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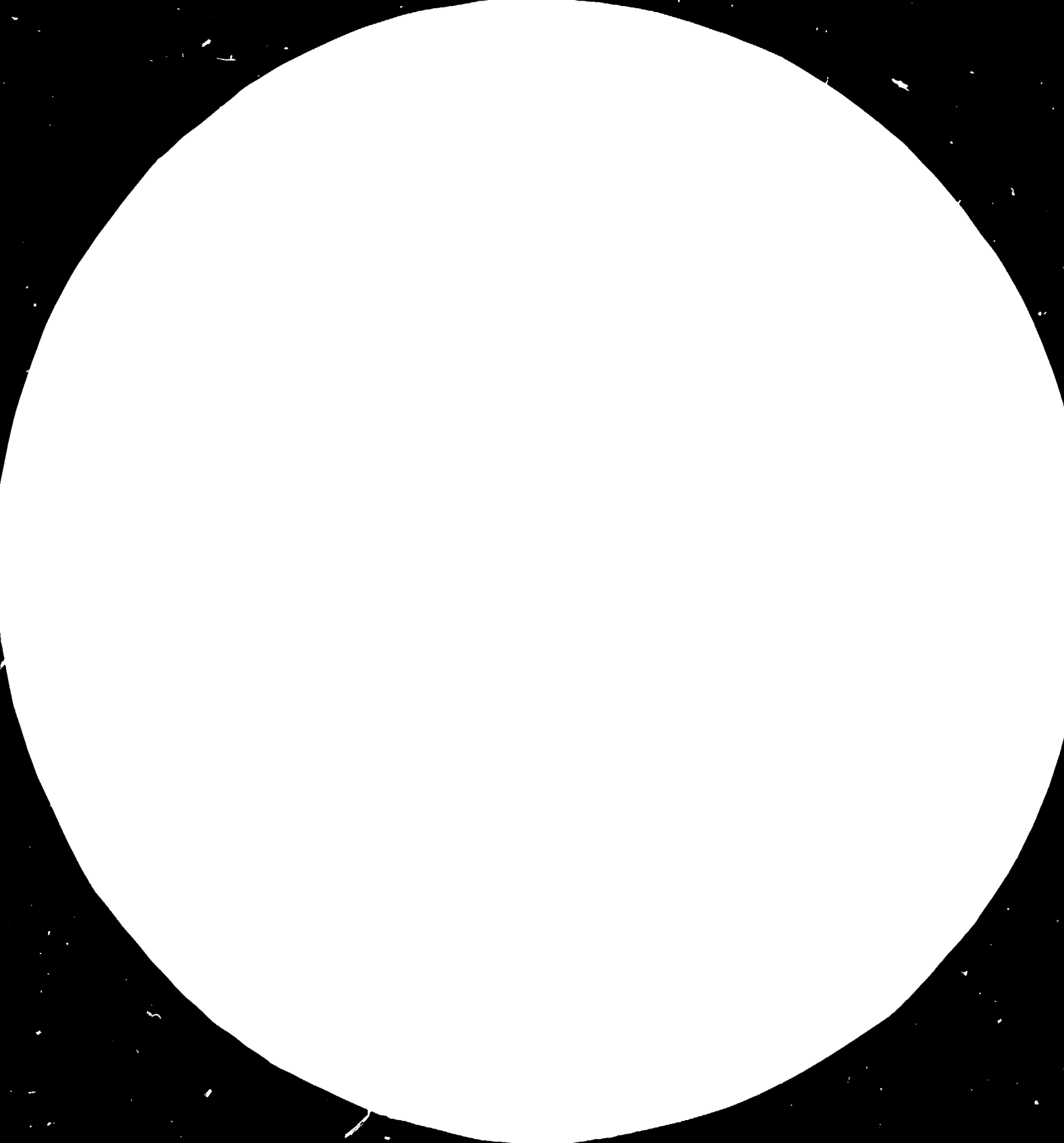
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A resolution test chart pattern consisting of a central vertical bar and two horizontal bars on either side, with a series of horizontal lines extending from the ends of the horizontal bars.

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MICROCOPY RESOLUTION TEST CHART

NATIONAL BUREAU OF STANDARDS-1963-A
U.S. GOVERNMENT PRINTING OFFICE: 1963

13857

1984

Recommendations for Joint Venture Capital
Goods Projects for the Arab Countries

UC/RAB/82/122

I. Introduction:

The Arab countries accounted for approximately ten percent of the world demand for capital goods in 1980, demanding capital goods valued at 44 billion U.S. dollars. Of this total, approximately 95 percent was imported. The advantages of increasing capital goods production in the Arab world are not limited to the substantial savings of foreign exchange, which are very important to those Arab countries without large export earnings from oil. Expanded production of capital goods will increase the technological capabilities of the region, thus reducing technological dependence. In addition, local design will lead to the production of capital goods suitable to the resource endowments and product requirements of the Arab countries. Joint Arab projects for the production of capital goods will lead to increased intra-Arab trade and cooperation, increasing the self-reliance of the Arab region.

2. The Supply-Demand Gaps:

The first step in identifying capital goods for production in the Arab countries is to examine the gap between Arab demand and Arab production for each category of capital goods. Forecasts of these gaps in 1990, based on a previous UNIDO study, are presented in Table 1. The categories are presented in descending order, with the largest supply-demand gap presented first.

The largest supply-demand gaps tend to be for what might be described as heavy equipment. The production of much of this equipment is only moderately complex technically, so that there is no technological reason why substantially more of this type of capital good could not be produced in Arab countries in the immediate future. Capital goods whose production requires more complex technology, such as computer controlled machine tools or gas turbines, should not be neglected in Arab planning; however, the production of these products must await the build-up of the appropriate technological knowledge.

The capital goods listed in Table 1 also differ according to the extent to which Arab production takes place. While for many of these products the amount of local production is small relative to imports, local production is still significant because it provides familiarity with the technology of production which can serve as a basis for dramatically expanded production. There is significant local production, in this sense, for items A-1, 2, 7, 8, 10 and 12; while local production is not significant for items A-3¹, 4, 5, 9 and 11. The lack of significant local production does not preclude Arab production, but does suggest cooperation (licensing or joint ventures) with existing producers.

3. Other Criteria for Project Selection:

The identification of large supply-demand gaps is the first

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1. Algeria will begin production of mobile cranes in 1984.

step in selecting capital goods for production in the Arab countries. The second step is to compare these gaps with the minimum efficient scale of production. For this purpose, the four and five digit SITC categories are too broad, in most cases including products whose production is normally carried out in different facilities. Thus specific products (or product groups which can be manufactured in the same facility) have been identified within each of the major categories listed in Table 1. The forecast supply-demand gaps for these products are compared with the minimum efficient scale of production in the first two columns of Table 2.² The ratio of the forecast supply-demand gap to minimum efficient scale can be taken to represent the approximate number of additional production facilities required to satisfy the total demand of all Arab countries. As can be seen from Table 3, this ratio varies a great deal from one product to another, from a low of 1.0 for Industrial Air Conditioning and Refrigeration Units and Oil-Well Casing to a high of 500 for Bench drills, saws, etc. (simple machine tools). Numbers as low as 1.0 imply a single production facility serving all Arab countries and a commitment from all Arab countries to purchase the Arab product. Values which range from 2.0 to 5.0 imply regional production centers; while values of 9.0 or more suggest that production could be located in each major country on a scale designed primarily to satisfy local

2. The forecast supply-demand gaps and minimum efficient scales of production for specific products are largely based on technical information contained in Volume 5 of the EIU/AIDO report, The Development of the Capital Goods Sector in the Arab Countries.

needs. These latter products could be left to local initiatives; however, there are reasons why joint ventures might be desirable. First, joint ventures might be desirable to stimulate production for products in which unfamiliar markets or technology have hindered the growth of production in Arab countries. For example, the supply-demand gap to MES ratio is very large for simple-machine tools (A-10-1), yet in 1980 the Arab countries supplied less than ten percent of their own needs. For this product, joint ventures may be necessary in order to establish Arab production. Second, the establishment of larger production units may increase bargaining power where licensing of advanced technology is necessary as, for example, in the production of textile machinery.³

Once a comparison of the forecast supply-demand gap and minimum efficient scale of production has been made, other features of production of specific capital goods must be examined. Table 2 provides a broad summary of these features of production, which include technological complexity, potential forward and backward linkages, input requirements and gains from high volume production or specialization.

Technological complexity may rule out the immediate production of some capital goods in Arab countries, for

3. This point has been made by EIU/AIDO.

example; gas turbines (A-14), steam turbines (A-15-1), textile machinery (A-11), oil well casing (B-1-3) and telephone switching equipment (B-3-1). These products should not be ignored by the Arab countries, for to do so would imply acceptance of a continued technological lag. However, in selecting projects for these products, consideration must be given to the additional costs imposed by the need to develop the required technological skills.

Large backward linkages associated with the production of a product may be desirable if there are reasonable possibilities of developing the supporting industries and engineering infrastructure. For example, the production of buses, lorries and trucks (A-1), construction equipment (A-3), fork lift trucks (A-4-1), mineral crushing, grinding and sorting equipment (A-5-1) and agricultural tractors (A-12) all require diesel engines. Since the production of diesel engines (A-8-1) is well within the technological capabilities of Arab countries, the co-ordinated development of the production of these products could feature diesel engine plants which supply engines to several other capital goods industries. Exactly the same argument could be made for backward linkages to casting or to steel production. On the other hand, the production of gas and steam turbines (A-14 and A-15-1) requires alloys which cannot be produced in Arab countries without very substantial upgrading of

technological capabilities. These backward linkages, which imply dependence on imported materials, are a negative aspect of the production of this product.

The particular input requirements may be important factors in determining the location of a project or in choosing among projects. For example, production of products which require large labour input should be located in countries with large populations, while those for which transportation is an important input should be located where there are good links to major ports. Depending upon goals, the amount of employment or value added per unit of investment may be important determinants of the desirability of the production of particular products.

(These figures are presented in Table 3.) For example, if employment creation is a major goal then products with large employment-investment ratios, such as power transformers (A-2-1), construction equipment (A-3), fork lift trucks (A-4-1), diesel engines (A-8-1), industrial air conditioning and refrigeration units (A-9-1), agricultural tractors (A-12) and heavy fabrications (B-1-1), become attractive. If value-added per unit of investment is a desirable feature, then products such as construction equipment (A-3), power transformers (A-2-1) and heavy fabrications (B-1-1) become attractive.

4. Identification of Specific Projects:

The general criteria discussed above must be applied on a product by product basis in order to evaluate projects for the production of specific products. These discussions are presented below.

A-1 Buses, Lorries and Trucks

The forecast supply-demand gap is large relative to minimum efficient scale, suggesting that production could be left to local initiatives. However, the large backward linkages associated with this production as well as the large size of the supply-demand gap imply that it can provide stimulation to infrastructure and be an important source of demand for other capital goods, such as diesel engines. Thus, in countries where local production has not been developed on a sufficient scale, joint ventures may be desirable. Modern production methods are relatively capital intensive and have relatively low labour requirements.

A-2-1 Power Transformers, 0.25 - 6 MVA

There appears to be sufficient demand for four or five regional centers of production. Production may be carried out either by highly automated labour saving methods, or by more labour intensive methods. The former are probably more appropriate to the Gulf region, while the latter may be more appropriate in highly populated countries, such as Egypt, Syria

or Algeria. There are backward linkages to steel and copper metal fabrication which suggest location near sources or potential sources (copper in the Arabian peninsula) of these products. In the Mahgreb, existing facilities may provide the basis for expanded production.

A-3-1 Hydraulic Excavators and Loader Backhoes

They appear to be scope for one or two joint projects. Production is labour intensive, and benefits greatly from specialization. Demand is heavier in the GCC and Fertile Crescent regions suggesting the location of at least one of the projects in this area, perhaps in Iraq. Existing production facilities in Algeria may provide the basis for expanded production in North Africa.

A-3-2 Crawler Dozers and Loaders, Wheeled Loaders

The forecast demand-supply gap suggests that up to seven regional centers may be appropriate, with at least one center in each region. Specialization of these centers in specific products is desirable. Production requires large inputs of semi-skilled labour so that location in populous countries is appropriate. However, the concentration of demand in the Arab East suggests production in countries of this region.

A-3-3 Mobile Cranes

Up to seven regional centers are indicated. The production

which should be located in the Arab East region.

A-4-1 Fork Lift Trucks

The supply-demand gap suggests six to nine production centers. Relatively large centers producing a variety of trucks (alternative a) use more labour and are more appropriate for countries with larger populations, while smaller more specialized and more automated centers (alternative b) are appropriate for less populous areas, such as the GCC. There is no significant local production upon which to base expansion. Backward linkages to electric motors may reinforce similar linkages from pumps.

A-5-1 Mineral Crushing, Grinding and Sorting Equipment

There appears to be scope for nine production centers. The fact that there is no local Arab production indicates that joint projects are needed. The technology of production is relatively simple and benefits of specialization are small. There is a heavy demand on transportation, so that production should be located with good access to ports. There is a concentration of demand in the Arab East, implying that some production units should be located in the Fertile Crescent and the Arabian peninsula.

A-7-1 Low Pressure and Temperature Pumps and Valves

The ratio of the supply-demand gap to minimum efficient scale is thirty one, suggesting that production of these

which should be located in the Arab East region.

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The ratio of the supply-demand gap to minimum efficient scale is thirty one, suggesting that production of these

is sufficient local production in both Egypt and Algeria to serve as the basis for expanded production. At least one plant should be located in the Arab East, specializing in engines for construction equipment and mineral crushing, sorting and grinding equipment.

A-9-1 Industrial Air Conditioning and Refrigeration Units

The supply-demand gap indicates scope for one joint project. Production is only moderately complex and requires large inputs of semi skilled labour, making location in a country with a large population desirable. Good access to ports is also desirable. These factors imply location in Egypt, Iraq, or one of the Mahgreb countries.

A-10-1 Bench Drills, Saws, Bench Grinders, Simple Shearing and Planing Machines

There are low gains from high volume, which, together with a large supply demand gap, lead to scope for five hundred new production units. These could easily be left for local initiatives, however, the small amount of local production of machine tools (six percent of demand in 1980) suggests that joint ventures may be desirable. Technology is relatively simple, but requires a large input of skilled labour. Demands on transportation are low.

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research center could be associated with a University which has established strength in computer and mechanical engineering, perhaps in Saudi Arabia or Egypt. The long-term goal of the research center would be to develop sufficient design capability so that Arab production could begin.

A-11 Spinning Machines, Looms

For these products over forty production units could be justified by the supply demand gap, suggesting that these products be left to local initiatives. However, the fact that there is no Arab production (probably due to the technological complexity of the product) implies that joint ventures are desirable. Again, grouping together a number of small producing units, each specializing in different products, has the advantages of increasing design capability and improving bargaining power in the licensing of advanced technology. These products may be designed with local needs and resource availabilities in mind. The world-wide trend in textile equipment is the introduction of highly automated, labour-saving machinery. However, the major Arab textile producers (Egypt, Morocco, Syria, Algeria and Iraq) all have large populations, suggesting that labour intensive equipment may be appropriate for this industry. Thus, these products should be tailored to the resource endowments of the Arab textile producers. Production of these products is complex with large

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with a center for oil well casing and perhaps in conjunction with a center for machine tools, whose goal would be to develop both design and production capability.

B-1-1 and B-1-2 Heavy Fabrications and Large High Pressure Boilers

The supply-demand gaps suggest the establishment of four to five new joint projects for the production of each of these products. Production requires good access to ports, and may also require large inputs of semi-skilled labour.

B-1-3 Oil Well Casing

One joint project is indicated for this product. Production is technologically complex and also requires large inputs of skilled labour and transportation. Support of a local research center is desirable. The high transportation input suggests production close to (or in) the using countries. Algeria, Iraq and Saudi Arabia are possible locations.

B-3-1 Telephone Switching Equipment

The supply demand gap suggests that one new joint project should be installed by 1990. The product is technically complex and would benefit from an associated research center. There are substantial gains from high volume production and substantial demands on skilled labour. Demands on transportation are low. The production of this product could provide the basis for the development of electronic control production which

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would provide inputs into the production of other capital goods.

5. Conclusion:

Although each capital good may have special characteristics which affects its production, there are general features which are relevant to all capital goods. In the above discussions, consideration has been given to the size of demand relative to minimum efficient scale, to the technological complexity of the product, to potential forward and backward linkages, to gains from high volume or specialization, and to input requirements. These features have been used to help prescribe the desirability and location of specific joint projects. Heavy use has been made of the technical information in the EIU/AIDO study, which has been presented in a way which allows comparison across projects.

Table 1

Forecast Supply-Demand Gaps for Capital Goods
in the Arab Countries, 1990

Product	SITC Code	Supply-Demand Gap, million US \$ at 1980 Prices
<u>A. Four and Five Digit SITC's</u>		
1. Buses, Lorries, Trucks	732.2,3,4	8487
2. Power Transforming Machinery	722.1	3510
3. Construction, Mining Machinery	718.4	3106
4. Mechanical Handling Equipment	719.8	2927
5. Mineral Processing Machinery	718.51	2263
6. Insulated Wire and Cable	723.1	2093
7. Pumps and Centrifuges	719.2	2061
8. Other Internal Combustion Engines	711.5	1457
9. Air Conditioning Machinery	719.2	1242
10. Machine Tools	715.1	865
11. Textile Machinery	717.1	860
12. Tractors	712.5	826
13. Refrigerating Equipment	719.15	796
14. Gas Turbines	711.6	658
15. Steam Engines	711.1,2,3	657
16. Measuring Apparatus	729.5	641
17. Powered Tools, Other	719.5	531
18. Aircraft Engines	711.4	391
19. Industrial Furnaces, Stokers, Ovens	719.13,14	372
20. Batteries and Accumulators	729.1	347
21. Food Processing Machinery	718.3	332
22. Electric Furnaces	729.92	303
23. Agricultural Machinery for Cultivating Soil	712.1,2	285
24. Printing Machinery	718.2	265

Table 1: Continued

Product	SITC Code	Supply-Demand Gap, million US \$ at 1980 Prices
25. Packaging Machinery	719.62	251
26. Spraying, Vending, Other Machinery	719.61,64, 65,66	220
27. Sewing Machinery	717.3	137
28. Pulp and Paper Machinery	718.1	133
29. Ball, Roller Bearings	719.7	119
30. Freight: Railway, Tramway Cars	731.6	110
31. Statistical Machinery	714.3	108
 <u>B. Two and Three Digit SITC's, not represented above</u>		
1. Metal Manufactures	69	6865
2. Ships and Boats	735	4393
3. Telecommunications Apparatus	725	3968
4. Aircraft	734	2563
5. Medical Apparatus	726	140

- Notes: 1. The forecast supply-demand gaps are based on forecasts contained in Arab Demand for Capital Goods in the Short, Medium and Long-Term, UNIDO, August 1983. The "low-trend" forecasts, which are the most conservative, were used.
2. The products are listed in descending order of supply-demand gap.
3. All four and five digit capital goods for which the forecast supply-demand gap exceeds 100 million US \$ are included.

Table 2
Comparisons of Selected Capital Goods Relevant
to the Arab Countries

Product ¹	Arab Supply ² Demand Gap, 1990 (million US\$ at 1980 prices)	Minimum ³ Efficient Scale (million US\$ at 1980 prices)	Technological Complexity of Production	Potential Forward/Backward Linkages (bought-in/sales)	Input Requirements				Gains from High Volume Special- ization			
					Capital (investment/ sales ratio)	Labour (labour/sales ratio) semi-skilled	skilled	Work in Process		Energy	Trans- portation	
<u>A-1 Buses, Lorries and Trucks</u>	8487	500	moderate	Backward to diesel engines tires, electri- cal components (0.85)	3.5	large	9	moderate	large	moderate	low	large
<u>A-2 Power Transform- ing Machinery</u>	3510											
1. Power Transformers, 0.25 - 6 MVA	125	23	moderate/ complex	Backward to steel, copper metal fabrica- tion	0.5	moderate	22	large	moderate	low	moderate	moderate
<u>A-3 Construction, Mining Equipment</u>	3106											
1. Hydraulic Excavators and loader Backhoes	353	190	moderate	large backward	0.25	large	9	moderate	large	moderate	moderate	large
2. Crawler Dozers and Loaders, Wheeled Loaders	1453	200	moderate	large backward (0.5)	0.1	large	8	moderate	large	moderate	moderate	large
3. Mobile Cranes	747	100	moderate	large backward (0.5)	0.4	large	14	moderate	large	moderate	moderate	large

Table 2: Continued

Product ¹	Arab Supply ² Demand Gap, 1990 (million US\$ at 1980 prices)	Minimum ³ Efficient Scale (million US\$ at 1980 prices)	Technological Complexity of Production	Potential Forward/Backward Linkages (bought-in/sales)	Capital (investment/ sales ratio)	Input Requirements			Energy	Trans- portation	Gains from High Volume, Special- ization
						Labour (labour/sales ratio) semi-skilled	Work In Process	skilled			
4. Motor Graders, Scrapers and Off- Highway Dump Trucks	316	70	moderate	large backward (0.5)	0.6	17 large	moderate	large	moderate	moderate	large
5. Portable Com- pressors for Construction	154	50	moderate	Backward to castings, diesel engines	0.75	12 large	moderate	moderate	moderate	moderate	large in casting, otherwise small
<u>A-4 Mechanical Handling Equipment</u>	2927										
1. Fork Lift Trucks ⁴	945	a) 150 b) 100	simple moderate	Backward	a) 0.5 b) 0.45	20 large	moderate	moderate	low	large	large
<u>A-5 Mineral Pro- cessing Machinery</u>	2263					8 large	moderate	moderate	low	large	large
1. Mineral Crushing, Grinding and Sorting Equipment	419	45	simple	Backward to castings, diesel engines, etc.	0.9	22 large	small	large	low	large	small
<u>A-6 Insulated Wire and Cable</u>	2093										
<u>A-7 Pumps and Centrifuges</u>	2061										
1. Low Pressure and Temperature Pumps and Valves 4-19 inch bore	620	20	moderate	backward to motors, actuators (0.4)	3.0	25 small	large	moderate	moderate	moderate	small (except foundry)

Table 2: Continued

Product ¹	Arab Supply ² Demand Gap, 1990 (million US\$ at 1980 prices)	Minimum ³ Efficient Scale (million US\$ at 1980 prices)	Technological Complexity of Production	Potential Forward/Backward Linkages (bought-in/sales)	Input Requirements					Gains from High Volume, Special- ization	
					Capital (investment/ sales ratio)	Labour (labour/sales ratio)		Work in Process	Energy		Trans- portation
						semi-skilled	skilled				
<u>A-8 Other Internal Combustion Engines</u>	1547										
1. High Speed (1200- 4000 rpm) Diesel Engines	400	120	moderate	large forward and backward	0.25	moderate	21 moderate	moderate	moderate	moderate	moderate to large
<u>A-9 Air Conditioning Machinery</u>	1242										
1. Industrial Air Conditioning and Refrigeration Units	200	200	moderate	substantial backward to casting	.6	large	25 moderate	moderate	moderate	moderate	large in casting, otherwise moderate
<u>A-10 Machine Tools</u>	865										
1. Bench drills, saws, bench grinders, simple shearing and planing machines	449	0.9	simple	low, backward	2.2	moderate	55 high	moderate	low	low	low
2. Lathes, milling and boring machines; planing and shaping machines	340	2.9	moderate	high backward (.33)	2.0	moderate	38 high	high	low	low	large
3. Numerically Controlled and Computer Numeri- cally Controlled Lathes	--	--	complex	high backward	--	moderate	-- high	high	low	low	large

Table 2: Continued

Product	Arab Supply ² Demand Gap, 1990 (million US\$ at 1980 prices)	Minimum ³ Efficient Scale (million US\$ at 1980 prices)	Technological Complexity of Production	Potential Forward/Backward Linkages (bought-in/sales)	Input Requirements					Gains from High Volume, Special- ization	
					Capital (investment/ sales ratio)	Labour (labour/sales ratio)	Work in Process	Energy	Trans- portation		
<u>A-11 Textile Machinery</u>											
1. Spinning machines, looms	415	10	complex	backward to casting, infrastructure (.35)	2.3	moderate	30 large	large	small	large	large
2. Dyeing and Finishing Machinery	390	3	complex	backward to casting (.37)	2.3	moderate	43 moderate (welding)	large	small	large	large
<u>A-12 Agricultural Tractors</u>											
A-12 Agricultural Tractors	826	155	moderate	large backward (.45)	.5	large	26 moderate	large	moderate	large	large
<u>A-14 Gas Turbines</u>											
A-14 Gas Turbines	658		very complex	large demands on infrastructure		moderate	large	large	moderate	large	large
<u>A-15 Steam Engines</u>											
1. Steam Turbines	657		complex	large demands on infrastructure		moderate	large	large	moderate	large	large
<u>B-1 Manufactures of Metal</u>											
1. Heavy Fabrications	370.5	79	moderate	backward to steel	.73	moderate	24 moderate	large	moderate	large	moderate
2. Large High Pressure Boilers and Heavy Fabrications ⁵	670.5	144	moderate	backward to steel	1.16	moderate	21 moderate	large	moderate	large	moderate

Table 2: Continued

Product ¹	Arab Supply ² Demand Gap, 1990 (million US\$ at 1980 prices)	Minimum ³ Efficient Scale (million US\$ at 1980 prices)	Technological Complexity of Production	Potential Forward/Backward Linkages (bought-in/sales)	Input Requirements					Gains from High Volume, Special- ization	
					Capital (investment/ sales ratio)	Labour (labour/sales ratio) semi skilled	skilled	Work in Process	Energy		Trans- portation
3. Well Casing	515	500	complex	backward to steel	1.2	moderate	1.5 large	large	moderate	large	large
<u>B-3 Telecommunica- tions Apparatus</u>	3968										
1. Telephone Switching Equipment	273	175	complex	backward to components, parts	.86	moderate	11 large	small	small	small	large

- Notes: (1) Product designations correspond to those in Table 1. Sub-categories refer to specific components or groups of components whose manufacture can be carried out in the same plant.
- (2) For broad product categories these are taken from Table 1. For sub-categories, these figures are based on the AIDO/EIU study, The Development of the Capital Goods Sector in the Arab Countries, Volume 5: Monographs on Potential Joint Projects.
- (3) These numbers refer to one plant. Most of the technical information in this table is based on the AIDO/EIU study.
- (4) Alternative a) refers to a relatively large plant producing a number of possible sizes while alternative b) refers to a specialized, automated plant producing 2-3 ton lift trucks.
- (5) The data refers to a combined heavy fabrication and boiler plant with a boiler output of \$86 million (1980 prices).

Table 3

Characteristics of Production
of Selected Capital Goods

Product	Ratio of Supply-Demand Gap to Minimum Efficient Scale	Ratio of Employment (Man-years) to Investment (millions of US dollars at 1980 prices)	Ratio of Annual Value-Added to Invest- ment
<u>A-1.</u> Buses, Lorries and Trucks	17.0	2.6	--
<u>A-2-1.</u> Power Transformers 0.25-6 MVA	5.4	44	1.9
<u>A-3-1.</u> Hydraulic Excavations and Loader Backhoes	1.9	36	2.0
<u>A-3-2.</u> Crawler Dozers and Loaders, Wheeled Loaders	7.3	40	2.5
<u>A-3-3.</u> Mobil Cranes	7.3	35	1.1
<u>A-3-4.</u> Motor Graders, Scrapers and Off-Highway Dump Trucks	4.5	28	0.8
<u>A-3-5.</u> Portable Compressors for Construction	3.1	16	0.6
<u>A-4-1.</u> Fork Lift a) Trucks b)	6.3 9.4	40 18	1.0 --
<u>A-5-1.</u> Mineral Crushing, Grinding and Sorting Equipment	9.3	24	0.5

Table 3: Continued

Product

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- A-6. Insulated Wire and Cable
 - A-7-1. Low Pressure and Temperature Pumps and Valves
 - A-8-1. High Speed (1200-4000 rpm) Diesel Engines
 - A-9-1. Industrial Air Conditioning and Refrigeration Units
 - A-10-1. Bench drills, saws, bench grinders, simple shearing and planing machines
 - A-10-2. Lathes, milling and boring machines, planing and shaping machines
 - A-11-1. Spinning machines, looms
 - A-11-2. Dyeing and Finishing Machinery
 - A-12. Agricultural Tractors
 - B-1-1. Heavy Fabrications
 - B-1-2. Large High Pressure Boilers and Heavy Fabrications

Ratio of
Supply-Demand
Gap to Minimum
Efficient Scale

Ratio of
Employment
(Man-years) to
Investment
(millions of US
dollars at 1980
prices)

Ratio of
Annual
Value-Added
to Invest-
ment

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31	8.3	0.2
3.3	84	1.0
1.0	42	0.6
499	25	0.3
117	19	0.3
41.5	9	--
130	19	--
5.3	50	0.9
4.7	33	1.3
4.7	18	0.7

Table 3: Continued

Product	Ratio of Supply-Demand Gap to Minimum Efficient Scale	Ratio of Employment (Man-years) to Investment (millions of US dollars at 1980 prices)	Ratio of Annual Value-Added to Invest- ment
<u>B-1-3.</u> Oil Well Casing	1.0	1.3	0.5
<u>B-3-1.</u> Telephone Switching Equipment	1.6	13	0.7

Notes: Numbers in the first two columns are based on Volume 5 of the EIU/AIDO study, while the value-added/investment ratios are taken from the project summaries in the AIDO recommendations.

