 3.25.

Table 3.25 Selected Products Based on Agricultural Resources

Selected Products	ISIC	Product Code
A. Utilization of Agricultural Products (including forestry)		
1. Meat (Sheep, Goat, Cattle and Chicken)		
1-1 Bacon, Ham and Salted meat	(3111)	76
1-2 Smoked, Dried meat	(3111)	77
1-3 Corned meat	(3111)	78
1-4 Sausages	(3111)	79
1-5 Meat paste and Spread	(3111)	80
1-6 Canned meat	(3111)	81
1-7 Cooked meat with vegetables (canned)	(3111)	81
1-8 Roasted meat	(3111)	82
2. Dairy Products		
2-1 Milk and Cream	(3112)	83
2-2 Butter	(3112)	84
2-3 Cheese and Curd	(3112)	85
2-4 Powdered milk	(3112)	86
2-5 Malted milk	(3112)	87
2-6 Sweetended milk	(3112)	88
2-7 Skimmed milk	(3112)	89
3. Oil and Fats		
3-1 Cooking oil	(3115)	90
3-2 Butter fats	(3115)	91
3-3 Waxes and Candles	(3116)	92
3-4 Lamp oil	(3115)	93
4. Plants, Fruits and Vegetables		
4-1 Juice (Bottled, Canned, Powdered)	(3113)	94
4-2 Oil (Cooking oil and Shortening)	(3115)	95
4-3 Soap	(3115)	96
4-4 Shampoo	(3115)	97
4-5 Margarine	(3115)	98
5. Leather		
5-1 Slippers	(3240)	99
5-2 Shoes	(3240)	100
5-3 Jackets	(3220)	101
5-4 Brief cases	(3233)	102
5-5 Handbags	(3233)	103
5-6 Travelling bags	(3233)	104

(to continue)

Selected Products	ISIC	Product Code
5-7 Belts	(3233)	105
5-8 Wallets	(3233)	106
5-9 Purses	(3233)	107
5-10 Watch straps	(3233)	108
5-11 Keyholders	(3233)	109
5-12 Balls	(3233)	110
5-13 Perfume bottle cases	(3233)	111
5-14 Cases of Radio, TV, Camera, Lens and Cigarette	(3233)	112
5-15 Music drums and Snares	(3233)	113
5-16 Hammocks	(3233)	114
5-17 Saddles of Horse, Bicycle and Motorcycle	(3233)	115
5-18 Furniture upholstery	(3233)	116
5-19 Handgloves	(3233)	117
5-20 Water and Oil straps	(3233)	118
5-21 Book covers	(3233)	119
5-22 Hat rims	(3233)	120
5-23 School bags	(3233)	121
5-24 Glue	(3233)	122
6. Animal Hair		
6-1 Brushes	(3909)	123
6-2 Bristles	(3909)	124
6-3 Toys	(3909)	125
7. Wool		
7-1 Jackets and Suits	(3220)	126
7-2 Blankets	(3220)	127
7-3 Pants	(3220)	128
7-4 Toys	(3220)	129
8. Horns and Bones		
8-1 Combs	(3909)	130
8-2 Buttons	(3909)	131
8-3 Buckles	(3909)	132
8-4 Flower vases	(3909)	133
8-5 Bolo handles	(3909)	134
8-6 Knife handles	(3909)	135
8-7 Picture frames	(3909)	136
8-8 Decorative articles	(3909)	137
9. Wooden Products		
9-1 Sawn lumber	(3311)	138
9-1-1 Building construction	(3311)	139
9-1-2 House construction	(3311)	140

(to continue)

Selected Products		ISIC	Product Code
9-1-3	Truck and Car assembly	(3311)	141
9-1-4	Match manufacture	(3311)	142
9-1-5	Plywood manufacture	(3311)	143
9-2	Lumber products		
9-2-1	Wooden mouldings	(3311)	144
9-2-2	Door jambs	(3311)	145
9-2-3	Door frames	(3311)	146
9-2-4	Window frames	(3311)	147
9-2-5	Tables	(3311)	148
9-2-6	Books shelves and Wall shelves	(3320)	149
9-2-7	Wooden containers (boxes, drums, vats, kegs, crates, barrels, trunks, tubs, buckets, pellets)	(3312)	150
9-2-8	Shoe lasts	(3319)	151
9-2-9	Cabinets (radio, wall clocks, TV, stereo medical instruments)	(3312)	152
9-2-10	Agricultural implements (plough, harrow, sledge)	(3319)	153
9-3	Furniture		
9-3-1	Tables and Chairs	(3320)	154
9-3-2	Cabinets	(3312)	155
9-3-3	Benches	(3320)	156
9-3-4	Beds	(3320)	157
9-3-5	Trunks	(3320)	158
9-3-6	Chests	(3320)	160
9-4	Wooden crafts		
9-4-1	Fancy kitchen (spoons, forks, bowls, saucers, plates, paddles, ashtrays)	(3319)	161
9-4-2	Figurines	(3319)	162
9-4-3	Flower vases	(3319)	163
9-4-4	Toys	(3909)	164
9-4-5	Wooden shoes	(3909)	165
9-4-6	Buttons and Buckles	(3909)	166
9-4-7	Tool handles	(3319)	167
9-5	Barks, Leaves and Branches		
9-5-1	Medicine	(3522)	168
9-5-2	Rosin (rosin oil, soap ester, varnish)	(3523)	169
9-5-3	Fuel	(3411)	170
9-5-4	Paper pulping	(3411)	171
9-5-5	Charcoal	(3319)	172
10.	Egg Products		
10-1	Mayonnaise	(3121)	173
10-2	Egg cement	(3529)	174
10-3	Egg oil	(3530)	175
10-4	Egg yellow (medicine)	(3522)	176

(to continue)

Selected Products	ISIC	Product Code
B. Supporting Industry for Agriculture		
1. Animal Feeds	(3122)	177
2. Agricultural Implements	(3822)	178
3. Irrigation Equipment		
3-1 Engines	(3822)	179
3-2 Pumps	(3822)	180
3-3 Generators	(3822)	181
3-4 Pipes	(3822)	182
4. Valve Products		
4-1 Portable sprayers	(3822)	183
4-2 Sprinklers	(3822)	184
4-3 Valves	(3822)	185
4-4 Nozzles	(3822)	186
5. Agricultural Equipment (Assembly and leasing industries)		
5-1 Cultivator	(3822)	187
5-2 Tractor	(3822)	188
5-3 Weeder	(3822)	189
6. Fertilizer and Insecticide		
6-1 Fertilizer distribution (compound and distribution)	(services)	
6-2 Insecticide	(3512)	190
6-3 Farm chemicals	(3512)	191

Source: Study Team.

c. Third Step

i. Identification and Selection Based on Existing Industries

3.135 In this Section, candidate products stemming from expansion or relocation of existing industries in the Study Area particularly in the Irbid Municipality are identified and selected for the purpose of relocation and promotion. Selected products are in Table 3.26.

3.136 As mentioned above, a part of the proposed IEI is expected to accommodate small factories to be relocated from Irbid City. Thus, making a rough predication of what factories will come to IEI is important for designing IEI.

Table 3.26 Selected Products Based on Existing Industries

Selected Products	ISIC	Product Code
A. Construction Fixtures		
1. Door locks	(3819)	192
2. Curtain rails	(3813)	193
3. Steel fixtures	(3819)	194
B. Decorative Metal Goods	(3909)	195
C. Iron Works (cast and forged products, metal parts)	(3819)	196
D. Furniture and Furniture Units		
1. Bedroom units	(3320)	197
2. Kitchen units	(3320)	198
3. Dining units	(3320)	199
E. Plastic Products		
1. Toys	(3909)	200
2. Stationery goods	(3909)	201
3. Egg trays	(3560)	202
4. Boxes	(3560)	203
5. Cases and Cartons	(3560)	204
F. Kiln Products		
1. Red bricks	(3691)	205
2. Tableware	(3610)	206
3. Sanitary goods	(3610)	207
4. Insulators	(3610)	208
5. Tiles	(3610)	209
G. Glass Sundries		
1. Tableware	(3620)	210
2. Ashtrays	(3620)	211
3. Folkcrafts	(3620)	212
H. Room and Outdoor Fixtures	(3813)	213

(to continue)

Selected Products	ISIC	Product Code
I. Service Industries with Workshop		
1. Auto-repair shops	(services)	214
2. Machine repair shops	(services)	215
J. Other Relocation Industries		
1. Stone cutting	(3699)	216
2. Bricks	(3691)	217
3. Ice making	(3121)	218

Source: Study Team.

ii. Identification and Selection Based on Distribution Requirement

3.137 In this Section, candidate products and services in the field of distribution and related functions which seem to be required to support the manufacturing sector in the Study Area are identified and selected for the purpose of locating them in the Study Area. Selected products and services are in Table 3.27.

Table 3.27 Selected Products and Services Based on Distribution Requirement for the Proposed Industrial Park

Selected Products and Services	ISIC	Product Code
A. Transportation		
1. Carrying trades	(services)	219
2. Carriers	(services)	220
3. Truck terminals	(services)	221
B. Warehouses		
1. Warehouses for general cargoes	(services)	222
2. Storehouses	(services)	223
3. Cold storage	(services)	224

(to continue)

Selected Products and Services	ISIC	Product Code
C. Loading and Unloading Services		
1. Loading machine services		225
2. Container services (repair, wash, storage)		226
3. Packaging services		227
4. Auto-repair services		228
5. Auto parts retail services		229
D. Related Manufacturing		
1. Packaging paper	(3412)	230
2. Boxes and Cartons (wooden and metal)	(3412) (3819) (3560)	231
3. Packing rope	(3215)	232
4. Pasteboard	(3412)	233
5. Car accessories	(3909)	234
E. Wholesale, Insurance, Bank, Restaurant, Canteen, Lodging-house for Drivers	(services)	235

Source: Study Team.

d. Fourth Step: Integration and Classification of Candidate Products

3.138 About 235 kinds of selected products and services which are listed above; they partly overlap, and many of them are similar in type and can be integrated into and classified under more general types of industrial sub-sectors. According to the International Standard of Industrial Classification (ISIC) selected products can be classified into 48 industrial sub-sectors, except for the service industries, as shown on Table 3.28. In total, 48 manufacturing sub-sectors and one service sub-sector are identified.

Table 3.28 Integration of Candidate Products into ISIC Sub-sectors

Sub-sector Code	ISIC		Products	Product Code
1	3111	Slaughtering, preparing and preserving meat	Goats, Sheep, Eggs and Chickens Processed Meat	62 63 75 76 77 78 79 80 81 82
2	3112	Manufacture of dairy products	Milk and Cream	83 84 85 86 87 88 89
3	3113	Canning and preserving of fruits and vegetables	Canned juice, Vegetables, Fruits	70 94
4	3114	Canning, preserving and processing of fish, crustacea and similar goods	Fish	66
5	3115	Manufacture of vegetable and animal oils and fats	Cooked oil, Vegetable oil, Fruit oil Soap, Shampoo, Margarine	90 91 92 93 95 96 97 98 174
6	3117	Manufacture of bakery products	Biscuits, Cake and Pastry	38
7	3118	Sugar factories and refineries	Sugar	31
8	3121	Manufacture of food products not elsewhere classified	Mayonnaise, Ice making	172 218
9	3122	Manufacture of prepared animal feeds	Animal feeds	64 176
10	3211	Spinning, weaving and finishing textiles	Woven fabrics and Textiles	32

(to continue)

Sub-sector Code	ISIC		Products	Product Code
11	3212	Manufacture of made-up textile goods except wearing apparel	Rugs and Blankets, Woolen blankets	58 127
12	3214	Manufacture of carpets and rugs	Carpets	74
13	3215	Cordage, rope and twine industries	Packaging rope	232
14	3220	Manufacture of wearing apparel, except footwear	Clothing, Travel goods, Bed and Table linen, Shawls and Mufflers, Brassieres, Undergarments, Jackets, Woolen pants	21 22 33 35 59 101 126 128
15	3233	Manufacture of products of leather and leather substitutes, except footwear and wearing apparel	Leather products	102 ∿ 121
16	3240	Manufacture of footwear, except vulcanized or moulded rubber or plastic footwear	Footwear, Slippers, Shoes	68 99 100
17	3311	Sawmills, planing and other wood mills	Sawn timber and Related products	139 ∿ 147
18	3312	Manufacture of wooden and cane containers and small cane ware	Wooden packing cases, Boxes and drums, Container, Cabinets, Trunks	60 150 152 155 158
19	3319	Manufacture of wood and cork products not elsewhere classified	Shoelasts, Agricultural implements, Fancy kitchen utensils, Figurines, Flower bases, Wooden shoes, Tool handles, Fuel, Charcoal	151 153 160 161 162 164 166 169 171

(to continue)

Sub-sector Code	ISIC		Products	Product Code
20	3320	Manufacture of furniture and fixtures, excepting metal	Furniture and parts, Tables and chairs, Bookshelves and wall shelves, Benches, Beds, Room units	20 148 149 154 156 157 159 197 198 199
21	3411	Manufacture of pulp, paper and paperboard	Paperpulping	170
22	3412	Manufacture of containers and boxes of paper and paperboard	Paper and paperboard, Packaging paper, Cartons, Pasteboard	36 230 231 233
23	3420	Printing, publishing and allied industries	Notebook, Books, Stationery	47
24	3511	Manufacture of basic industrial chemicals except fertilizers	Synthetic dye stuffs, Titanium dioxide, Monoacids and tartaric acids	39 41 42
25	3512	Manufacture of fertilizers and pesticides	Insecticide, Hydrated lime, Farm chemicals	7 8 190 191
26	3521	Manufacture of paints, varnishes, and lacquers	Printing ink, Lubricating oil and greases, Varnishes	18 34 44
27	3522	Manufacture of drugs and medicines	Pharmaceutical products, Medicine, Egg yellow	56 167 175
28	3523	Manufacture of soap and cleaning preparations, perfumes, cosmetics and other toilet preparations	Polishes, Commercial glycerol, Toilet soap, Rosin	43 45 73 168

(to continue)

Sub-sector Code	ISIC		Products	Product Code
29	3529	Manufacture of chemical products not elsewhere classified	Prepared glues, Glue, Egg cement	40 122 173
30	3559	Manufacture of rubber products not elsewhere classified	Rubber Tyres (Retreated tyres)	49
31	3560	Manufacture of plastic products not elsewhere classified	Plastic products, Egg trays, Boxes, Cases, Containers, Cartons	37 202 203 204 231
32	3610	Manufacture of pottery, china and earthenware	Ceramics, Sanitary ware, Tableware, Insulators, Ceramic goods, Tiles	10 14 15 69 206 207 208 209
33	3620	Manufacture of glass and glass products	Lime materials for glass, Clay, Glassware, Tableware, Ashtray, Folkcraft	9 11 65 210 211 212
34	3691	Manufacture of structural clay products	Bricks	6 13 205 219
35	3692	Manufacture of cement, lime and plaster	Cement, Mixed concrete, Lime	1 5 57
36	3699	Manufacture of non-metallic mineral products not elsewhere classified	Mortar, Plaster, Tiles, Chalks, Imitation jewelry, Stone cutting	2 3 4 12 48 72 216
37	3811	Manufacture of cutlery, handtools, and general hardware	Houseware, Kitchenware of aluminum, Knives and cutting blades, Spoons, Forks and related items, Agricultural implements	26 27 28 177

(to continue)

Sub-sector Code	ISIC		Products	Product Code
38	3813	Manufacture of structural metal products	Curtain rail, Fixtures	193 213
39	3819	Manufacture of fabricated metal products except machinery and equipment not elsewhere classified	Locks and padlocks, Tubes, Pipes, Cocks, Taps, Valves, Bolts, Nuts, Nails, Springs, Angles, Shapes of iron or steel, Steel fixtures, Cartons (metal)	17 23 24 25 30 192 194 196 231
40	3822	Manufacture of agricultural machinery and equipment	Engines, Pumps, Generators, Pipes, Portable sprayers, Sprinklers, Valves, Nozzles, Cultivators, Tractors, Weeders	178 179 180 181 182 183 184 185 186 187 188
41	3825	Manufacture of office, computing and accounting machinery	Gas, Liquid, Electricity meters	16
42	3829	Machinery and equipment except electrical not elsewhere classified	Fuel pumps	50
43	3831	Manufacture of electrical industrial machinery and apparatus	Generators (Auto parts)	51
44	3832	Manufacture of radio, television, communication equipment and apparatus	Electrical and Electronic products	29
45	3833	Manufacture of electrical appliances and houseware	Refrigerators	61

(to continue)

Sub-sector Code	ISIC		Products	Product Code
46	3839	Manufacture of electrical apparatus and supplies not elsewhere classified	Lamps and lighting fittings	19
47	3843	Manufacture of motor vehicles	Starters, Carburetters, exhaust-mufflers, Distributors	52 53 54 55
48	3909	Manufacturing industries not elsewhere classified	Pencils, Pens and ballpoint pens, Chalks, Toys, Matches, Brushes, Bristle, Combs, Buttons, Buckles, Products of bones and horns, Decorative metal products, Stationery goods, Car accesories	46 48 67 71 123 124 125 129 130 131 132 133 134 135 136 137 138 163 165 195 200 201 234
49	services		Fertilizer distribution, Auto-repair, Machine repair, Carrying trade, Carrier, Truck terminal, Warehouse, Storehouse, Cold storage, Loading machine service, Container service, Packaging service, Auto parts retailer, Wholesale, Insurance, Bank, Restaurants, Canteen, Lodging house	

Source: ISIC.

e. Fifth Step: Identification of Suitable Sub-sectors to Be Introduced into the Irbid Municipality Industrial Park

i. Identification

3.139 In general, in order to identify the possibility of being established in a specific region, several factors should be taken into account, as follows:

(1) Availability of materials;
(2) Markets;
(3) Competitive conditions;
(4) Labor availability and technological maturity;
(5) Agglomeration economy;
(6) Possibility of interlinkage (related industries);
(7) Contribution to the promotion of local industries and to the development of the region; and
(8) Environmental impact.

3.140 Among these, (1), (2), (7) and (4) are used as criteria to select suitable sub-sectors in this Study. They are explained in the following paragraphs in this order. In addition to the four criteria above, the effect on the environment, the amount of water consumption and the amount of energy consumption should also be examined; this is done in Section 3.6.

3.141 At first, the availability of materials was examined, and candidate sub-sectors were evaluated and measured by the following criteria:

Criteria	Points
a. Locally available materials	3
b. Domestically available materials	2
c. Dependence upon imported materials	1

3.142 Next, the market condition was examined. So far as the Irbid Municipality Industrial Park is concerned, the local market should be just as important as the export or domestic market. From this point of view, therefore, candidate sub-sectors can be measured by the following three criteria in terms of market condition:

Criteria	Points
a. Local market oriented	3
b. Domestic market oriented	2
c. Export market oriented	1

This criteria depends on the standard size by which enterprises can operate economically.

3.143 Following the study of materials and market, the possibility of interlinkage with existing industries and the contribution to the development of other industries, in particular the agricultural and

service industries, should be given much consideration. This can be called "economic effect," and the possibility of expansion or modernization in existing industry is also included in this effect. The economic effect of candidate sub-sectors to existing manufacturing industries and other industries are measured by the following criteria.

Criteria	Points
a. Effect on a large extent	3
b. Effect on a small extent	2
c. Relatively no effect	1

3.144 Some kinds of modern manufacturing industries depend on technological maturity of the region and on skilled labor. As mentioned previously, the industrialization of the Study Area lags behind to some extent, when compared with the Amman-Zarqa region. Thus, according to the degree of technological maturity required for candidate sub-sectors, the following criteria can be given.

Criteria	Points
a. Technological maturity is unnecessary	3
b. Technological maturity is necessary to some extent	2
c. Technological maturity is important	1

3.145 To the criteria mentioned above, (1), (2), (7) and (4), the weights of 2, 3, 4, and 1 were given respectively in the evaluation. Depending on these assumptions, the possibility of 48 types of candidate sub-sectors were evaluated as shown in Table 3.29. Evaluation was made based on calculation of the Degree of Possibility, whose formula follows:

$$\text{Degree of possibility} = \sum_{t=1}^{4} (Wi \times Si)$$

where,
Wi = Weight of criterion i;
Si = Point of each project by criterion i.

3.146 Taking the average of the Degree of Possibilities, which is 21.3, as the cut-off point, 27 sub-sectors out of 48 sub-sectors were identified to be the final sub-sectors to be located in the proposed Irbid Municipality Industrial Park. Sub-sectors code number of those 27 are within the parentheses in Table 3.29.

Table 3.29 Examination and Evaluation of Candidate Industries

Sub-sector Code[1]	Material (W=2)	Market (W=3)	Economic Effect (W=4)	Technological Maturity (W=1)	Degree of Possibility
(1)	a (6)	b (6)	a (12)	b (2)	26
(2)	a (6)	a (9)	a (12)	b (2)	29
(3)	a (6)	b (6)	a (12)	c (1)	25
4	b (4)	b (6)	c (4)	c (1)	16
(5)	a (6)	b (6)	a (12)	b (2)	26
(6)	a (6)	b (6)	b (8)	a (3)	23
(7)	a (6)	b (6)	a (12)	c (1)	25
(8)	a (6)	a (9)	b (8)	b (2)	25
(9)	a (6)	a (9)	a (12)	a (3)	30
10	c (2)	b (6)	c (4)	b (2)	14
11	c (2)	c (3)	c (4)	a (3)	12
12	c (2)	c (3)	c (4)	a (3)	12
(13)	c (2)	a (9)	b (8)	a (3)	22
14	c (2)	a (9)	c (4)	b (2)	17
(15)	a (6)	c (3)	a (12)	b (2)	23
(16)	a (6)	b (6)	a (12)	b (2)	26
(17)	a (6)	a (9)	a (12)	a (3)	30
(18)	a (6)	a (9)	a (12)	a (3)	30
(19)	a (6)	a (9)	a (12)	a (3)	30
(20)	a (6)	b (6)	a (12)	a (3)	27
21	c (2)	b (6)	c (4)	c (1)	13
(22)	c (2)	a (9)	a (12)	b (2)	25
23	c (2)	b (6)	c (4)	c (1)	13
24	b (2)	b (6)	b (8)	c (1)	17
(25)	b (4)	b (6)	a (12)	c (1)	23
26	b (4)	b (6)	c (4)	c (1)	15
27	b (4)	b (6)	b (8)	c (1)	19
28	b (4)	b (6)	b (8)	c (1)	19
29	b (4)	b (6)	b (8)	c (1)	19

(to continue)

Sub-sector Code 1/	Material (W=2)	Market (W=3)	Economic Effect (W=4)	Technological Maturity (W=1)	Degree of Possibility
30	a (6)	b (6)	c (4)	b (2)	18
(31)	c (2)	a (9)	a (12)	a (3)	26
(32)	a (6)	b (6)	a (12)	b (2)	26
(33)	b (4)	b (6)	a (12)	b (2)	24
(34)	a (6)	a (9)	a (12)	a (3)	30
(35)	a (6)	a (9)	a (12)	b (2)	29
(36)	a (6)	a (9)	a (12)	b (2)	29
(37)	c (2)	b (6)	a (12)	b (2)	22
(38)	c (2)	b (6)	a (12)	a (3)	23
(39)	c (2)	b (6)	a (12)	b (2)	26
(40)	c (2)	c (3)	a (12)	c (1)	28
41	c (2)	b (6)	b (8)	c (1)	17
42	c (2)	b (6)	c (4)	c (1)	13
43	c (2)	c (3)	c (4)	c (1)	10
44	c (2)	c (3)	c (4)	c (1)	10
45	c (2)	c (3)	b (8)	c (1)	14
46	c (2)	c (3)	b (8)	b (2)	15
47	c (2)	c (3)	c (4)	c (1)	10
48	c (2)	c (3)	a (12)	b (2)	19

Source: Study Team.

Note: 1/ Numbers in parentheses indicate the sub-sectors selected to be located in the IEI.

ii. Grouping of Selected Sub-sectors by Priority

3.147 Those identified 27 sub-sectors were sorted into three groups according to priority as shown in Table 3.30.

Table 3.30 Grouping of Selected Sub-sectors

Group	Code	ISIC	Products
First Priority Group (Dgree=30)	9	3122	Animal feeds
	17	3311	Sawmill
	18	3312	Wooden cases, Boxes, Containers and Cabinets
	19	3319	Other wooden products (Agricultural implements, Figurines, Shoelasts, Flower vases, Tableware, Kitchenware)
	34	3691	Structural clay products (Bricks)
Second Priority Group (Degree=26-29)	2	3112	Dairy
	35	3692	Cement, Lime and Plaster
	36	3699	Non-metallic mineral products (Mortar, Plaster, Tiles, Chalks, Stone cutting)
	40	3822	Agricultural machinery and equipment (Engines, Pumps, Generators, Pipes, Portable sprayers, Sprinklers, Valves, Nozzles, Cultivators, Tractors, Weeders)
	20	3320	Furniture and Fixtures (Tables, Chairs, Bookshelves, Wall shelves, Benches, Beds, Room units)
	1	3111	Processed meat
	5	3115	Vegetable oil, Fruit oil, Animal fats and Processed products
	16	3240	Leather footwear
	31	3560	Plastic products (Egg trays, Boxes, Cases, Containers, Cartons)
	32	3610	Pottery, China and Earthenware (Ceramics, Sanitary ware, Tableware, Insulators, Tiles)

(to continue)

Group	Code	ISIC	Products
	29	3819	Fabricated metal products (Locks, Padlocks, Tubes, Nails, Springs, Cocks, Taps, Valves, Bolts, Springs, Angles, Shapes, Fixtures of iron or steel)
Third Priority Group (Degree is over 22)	3	3113	Canning and Preserving of fruits and vegetables
	6	3117	Bakery (Biscuits, Cakes, Pastry)
	7	3118	Sugar
	8	3121	Mayonnaise, Ice making
	13	3215	Cordage, Rope and Twine industries (Packaging ropes)
	15	3233	Leather products
	22	3412	Containers and Boxes of paper and paperboard (Paperboard, Packaging Paper, Cartons, Containers, Boxes)
	25	3512	Fertilizers and Pesticides (Compounded fertilizers, Insecticide, Hydrated lime, Farm chemicals)
	33	3620	Glass and Glass products (Glassware, Tableware, Ashtrays, Handicrafts)
	37	3811	Cutlery, Hand tools and General hardware of metal (Houseware and kitchenware of Aluminum, Knives, Forks, Spoons, Cutting blades, Agricultural implements)
	38	3813	Metal products (Curtain rails, Fixtures of metal)

Source: Study Team.