

## CHAPTER 4

# Technology Trade With the Middle East

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# Technology Trade With the Middle East

## INTRODUCTION: EXPLOSIVE GROWTH OF TRADE AFTER 1973

In recent years, exports to the Middle East have become a significant fraction of the total exports of the major industrial countries. For instance, U.S. 1982 exports of all kinds to the Middle East (\$17.5 billion) were 8 percent of the total U.S. exports in 1982 (table 12). The other major non-Communist industrial countries also exported comparable or greater percentages to the region.

Industrial-country exports to the Middle East reached this high level after a decade of phenomenal growth. Total Middle Eastern real expenditure on imports, most of which came from the industrial countries, increased at an average annual rate of 15.3 percent in 1973-82, compared to 5.4 percent for world trade as a whole. After oil prices escalated following the 1973 oil crisis, the value of industrial-country imports from the Middle East increased rapidly, and most industrial countries experienced large bilateral balance-of-payments deficits with the region. A jump in balance-of-payments deficits occurred again in 1979, when oil prices rose substantially in real

terms and the value of industrial-country imports from the Middle East increased substantially.

Technology trade with the Middle East has also grown rapidly within this dynamic overall trade context. Real expenditure on U.S. exports of production machinery and equipment to the Middle East grew rapidly, at an average rate of 18 percent per annum over the period 1970-82.<sup>2</sup> The export experience of other industrial countries in this category was similar, except for Japan's, whose trade expanded even more rapidly, and France's, whose trade grew more slowly. Contracts for large projects, another technology trade indicator, also expanded rapidly from a small base after 1978.

On the recipient side, Middle Eastern countries are a diverse group, demographically, economically, and politically. This diversity is also reflected in their trade growth. The real value of total exports from Middle Eastern countries grew at very different rates for the countries in OIA's Middle Eastern sample.

<sup>1</sup> Calculated from International Monetary Fund, *Direction of Trade Statistics Yearbook*, 1979, 1983. Deflated using U.S. gross national product (deflator).

<sup>2</sup> Production machinery and equipment (including transportation machinery and equipment) as it appears in OECD trade data in the United Nations trade data categorization SITC (Revision 1) categories 71-72.

**Table 12.—The Importance of Exports to the Middle East for the Major Industrial Countries**

Country	Exports to Middle East as percent of country exports,	Exports to Middle East as percent of country exports,	Machinery and equipment exports as percent of exports to Middle East
	1970	1982	1982
United States	2%	8%	67%
Japan	3	12	59
West Germany	2	8	68
France	6	10	52
United Kingdom	4	9	51
Italy	4	15	56

SOURCE: International Monetary Fund, *Direction of Trade Statistics Yearbook*, 1975 and 1983 volumes.

primarily because they exported varying amounts of petroleum. As seen in table 13, the average annual growth rates of the real value of total exports of the six countries examined most closely by OTA ranged from 3 percent in the case of Kuwait to 17 percent in the case of Saudi Arabia over the period 1973-82.

Total imports of the Middle Eastern countries also grew at diverse rates (table 13), because the countries that exported large quantities of petroleum had large positive trade balances, while the countries exporting smaller amounts of oil were constrained by small sur-

pluses or negative balances. During 1983 and 1984 changes in the petroleum market-price and quantity shortfalls from earlier levels—resulted in reduced export revenues. Together with continuing high imports, the result has been severely diminished trade surpluses and increased trade deficits. (Table 13 gives imports as a fraction of exports for 1979 and 1982 for six countries.) This chapter analyzes technology trade with the Middle East over the last decade and evaluates factors affecting the export shares of the major technology suppliers.

Table 13.—Trade With the Middle East—Data for Six Importing Countries

Country	Average growth of real exports, 1973-82 <sup>a</sup> (percent per annum)	Average growth of real imports, 1973-82 <sup>a</sup> (percent per annum)	Imports as percent of exports	
			1979	1982
Saudi Arabia. . . . .	17%	2.5 %	4.1 %	4.3 %
Egypt . . . . .	8	17	198	239
Algeria. . . . .	14	9	75	71
Iraq . . . . .	12	27	40	159
Iran . . . . .	3	3	38	59
Kuwait . . . . .	3	17	28	84

<sup>a</sup>Export or import values adjusted for changes in the general purchasing power of the dollar using the U.S.G.N.P. deflator

SOURCE International Monetary Fund, *Direction of Trade Statistics Yearbook 1979 and 1983 volumes world table*, pt A.

## TECHNOLOGY TRADE WITH THE MIDDLE EAST IN GLOBAL CONTEXT

Exports from industrial countries to all developing countries considered together are very large business. West European countries send about one-third of their total exports, and also of their manufactured goods exports, to less developed countries (LDCs).<sup>3</sup> The United States and Japan export even higher percentages of exports to LDCs—somewhat less than half of both total and manufactured exports for the United States and somewhat more than half of both categories for Japan (see table 14).

<sup>3</sup>OTA categorizes the Middle East high-income oil exporters (Libya, Kuwait, Saudi Arabia, and UAE) as LDCs for purposes of this calculation. Source of the data cited in this paragraph is the World Bank, *World Development Report 1983* (New York: Oxford University Press, 1983), tables 12 and 13.

There is a contrast between the United States and Japan, on one hand, and the West European countries, on the other, in exports of machinery and equipment, a trade category which gives a closer indication of technology transfer. While the United States and Japan had the highest supplier shares in 1982, they sent only 20 and 27 percent, respectively, of their production machinery exports to LDCs to the Middle East. The West European countries, with lower market shares, sent 35 to 47 percent to the Middle East (see table 15).

To put the Middle East in world context, for industrial countries, individual Middle Eastern countries are in some cases export markets as large as all but their largest industrial coun-

**Table 14.—Industrial-Country Exports to the Middle East in World Context**

Country	Total exports to LDCs <sup>a</sup> as percent of country's exports 1981 <sup>b</sup>	Total exports to Middle East as percent of exports to all LDCs 1982	Manufactured exports to LDCs as percent of total manufacturing exports, 1980 <sup>b</sup>	Manufactured exports to Middle East as percent of those to all LDCs, 1982
United States	43%	16%	45%	19%
Japan	51	25	51	26
West Germany	24	43	22	44
France	30	33	28	33
United Kingdom	30	31	33	32
Italy	36	53	30	52
Industrial market economies	32	28 <sup>d</sup>	31	30 <sup>d</sup>

<sup>a</sup>Less developed countries (LDCs) are defined here to include the high income oil producers of the Middle East: Saudi Arabia, Kuwait, Libya, and the United Arab Emirates  
<sup>b</sup>calculated from percentages in *World Development Report* 1983, there may be some inaccuracy due to rounding

<sup>c</sup>Fourteen West European countries plus the United States, Canada, Japan, Australia and New Zealand  
<sup>d</sup>United States, Japan, West Germany, France, United Kingdom, and Italy, only.

SOURCES World Bank World Development Report 1983 tables 12 and 13 Organization for Economic Cooperation and Development, Trade Series C, obtained from Data Resources Inc. data bank

**Table 15.—Production Machinery Exports to the Middle East in World Context, 1982<sup>a</sup>**

Country	Country's market share of production machinery exports to the Middle East <sup>b</sup>	Production machinery exports to Middle East as percent of country's total production machinery exports to LDCs
United States	24%	20%
Japan	23	27
West Germany	19	41
France	12	38
United Kingdom	13	35
Italy	10	47

<sup>a</sup>SITC (Revision 1) Categories 71-72 Nontransportation machinery and equipment (includes electrical-mechanical consumer durables)

<sup>b</sup>Data for 15 Countries Saudi Arabia, Algeria Egypt Iran Iraq Kuwait Libya, United Arab Emirates, Syria, Lebanon, Jordan Qatar, Oman, North Yemen, and South Yemen

SOURCE Organization for Economic Cooperation and Development Trade Series C, obtained from Data Resources Inc., data bank.

try trading partners. For instance, Saudi Arabia was the sixth largest customer of the United States in 1982, larger than France. Iran was in a strong bilateral position with the United States in 1978; at that time it was the tenth largest export market for the United States. As other examples, Algeria was the ninth largest customer for France in 1982, and

Libya was the eighth largest buyer for Italy in the same year.

These data indicate clearly that the Middle East is important in world trade in general, and particularly for imports of machinery and equipment.

## INDICATORS OF TECHNOLOGY TRADE WITH THE MIDDLE EAST

This section analyzes a number of indicators of technology trade with the Middle East: machinery and equipment imports, large contracts, and direct investment in the Middle East.

### ANALYSIS OF MACHINERY AND EQUIPMENT IMPORTS

#### Middle East Imports of Machinery and Equipment

The size and prominence of machinery and equipment imports into the Middle East is striking. As table 16 shows, in recent years more than half of the Middle East imports from the major industrial countries have consisted of machinery and equipment. In this limited sense, trade with the Middle East can be thought of as the exchange of "oil for technology."

In 1982, imports of machinery and equipment into 15 Middle East countries<sup>4</sup> and from the six major industrial countries were valued at more than \$42 billion. These imports from

six industrial countries constituted 57 percent of total imports for the 15 Middle Eastern countries, according to official trade statistics.<sup>5</sup> The predominance of machinery and equipment imports was also apparent for the individual countries. In 1982, the percentage of machinery and equipment imports varied from 51 percent for Iran to 67 percent for Iraq (see table 17).

These machinery and equipment import percentages were much higher than those of other large groups of countries—e.g., middle-income LDCs (31 percent) or even industrial countries (22 percent).<sup>6</sup> The Middle East has thus imported machinery and equipment at a rate unmatched by other developing countries during the past decade.

<sup>4</sup>The 15 countries are listed in the footnote below table 16.

<sup>5</sup>Saudi Arabia, Egypt, Iraq, Iran, Algeria, and Kuwait also had a similarly high percentage of machinery and equipment imports (table 16).

<sup>6</sup>The World Bank, *World Development Report, 1983*, table 11. These percentages apply to 1980.

**Table 16.—Imports Into Middle Eastern Countries From Major Industrial Countries, 1982<sup>a</sup>**

Import category	Total 6 countries:		Total 15 countries <sup>b</sup>	
	Millions of dollars	Percent	Millions of dollars	Percent
<i>Machinery and equipment</i>	\$32,663	57.7%	\$42,070	57.0%
Nonelectric	11,262	199	13,945	189
E l e c t r i c	8,021	142	10,394	141
Telecommunication	1,724	30	2,358	32
Electrical medical	118	02	144	02
Other electric	6,179	109	7,892	107
T r a n s p o r t	11,235	198	14,523	19.7
R o a d v e h i c l e s	8,577	15.2	10,819	147
A i r c r a f t	1,351	2.4	1,810	25
O t h e r t r a n s p o r t	1,307	23	1,895	2.6
<b>Other imports</b>	<b>23,939</b>	<b>42.3</b>	<b>31,746</b>	<b>43.0</b>
Food, beverage and tobacco . .	4,036	7.1	5,204	70
Material, chemical, miscellaneous . .	5,849	10.3	8,424	11.4
O t h e r m a n u f a c t u r e s . .	14,055	24.8	18,119	24.5
<b>Total imports</b>	<b>\$56,603</b>	<b>100.0%</b>	<b>\$73,816</b>	<b>100.00%</b>

<sup>a</sup>Data are for the six major industrial countries: United States, Japan, United Kingdom, France, West Germany, and Italy only.

<sup>b</sup>Saudi Arabia, Iran, Algeria, Egypt, Iraq, and Kuwait.

<sup>c</sup>The above six countries plus Libya, United Arab Emirates, Syria, Lebanon, Jordan, Qatar, Oman, North Yemen, and South Yemen.

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United States ...	43%	16%	4.5%	<b>19%</b>
Japan . . . . .	51	25	51	26
West Germany . . . . .	24	43	22	44
France . . . . .	30	33	28	33
United Kingdom . . . . .	30	31	33	32
Italy . . . . .	36	53	30	52
Industrial market economies . .	32	2.8 <sup>d</sup>	31	30 <sup>d</sup>

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United States. . . . .	240/0	20.0/0
Japan . . . . .	23	27
West Germany. . . . .	19	41
France . . . . .	12	38
United Kingdom . . . . .	13	35
Italy . . . . .	10	47

a SITC (Revision 1) Categories 71.72 Nontransportation machinery and equipment (includes electrical-mechanical consumer durables).

b Data for 15 countries: Saudi Arabia, Algeria, Egypt, Iran, Iraq, Kuwait, Libya, United Arab Emirates, Syria, Lebanon, Jordan, Qatar, Oman, North Yemen, and South Yemen

SOURCE Organization for Economic Cooperation and Development, Trade Series C, obtained from Data Resources, Inc., data bank

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	Millions of dollars	Percent	Millions of dollars	Percent
<b>Machinery and equipment</b>	<b>\$32,663</b>	<b>57.7%</b>	\$42,070	57.0%
Nonelectric .....	11,262	19.9	13,945	18.9
Electric .....	8,021	14.2	10,394	14.1
T e l e c o m m u n i c a t i o n	1,724	3.0	2,358	3.2
Electrical medical .....	118	0.2	144	0.2
Other electric .....	6,179	10.9	7,892	10.7
Transport .....	11,235	19.8	14,523	19.7
Road vehicles .....	8,577	15.2	10,819	14.7
Aircraft .....	1,351	2.4	1,810	2.5
Other transport .....	1,307	2.3	1,895	2.6
<b>Other imports</b>	<b>23,939</b>	<b>42.3</b>	31,746	43.0
Food, beverage and tobacco .....	4,036	7.1	5,204	7.0
Material, chemical, miscellaneous .....	5,849	10.3	8,424	11.4
Other manufactures .....	14,055	24.8	18,119	24.5
<b>Total imports</b>	<b>\$56,603</b>	<b>100.0%</b>	\$73,816	100.0%

<sup>a</sup> Data are for the six major industrial countries: United States, Japan, United Kingdom, France, West Germany, and Italy only.

<sup>b</sup> Saudi Arabia, Iran, Algeria, Egypt, Iraq, and Kuwait.

<sup>c</sup> The above six countries plus Libya, United Arab Emirates, Syria, Lebanon, Jordan, Qatar, Oman, North Yemen and South Yemen.

SOURCE: Organization for Economic Cooperation and Development, Trade Series C, Data Resources, Inc., data bank.

**Table 19.— Middle East Telecommunications Imports From Industrial Countries, Selected Years**

Country or country group	Telecommunications imports 1978 <sup>a</sup>	Percent "Infrastructure" <sup>b</sup>	Telecommunications-Imports, 1980 <sup>c</sup>	Percent "Infrastructure" <sup>b</sup>	Telecommunications Imports 1982 <sup>d</sup>
	(millions)	(2)	(millions)	(4)	(millions)
	(1)		(3)		(5)
Saudi Arabia	\$ 786	56.60/0	\$1,164	63.70/0	\$ 658
Egypt	195	718	258	698	268
Iraq	207	797	357	71.4	526
Iran	360	81.4	120	625	52
Algeria	125	808	138	725	86
Kuwait	150	447	294	306	134
<b>Total 6 countries</b>	<b>\$1,823</b>	<b>66.5%</b>	<b>\$2,331</b>	<b>61.8%</b>	<b>\$1,724</b>
<b>Total 15 countries</b>	<b>\$2,417</b>	<b>68.2%</b>	<b>\$3,362</b>	<b>59.3%</b>	<b>\$2,358</b>
As percentage of total imports	2.9%	2.0%	4.0%	2.4%	3.2%
As percentage of machinery and equipment	7.4%	5.1%	10.3%	6.1%	5.6%

<sup>a</sup>SITC Revision 1 #724 Telecommunications Apparatus

<sup>b</sup>Telephone switching and line equipment and television broadcast equipment, which might be called Infrastructure, are included in SITC Revision 1# 7249 and SITC Revision 2 #726 and it is these subcategories that are used to calculate the percentages in cols 2 and 4. While these categories do exclude television and radio receivers (and also gramophones for #726) they include all other telecommunications equipment and parts and hence only roughly measure the infrastructure component

<sup>c</sup>SITC, Revision 2.#76 Telecommunications and Sound Recording and Reproducing Apparatus and Equipment

<sup>d</sup>SITC, Revision #724, 1982 data for six major industrial countries only

**Table 20.—Middle East Aircraft Imports From Industrial Countries, Selected Years (millions of dollars)**

Country or country group	Aircraft Imports, 1978a	Aircraft and parts imports, 1978b	Aircraft and parts imports, 1982C
Saudi Arabia . . . . .	\$ 267	\$120	\$ 620
Egypt . . . . .	26	21	218
Iraq . . . . .	0	14	229
Iran . . . . .	182	90	103
Algeria . . . . .	3	7	50
Kuwait . . . . .	170	21	131
<b>Total 6 countries . . . . .</b>	<b>\$ 648</b>	<b>\$278</b>	<b>\$1,351</b>
<b>Total 15 countries . . . . .</b>	<b>\$1,016</b>	<b>\$559</b>	<b>\$1,810</b>
As percentage of total imports	1.5%	0.8%	2.5%
As percentage of machinery and equipment . . . . .	3.1%	1.7%	4.3%

<sup>a</sup>SITC Revision 1 #734 less #7349 — Aircraft and parts less parts

<sup>b</sup>SITC Revision 1 #7349 — parts of aircraft airships and balloons (not including rubber tires, engines, or electrical parts) and airships and balloons

<sup>c</sup>SITC Revision 1 #734 — Aircraft and parts 1982 data for six major industrial countries only

SOURCES 1978: United Nations Trade With Industrial Countries, supplement to the *World Trade Annual*, 1982: Organization for Economic Cooperation and Development, Trade Series C, Data Resources, Inc., data bank

data has been extensive enough to allow OTA to separate the projects into the expenditure categories of technical services, equipment supply, and construction.<sup>12</sup> Table 22 includes contract values for the period 1980-82.

"Difficulties in analyzing contract data were discussed in ch. 2 at greater length. They include incompleteness (with large projects disproportionately represented), double counting of contracts and subcontracts, the fact that awards are subject to substantial changes in both project design and amount, and the paucity of data on certain projects.

A great number of contract awards have been made in recent years. In 1980-82, total contracts awarded (and recorded) were valued at \$40 billion to \$75 billion per year. These contracts were highly concentrated in a few countries. In 1981, Saudi Arabia and Iraq awarded the greatest shares of the contracts.

The concentration of contract awards in various countries has shifted strikingly in recent years, owing to political events and to events

**Table 21.—Middle East Medical Equipment Imports From Industrial Countries, Selected Years (millions of dollars)**

Country or country group	1978		1980		1982	
	Electrical medical equipment	Professional and scientific instruments	Electrical medical equipment	Professional and scientific instruments <sup>d</sup>	Electrical medical equipment <sup>e</sup>	Professional and scientific instruments <sup>e</sup>
Saudi Arabia . . . . .	\$28	\$ 445	\$27	\$ 322	\$ 45	\$301
Egypt . . . . .	8	70	10	105	9	78
Iraq . . . . .	7	90	18	153	16	132
Iran . . . . .	22	256	7	84	9	55
Algeria . . . . .	7	79	8	110	31	88
Kuwait . . . . .	5	117	7	50	7	43
<b>Total 6 countries . . . . .</b>	<b>\$77</b>	<b>\$1,058</b>	<b>\$76</b>	<b>\$824</b>	<b>\$118</b>	<b>\$698</b>
<b>Total 15 countries . . . . .</b>	<b>\$99</b>	<b>NA</b>	<b>\$99</b>	<b>\$1,126</b>	<b>\$144</b>	<b>\$895</b>
As percentage of total imports . . . . .	0.1%	1.3 % <sup>g</sup>	0.1 % <sup>g</sup>	1.3 %	0.2%	1.2 %
As percentage of machinery and equipment imports	<b>0.30/0</b>	<b>2.8%<sup>f</sup></b>	<b>0.3%</b>	<b>3.0%</b>	<b>0.3%</b>	<b>2.1%</b>

a SITC Revision 1 #726— Electrical apparatus for medical purposes and radiological apparatus.

b SITC Revision 1 #86— professional, scientific, and controlling instruments: photographic and optical goods, watches and clocks

c SITC Revision 2 #774— Electrical apparatus for medical purposes and radiological apparatus.

d SITC Revision 2 #87— Professional, scientific, and controlling instruments and apparatus, n.e.s.

e 1982 data for six major Industrial countries only

f calculated on data for six Middle East Countries

NA—not available

SOURCES<sup>g</sup> 1978: United Nations, "Trade With Industrial Countries," supplement to the *World Trade Annual, 1980*; Organization for Economic Cooperation and Development, *Statistics on Foreign Trade, 1982*; Organization for Economic Cooperation and Development, Trade Series C, Data Resources, Inc., data bank

**Table 22.—Contract Awards by 15 Middle East Countries, 1980-82**

Country or country group	Total contract awards 1980 <sup>a</sup> (millions)	Percent of 15-country total <sup>a</sup>	Total contract awards, 1981 <sup>a</sup> (millions)	Percent of 15-country total	Total contract awards, 1982 (millions)	Percent of 15-country total
Saudi Arabia . . . . .	\$15,697	37.1%	\$21,847	28.5%	\$27,107	60.3%
Egypt . . . . .	1,709	4.0	4,248	5.5	1,382	3.1
Iraq . . . . .	12,647	29.9	23,018	30.0	3,832	8.5
Iran . . . . .	70	0.2	899	1.2	928	2.1
Algeria . . . . .	1,083	2.6	1,375	1.8	2,704	6.0
Kuwait . . . . .	3,522	8.3	3,564	4.6	2,814	6.3
<b>Total 6 countries . . . . .</b>	<b>\$34,728</b>	<b>82.1 %<sup>g</sup></b>	<b>\$54,951</b>	<b>71.6 %<sup>g</sup></b>	<b>\$38,767</b>	<b>86.3 %<sup>g</sup></b>
<b>Total 15 countries . . . . .</b>	<b>\$42,304</b>	<b>100.0 %<sup>g</sup></b>	<b>\$76,789</b>	<b>100.0 %<sup>g</sup></b>	<b>\$44,939</b>	<b>100.0 %<sup>g</sup></b>

a Total contract awards refers to the annual contract amounts compiled in *Middle East Contracts Data and Analysis*, MEED Consultants, London, semiannually. This is an incomplete total both because smaller contracts escape notice and because information on value is sometimes not available. There is an unknown amount of double counting of contracts and their subcontracts.

b Saudi Arabia, Iran, Algeria, Egypt, Iran, Kuwait, Libya, United Arab Emirates, Syria, Jordan, Qatar, Oman, Lebanon, Yemen, and South Yemen are not included for 1980.

These three countries awarded contracts in the MEED compilation of only \$780 million in 1981.

NOTE: Total contract awards for 1983 amounted to \$33,984 million for the six countries under review. Saudi Arabian contracts reported were valued at \$14,980 million.

SOURCE: MEED Consultants, *Middle East Contracts Data and Analysis*, various issues.

in the international oil economy. In certain past years Iran (in 1978) and Libya (in 1980) have both been large contract purchasers, but neither were large contract purchasers in 1981. In another example, Iraq was the largest contractor in the Middle East in 1981. In 1982 and 1983, however, Iraq scaled back its civilian contracting effort, primarily because of the war-related diminution of its oil revenues. Its payments on existing contracts were also cut

back, leaving in jeopardy the completion of many projects contracted for earlier.<sup>13</sup>

Countries such as Saudi Arabia and Egypt have experienced large unexpected changes in their financial positions owing to the recent changes in the price of oil, and these changes have affected their willingness to undertake

<sup>13</sup> "See, for instance, "West Germans in the Iraq Quagmire," *Financial Times*, Oct. 17, 1983, p. 14.

contracting on the same scale as previously. Saudi Arabian international contracts continued to expand in 1982, with total contracts of \$27 billion, but in 1983 only about \$15 billion in contracts were awarded.<sup>14</sup>

The annual amount of large construction and equipment contracts has varied greatly. Contracts like the \$1.8 billion Siemens Group contract to install the new Cairo telephone system or the \$3 billion Fluor Corp. contract to build a petrochemical complex at Jubail, Saudi Arabia, are not likely to be duplicated in these same countries. Since each such large contract is a significant fraction of a country's contracting in a given year, annual totals are quite variable.

With many of the large infrastructure contracts completed, service and maintenance has emerged as an increasingly important area of contracting. This is a natural follow-on to technology transfer in the original projects.<sup>15</sup> In general, as the structure of Middle Eastern economies changes the emphasis will shift toward management, financial, and technical services contracting.

OTA analyzed of contract awards in the Middle East for four of the technology sectors. Where information is available, the total contract amounts are broken down by technical services, equipment supply, and construction. Table 23 summarizes this information by technology sector.

Contracts with Saudi Arabia dominated the tabulation in all four sectors; three-fourths of all the contracts tallied were with Saudi Arabia. Iraq came in a distant second, with significant participation in three of the four sectors. Although Iraq was a significant contractor overall in 1980 and 1981, it did not invest in

these sectors to nearly the extent that Saudi Arabia did. Iraq's civilian contracting program decreased markedly in 1982 owing to the Iran-Iraq War.

No contracts were reported for the construction of nuclear powerplants during the 1978-82 period. In fact, contracts for two 900-megawatt (MW) plants, which were to have been built in Iran by Framatome of France, were canceled in 1979, and a letter of intent given by Egypt to Westinghouse Electric of the United States was canceled in 1981. Nevertheless, as analyzed in chapter 9, a number of Middle Eastern countries are considering commercial nuclear power development. For instance, Egypt has accepted bids on a \$2 billion nuclear power project. "

Saudi Arabia also was the only country extensively purchasing technical services in identifiable contracts. As noted in chapter 2, the technology transfer "package" normally includes technical and management assistance when the transfer is to developing countries with limited technical capabilities. Thus, the absence of identifiable technical services contracts does not mean that technical assistance was not provided, but rather that it may have been included in other contracts.<sup>17</sup>

#### ANALYSIS OF DATA ON DIRECT INVESTMENT

Direct investment from the industrial countries has not as yet been a major mechanism of technology transfer to the Middle East, except in petroleum extraction and refining. The U.S. direct investment position in the Middle East (excluding Israel and including Turkey) was only \$3.3 billion in 1981 (\$2.2 billion in

<sup>14</sup> see, Edmund O'Sullivan, "Saudi-Arabia-The Construction Bubble Bursts," *Middle East Economic Digest*, June 17-23, 1983, pp. 8-12; \*'Proof That the Bubble Has Burst,' *Middle East Economic Digest*, April 1983, special report.

<sup>15</sup> see "Service and Maintenance-The Way to Go in the Kingdom," *Middle East Executive Reports*, October 1983, p. 18; "Cleaning Up the City Streets," *The Middle East*, October 1983.

<sup>16</sup> *Financial Times*, Sept. 1, 1983, p. 1.

<sup>17</sup> The large Fluor contract to build the Jubail petrochemical complex is an example of both points. Although the technical services aspects of the contract were identified in press coverage of the contract, no amount was given; thus, in this case, it was not possible to ascertain the value of the technical services component. Much of the technical services (as an identifiable part of a turnkey project or separately) were to be provided in this project by multinational joint venture partners.

Table 23.—Contract Awards by Technology Sectors, 1978-82\*

Technology sector	Millions of dollars				Percent
	Technical services	Equipment supply	Construction	Total	
<b>Telecommunications</b>	\$1,412	\$9,339	\$479	\$11,230	100.0%
Saudi Arabia	1,362	5,881	293	7,536	67.1
Egypt	21	2,442	4	2,467	22.0
Iraq	15	828	149	992	8.8
Iran	—	111	—	111	1.0
Algeria	1	4	26	31	0.3
Kuwait	13	73	7	93	0.8
<b>Commercial airline support systems</b>	963	488	3,992	5,443	100.0%
Saudi Arabia	953	338	2,348	3,639	66.9
Egypt	7	135	122	264	4.9
Iraq	3	11	1,486	1,500	27.6
Algeria	—	1	—	1	0.0
Kuwait	—	3	36	39	0.7
<b>Medical services</b>	1,926	69	4,283	6,278	100.0%
Saudi Arabia	1,925	31	2,950	4,906	78.1
Egypt	—	3	47	50	0.8
Iraq	—	16	1,264	1,280	20.4
Algeria	—	1	—	1	0.0
Kuwait	1	18	22	41	0.7
<b>Petrochemical/facilities</b>	54	884	4,804	5,742	100.0%
Saudi Arabia	—	751	4,497	5,248	91.4
Egypt	—	—	168	168	2.9
Iraq	—	2	—	2	0.0
Algeria	54	—	—	54	0.9
Kuwait	—	131	139	270	4.7
<b>Four sectors (total)</b>	4,355	10,780	13,558	28,693	100.0%
Saudi Arabia	4,240	7,001	10,088	21,329	74.3
Egypt	28	2,580	341	2,949	10.3
Iraq	18	857	2,899	3,774	13.2
Iran	—	111	—	111	0.4
Algeria	55	6	26	87	0.3
Kuwait	14	225	204	443	1.5

\*Incomplete coverage especially for 1978-79 and 1982. See notes to table 30.  
SOURCE: OTA compilation.

the petroleum sector) out of a world total of \$227 billion (see table 24).

Other industrial countries have limited direct investments in the Middle East, with the United Kingdom being the principal source besides the United States. Data on their direct investments are often inadequate to determine their positions in individual countries.<sup>18</sup> While U.S. data on direct investment are better,

<sup>18</sup>In 1978, the United Kingdom had direct investments of \$2.8 billion in "oil-exporting countries" out of a world total of \$50.7 billion, and in 1977 West Germany had direct investments of \$1.0 billion in OPEC out of a world total of \$22.8 billion. Year-end stock figures were not available for France, Japan, and Italy but investment flows to the Middle East were relatively small. *OECD, International Investment and Multinational Enterprise, Recent Trends in International Direct Investment* Paris, 1981.

country coverage is restricted and data are suppressed in various categories.<sup>19</sup>

Nevertheless, U.S. direct investment data do allow conclusions to be drawn concerning the role of direct investment in technology transfer to the Middle East. First, U.S. non-petroleum direct investment in the Middle East is small compared to that in developing

<sup>19</sup>The suppression is designed to avoid revealing confidential data about individual companies. The data are subject to surprising instability from year to year, and accounting reevaluations can affect changes in positions. For example, considering countries in the non-African part of the Middle East and not including Israel, the investment position of U.S. companies in OPEC countries plummeted by \$655 million in 1981, while increasing almost tenfold in non-OPEC Middle East countries.

Table 24.—U.S. Direct Investment Position Abroad, Year-end 1981 (millions of dollars)

Country or region	Petroleum	Chemicals and allied products	Other manufacturing	Trade, banking, finance	Other industries	Total
Middle East (not including Israel)						
Egypt	934	8 <sup>a</sup>	12	91	38	1,083
Libya	473	0	16	0	12	501
Other Saharan						
Africa	139	<sup>a</sup>	33	12	16	200
Other OPEC <sup>b</sup> . . . . .	312	12	22	246	432	1,024
Other . . . . .	362 <sup>c</sup>	0	2	148 <sup>c</sup>	17	52 <sup>d</sup>
Total . . . . .	\$ 2,220	\$ 20	\$ 85	\$ 497	\$ 515	\$ 3,337
Other less developed countries						
Israel	43 <sup>c</sup>	15	147	180 <sup>c</sup>	20	405
Latin America	4,499	3,719	12,043	14,371	4,252	38,884
Asia and Pacific	4,183	770	2,139	2,851	1,043	10,986
Sub-Saharan Africa <sup>d</sup>	1,187	96	283	321	612	2,499
Total . . . . .	9,912	4,600	14,612	17,723	5,927	52,774
Developed countries	37,348	15,380	57,784	45,004	11,596	167,112
World total <sup>e</sup> ...	\$52,107	\$20,000	\$72,481	\$63,224	\$19,533	\$227,345

<sup>a</sup> The total for Egypt and other Saharan entered under Egypt

<sup>b</sup> Saudi Arabia, Iraq, Iran, Kuwait, United Arab Emirates and Qatar

<sup>c</sup> Estimated as follows: rough division of the \$128 million U.S. investment in trade subsidiaries in Israel and non-OPEC Asian Middle East (\$70 million for Israel \$58 million for non-OPEC Asian Middle East which was not disaggregated in the source in order to avoid disclosure of individual company data allows us to disaggregate petroleum investment between the two for the purposes of this table

<sup>d</sup> Does not include South Africa, which is included in developed countries

<sup>e</sup> World total includes "international" petroleum and shipping investment of \$799 million which cannot be allocated to individual countries

SOURCE: Based on U.S. Department of Commerce Survey of Current Business, August 1982 table 14 p 22

countries generally. Only 2.5 percent of total U.S. nonpetroleum direct investment in developing countries was in the Middle East. The Middle East's share of U.S. investment in LDC manufacturing subsidiaries was extremely small—one-half of 1 percent. This contrasts with the large Middle Eastern share of exports to LDCs (13 percent of industrial-country exports of manufactured goods to LDCs in 1980), and with the vast contracting effort that has been occurring in recent years.

The lack of foreign direct investment in the Middle East reflects manufacturing output relatively small fraction of gross national product (GNP) for most of the countries in the region. Where direct investment is relatively large in developing countries, manufacturing is typically its largest destination. Direct investment in manufacturing in Egypt is practically nonexistent, despite the relatively high fraction of Egypt's GNP that comes from manufacturing, the strong bilateral relationship with the United States, and favorable Egyptian investment law.

Political risk, the lack of import barriers in most countries to stimulate domestic investment, small internal markets for many manufactured goods, and anticipated difficulties in technology transfer have all probably deterred manufacturing investment. The major exception to this is the Saudi petrochemical plants that are now starting to come into production. The availability of generous debt financing for joint venture partners, which reduced the amount of direct investment they were required to contribute to 15 percent in some Saudi Arabian joint ventures, was a powerful incentive.<sup>20</sup>

Most of the nonpetroleum direct foreign investment in the Middle East has been in subsidiaries in trade, banking, finance, and other industries, such as hotels and construction. Middle Eastern governments provide investment incentives to foreign firms willing to

<sup>20</sup>Wijil entitlements have also been cited as an attraction to joint venture partners, but this was less of a benefit during the early 1980's when demand for oil fell.

form partnerships with local firms.<sup>21</sup> Even in the chemical industry, which includes the pe-

<sup>21</sup>The existence of such joint ventures may be the explanation of the significant direct investment position in 'other industries' in the 'other OPEC countries' (table 24). See discussion of plans to set up the National Industrialization Company in Saudi Arabia to promote joint ventures with local firms in "Saudi Arabia's NIC Seeks Foreign Partners, Middle East Economic Digest, Apr. 6, 1984, p. 45.

trochemical sector, little direct investment was recorded as of 1981. Table 25 shows that U.S. direct investments in the Middle East declined slightly in the early 1980's, in contrast to the pattern of increasing direct investment in other LDCs.

Table 25.—Change in U.S. Direct Investment Position Abroad, 1980-81

Country or region	Millions of dollars			Percent of 1980
	Total position 1980	Total position 1981	Change 1980-81	
Middle East (not including Israel):				
Egypt .....	\$ 1,038	\$ 1,083	\$ 45	4.3%
Libya .....	575	501	-74	-12.9
Other Saharan Africa ..	190	200	10	5.3
Other OPEC <sup>a</sup> .....	1,679	1,024	-655	-39.0
Other .....	55	529	474	861.8
Total .....	\$ 3,537	\$ 3,337	-\$ 200	-5.7%
Other less developed:				
Israel .....	\$ 379	\$ 405	\$ 26	6.90/o
Latin America .....	38,882	38,884	2	0
Asia and Pacific .....	8,505	10,986	2,481	29.2
Sub-Saharan Africa <sup>a</sup> ...	1,975	2,499	524	26.5
Total .....	\$ 49,741	\$ 52,774	\$ 3,033	6.1 00
Developed countries ..	\$158,350	\$167,112	\$8,762	5.50/0
World total <sup>b</sup> .....	\$215,579	\$227,345	\$11,766	5.50/0

<sup>a</sup> See notes for table 24

SOURCE U S Department of Commerce, Survey of Current Business August 1982 tables 13 and 14, pp 21-22

## SUPPLIER COUNTRY EXPORT SHARES IN MIDDLE EAST TECHNOLOGY TRADE

### TRENDS IN INDUSTRIAL-COUNTRY EXPORT SHARES

Supplier shares of total exports of all industrialized countries to the Middle East have remained fairly stable in most cases during the past 12 years, despite changes in the oil economy, the exceptionally rapid expansion of Middle Eastern trade in the 1970's, and political conflicts and the shifting alliances in the region. For instance, according to tables 26 and 27, four of the principal suppliers had shares in industrial-country exports to 15 Middle

Eastern countries, as follows, in 1970 and 1982:

		Total export shares (percent)	
		1970	1982
United States		18	18
West Germany		15	15
United Kingdom		11	9
Italy	10		11

In contrast, the shares of two other countries, France and Japan, did change steadily and markedly over the 12-year period. The

Table 26.—Industrial-Country Exports and Export Shares to the Middle East 1982

	United States	Japan	West Germany	France	United Kingdom	Italy	Other industrial countries	Total value (millions)
Saudi Arabia . . . . .	29.3	21.4	11.4	6.4	7.7	8.0	15.8	\$30,820
Egypt . . . . .	30.1	6.9	12.0	10.4	6.2	8.7	25.7	9,557
Iraq . . . . .	6.0	19.5	22.2	10.2	10.8	118	19.5	14,105
Iran . . . . .	2.0	15.6	23.2	5.5	9.6	12.0	32.2	6,031
Algeria . . . . .	11.1	8.3	16.5	25.9	4.2	8.1	25.9	8,198
Kuwait . . . . .	15.9	30.2	13.8	5.3	8.9	10.6	15.2	5,908
<b>6 countries</b>	<b>19.7%</b>	<b>18.0%</b>	<b>15.2%</b>	<b>9.6%</b>	<b>8.0%</b>	<b>9.3%</b>	<b>20.1%</b>	<b>74,619</b>
Libya . . . . .	5.1	4.8	25.7	7.2	7.7	36.0	13.6	5,952
Oman . . . . .	10.3	27.3	9.6	4.5	27.4	5.2	15.7	1,680
Qatar . . . . .	9.8	22.1	9.6	12.1	27.5	5.0	13.9	1,564
UAE . . . . .	17.2	23.3	11.3	8.5	15.3	9.2	16.4	6,403
Jordan . . . . .	22.8	9.2	14.8	6.3	18.9	11.6	16.4	2,714
Lebanon, . . . . .	13.3	7.2	11.1	15.1	5.3	22.3	25.6	2,209
Syria, . . . . .	8.3	10.2	22.0	12.0	9.4	14.4	23.6	1,663
North Yemen, . . . . .	4.5	22.6	12.4	14.2	10.9	12.5	23.0	847
South Yemen . . . . .	2.1	22.9	4.6	9.3	16.0	14.4	30.7	388
<b>15 countries . . . . .</b>	<b>17.9%</b>	<b>17.2%</b>	<b>15.4%</b>	<b>9.5%</b>	<b>9.4%</b>	<b>71.2%</b>	<b>19.5%</b>	<b>\$98,039</b>

NOTE Supplier shares calculated on the basis of total industrial-country exports to the Middle East countries listed

SOURCE International Monetary Fund Direction of Trade Statistics Yearbook 1983

shares of the two countries were as follows in 1970 and 1982:

	Total export shares (percent)	
	1970	1982
Japan	10	17
France	17	9

Changes in supplier country export shares were more noticeable for machinery equipment exports to the Middle East:

	Machinery and equipment export shares (percent)	
	1970	1982
United States	23	20
West Germany	23	22
United Kingdom	16	9
Italy	10	14
Japan	9	23
France	18	9

This calculation of supplier shares is based on total exports for the six major suppliers only. In machinery and equipment exports, a decline in the position of the United Kingdom and an improvement in Italy's position occurred during the period.

These changes in share for Japan and France are related to events that probably have run their course. In the case of Japan,

the expansion in exports to the Middle East follows the striking expansion of Japan's exports to the world in general. Japan's relative earlier neglect of export markets of all but the major countries of the distant Middle East changed to greater interest because of the increase in the size of the regional market, Japan's official desire to redress bilateral trade imbalances and develop relations with oil suppliers, and the improvement of global communications and transportation. The increased importance that Japan's government and private sectors placed on the Middle East following the oil "shock" of 1973 was matched by a substantial increase in both commercial and government presence. On the commercial side, trading companies opened new branch offices, and on the government side, high level official delegations visited various capitals and helped negotiate large contracts. In this way, Japan developed a competitive position in the Middle East fully consistent with its worldwide position. With the removal of the Middle East as an exception to Japan's world trading pattern, the factors that affect Japan's worldwide export share—the rate of growth of the Japanese economy, the government's general export promotion policies, the pattern of Japan's comparative advantage, and the value of the

**Table 27.—Industrial-Country Exports to the Middle East—Market Share for Selected Years (percent)**

	United States	Japan	West Germany	France	United Kingdom	Italy
<b>1987</b>						
Saudi Arabia . . . . .	27	23	12	7	8	8
Iran . . . . .	4	19	20	9	9	10
Algeria . . . . .	8	5	14	27	5	16
Egypt . . . . .	29	1	15	14	7	11
Iraq . . . . .	7	23	22	11	9	10
Kuwait . . . . .	18	30	11	4	11	9
Total 6 countries, ...	17	19	15	11	8	10
Total 15 countries . . . . .	16	18	14	10	9	14
<b>1980</b>						
Saudi Arabia . . . . .	25	23	11	7	8	9
Iran . . . . .	0	20	20	9	12	7
Algeria . . . . .	6	5	16	30	4	15
Egypt . . . . .	26	6	13	14	8	9
Iraq . . . . .	7	23	19	11	8	10
Kuwait . . . . .	0	28	12	5	12	8
Total 6 countries. . . . .	15	19	12	12	8	10
Total 15 countries. . . . .	14	17	14	11	8	12
<b>1975</b>						
Saudi Arabia . . . . .	30	27	11	9	9	6
Iran . . . . .	28	16	19	6	10	5
Algeria . . . . .	13	5	12	39	4	11
Egypt . . . . .	22	7	14	14	8	12
Iraq . . . . .	8	20	26	10	7	6
Kuwait . . . . .	21	22	12	6	13	7
Total 6 countries. . . . .	22	16	16	12	8	7
Total 15 countries. . . . .	20	15	16	12	9	10
<b>1970</b>						
Saudi Arabia . . . . .	26	16	12	5	15	6
Iran . . . . .	23	13	23	5	11	6
Algeria . . . . .	6	2	10	55	4	9
Egypt . . . . .	13	2	21	11	8	11
Iraq . . . . .	8	6	7	13	21	6
Kuwait . . . . .	16	24	11	8	18	7
Total 6 countries . . . . .	16	10	16	19	11	8
Total 15 countries. . . . .	18	10	15	17	11	10

NOTE: Supplier shares calculated on the basis of total industrial country exports to the Middle East countries listed in table 26

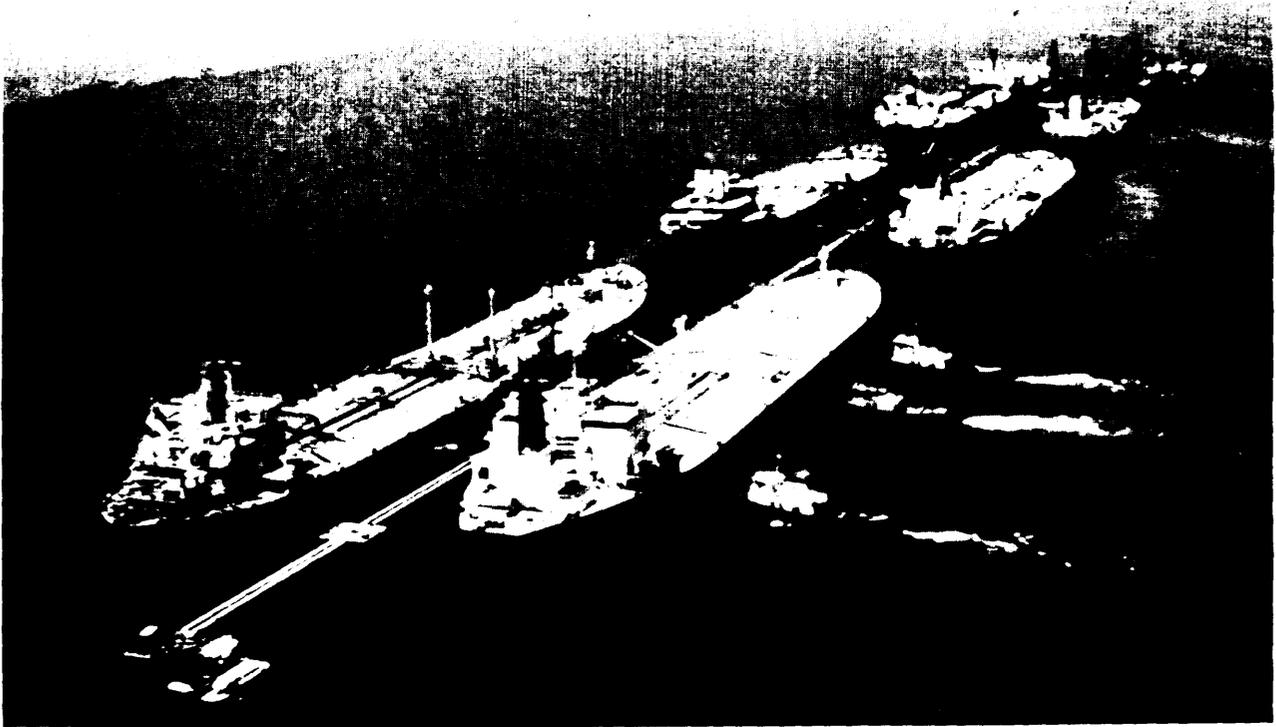
SOURCE: Compiled for the Office of Technology Assessment, from International Monetary Fund, *Direction of Trade Yearbook*, various issues

yen—will be key factors influencing Japan's Middle East trade.

In the case of France, the decline in its export share to the Middle East was almost entirely caused by the steady decrease in its share of the postcolonial Algerian market from 55 percent in 1970 to 27 percent in 1981 (see table 27). Its exports to Algeria in that year also dropped to 24 percent of its exports to the 15-country region. Given the historical relationship between France and Algeria, within which French firms have developed significant market presence, there should be no simple expectation that the decline in the French share

in Algeria will continue. Some further reduction in the French share of the Algerian market may take place, but in view of the decreased importance of the Algerian market to France, it is unlikely to have a large impact on France's region wide share.

In the past decade, to reiterate, the overall shares of most countries have been relatively stable and those that have changed significantly have done so for reasons that are not likely to persist. Nevertheless, a number of changes in bilateral political relationships did have effects on bilateral trade in the last decade.



*Photo credit: Aramco World Magazine*

Ras Tanura Marine Port, Saudi Arabia. Oil exports provide Saudi Arabia with revenues to finance imports of technology and services from supplier firms around the world

For example, the U.S. export share to Egypt went from 13 percent in 1970 to 31 percent in 1974, and the U.S. export share to Iran went from 24 percent in 1978 to zero in 1980. Similar gyrations in shares have affected bilateral U.S. trade with Iraq, Libya, Syria, and Algeria at various times. Nevertheless, diversification within the “portfolio” of export opportunities resulted in substantial stability in the U.S. market share in the Middle East region. Even the complete cessation of exports to Iran after 1979 only reduced the U.S. 15-country share from 18 percent in 1978 to 14 percent in 1980. By 1982, the U.S. share had recovered to 18 percent.<sup>22</sup> These developments were strongly influenced by U.S. superpower

status and strong U.S. political positions *in* the Arab-Israel dispute. Therefore, despite overall stability of U.S. export shares, there has been striking variation in particular country markets which has been affected by political factors.

The experience of other industrial countries over the period was similar to that of the United States in the overall stability of their regional export shares, despite some shifts in particular country markets, such as West Germany’s growing share in Iraq or the volatility of Japan’s share in Iran. Year-to-year country changes in share for the other industrial countries usually varied gradually. As a rule, countries with dominant trading positions in former colonies or protectorates have seen these positions deteriorate (although they are still

<sup>22</sup> The U.S. overall share reached a high of 20 to 22 percent in the 1971-74 period



*Photo credit Perry Ketchum*

Algerian port. France and Algeria have been important trading partners, with the Mediterranean Sea offering a convenient shipping route

strong). This has been true of France in Algeria and the United Kingdom in the Gulf countries. Table 27 presents export shares for supplier countries in various Middle Eastern countries and country groups in selected years.

#### PRODUCT EXPORT SPECIALIZATION OF MAJOR SUPPLIER COUNTRIES

Export shares by product category show a significant degree of supplier specialization. Table 28 gives the market shares of the six major industrial countries by product category in 1978 and 1982. Similar tables for six Middle Eastern countries are presented in appendix tables 4A-4F. From these tables it can be seen that the United States, Italy, and France had large shares in food and other raw material exports. All the major West European countries (except Italy in 1982) exported larger shares of chemicals to the Middle East than

did the United States and Japan, probably because of transportation cost differentials. In 1978, Japan and Italy were relatively strong in basic and other manufactures. By 1982, however, Italy's share of the combined category of basic and other manufactures had declined substantially.

In the machinery and equipment category, certain specializations emerged in the export data for the Middle East: Japan was the dominant supplier of consumer electronics and road vehicles in both 1978 and 1982. Japan also gained the largest overall market share in machinery and equipment exports in 1982.

In 1978, West Germany and the United States were clearly the most important exporters of production machinery (SITC 71 and 72),<sup>23</sup> but Japan, France, the United Kingdom, and other OECD countries were all significant exporters of production machinery as well. In 1982, both the United States and Japan in-

<sup>23</sup>Standard International Trade Classification.



Photo credit: U.S. Agency for International Development

Port of Alexandria, Egypt

creased their shares relative to West Germany in both nonelectric and electric machinery'. West Germany, which in 1978 had the highest share in both categories, relinquished first place in 1982 to the United States in nonelectric machinery and to Japan in electric machinery. Except for Italy, all of the major industrial countries participated significantly in telephone and other nonconsumer telecommunications equipment exports, judging by 1978 and 1980 data.<sup>24</sup>

<sup>24</sup>For 1978 data, see table 28.1 1980 supplement '1' shares of communication systems, areas follows United States (18.0 percent), Japan (12.5 percent), West Germany (17.8 percent), France (23.6 percent), United Kingdom (21.9 percent), Italy 16.2

**Table 28.—Supplier Export Shares to the Middle East by Commodity Class, 1982, 1978  
(15 Middle East Countries<sup>a</sup>—6 Major Industrial Countries<sup>b</sup>)**

SITC Commodity Code	United States	Japan	West Germany	France	United Kingdom	Italy	Total
<b>1982</b>							
0-4—Raw materials	31.4%	3.5%	10.2%	19.0%	11.2%	24.8%	\$ 7,870
5—Chemicals	15.2	5.4	24.7	20.1	24.3	10.2	3,534
6—Basic manufactures	13.2	40.5	18.1	14.6	9.6	3.9	12,998
7—Machinery and equipment	20.3	23.5	22.8	9.4	9.6	14.4	42,070
71—Nonelectric	30.0	21.0	21.6	11.4	13.8	2.2	13,945
72—Electric	15.3	26.0	15.7	11.7	11.7	19.6	10,394
724—Telecommunications	13.6	43.5	13.9	13.6	15.3	0.1	2,358
726—Electrical medical	25.5	10.7	33.1	15.9	9.9	5.0	144
73—Transport	19.0	29.3	29.3	7.9	6.1	8.4	14,523
732—Road vehicles	12.8	36.3	35.3	7.1	5.8	2.7	10,819
734—Aircraft	63.0	0.7	.0	13.4	7.7	15.2	1,810
8—Other manufactures	17.8	23.9	14.7	13.5	13.9	16.1	5,120
861—Professional scientific instruments	22.0	22.9	20.5	14.9	18.3	1.3	895
9—Other	4.8	1.6	13.7	0.5	25.4	54.0	2,223
Total	19.3%	22.9%	19.9%	11.9%	11.2%	14.8%	\$73,816
<b>1978</b>							
0-4—Raw materials	44.8	2.0	9.7	20.0	10.7	12.9	\$ 3,605
5—Chemicals	14.0	6.1	24.0	17.5	22.6	15.8	2,566
6—Basic manufactures	9.9	33.6	17.2	11.1	10.2	18.0	11,046
7—Machinery and equipment	21.2	21.9	24.4	11.1	12.9	8.6	28,456
71—Nonelectric	21.7	16.4	26.6	11.9	13.2	10.2	12,100
72—Electric	17.9	23.1	27.2	10.4	13.5	8.0	7,551
724—Telecommunications	19.0	35.4	15.1	10.8	15.8	3.8	1,918
7249—Telecommunications n.e.s.	26.7	14.2	17.1	14.9	22.0	5.2	1,354
726—Electrical medical	23.3	7.3	38.2	9.4	14.3	7.5	83
73—Transport	23.4	28.4	18.8	10.5	11.9	7.0	8,805
734—Aircraft	55.3	1.3	1.3	7.2	22.9	12.0	1,482
7349—Aircraft parts	63.3	0.1	1.6	8.2	17.8	9.0	545
8—Other manufactures	10.3	18.6	12.9	11.0	16.4	30.7	3,797
Total	22.7%	20.7%	19.8%	11.4%	12.7%	12.7%	\$53,365

<sup>a</sup>Saudi Arabia, Iran, Algeria, Egypt, Iraq, Kuwait, Libya, United Arab Emirates, Syria, Lebanon, Jordan, Qatar, Oman, North Yemen, South Yemen

<sup>b</sup>United States, Japan, West Germany, France, United Kingdom, Italy only.

SOURCE 1982: Organization for Economic Cooperation and Development Trade Series C Data Resources, Inc., data bank 1978. United Nations Trade With Industrial Countries supplement to the *World Trade Annual*.

Some other machinery and equipment specializations were notable. The United States was the dominant supplier of aircraft and parts in both years. All the industrial countries, except Italy, were strong in instruments in 1982. Finally, Italy had a specialization in office equipment exports.

### CONTRACTING SPECIALIZATION OF SUPPLIER COUNTRIES

Because of the incomplete coverage<sup>25</sup> of the data on contracts, and because the magnitude of many of the individual contracts lends instability to the data from year to year, the data presented in table 29 support only limited judgments about supplier shares and about their significance. Four major suppliers—the United States, Japan, West Germany, and France—had about equal shares of the overall MEED contract data totals for 1979-82. In addition, the United Kingdom and Italy together had a share about equal to one of the leading countries. The United States had a smaller 4-year contracts share than the other three leading countries.<sup>26</sup>

Ideally, OTA would carry out detailed analysis of the components of these contracts to estimate the benefits to the various supplier

percent), In both 1978 and 1980, smaller industrial countries as a group, notably the Netherlands and Sweden, also exported significant shares of telecommunications, n.e.s. equipment to the Middle East — 17.9 percent of the total for industrial countries in 1978 and 36.5 percent in 1980.

<sup>25</sup>The major source of contractor data used here is Middle East *Contracts*, MEED Consultants, London, annual issues for contract years since 1979. MEED relies on voluntary reports of contracts and on information from correspondents. As discussed in chapter 2, small contracts may be missed and certain country data may be unreliable. A further source of difficulty is that joint venture contracts with various Western suppliers may be attributed to local contractors. In this case it also is impossible to determine the nationality of the international contractor.

“Supporting the judgment that the United States has not been the leading prime contractor during the past few years is the expectation that unreported Iraqi data would not be likely to favor the United States if they had been included. On the other hand, some local Middle East companies receiving about one-fourth of contract awards in 1982 were joint ventures with industrial-country firms, and some of these undoubtedly involved U.S. firms particularly in Saudi Arabia where most of the contracts were awarded. There is no way to determine whether or not U.S. firms play a disproportionately large role in these joint ventures, although the direct investment data presented above suggest that they do.

countries—e.g., to determine the employment supported by these contracts in the various home countries. Unfortunately, the contract data do not generally include information concerning subcontractors, or other detailed data below the prime contract level.

Trade data indicate that the United States exports large amounts of machinery and equipment to the Middle East. The value of machinery and equipment exports (\$8.5 billion) in 1982, for instance, was larger than that of 1981 reported contracts awarded to U.S. firms.<sup>27</sup> This suggests that prime contracts of other countries were serviced by large amounts of U.S. machinery. The contract data may, therefore, underestimate the underlying U.S. share of contract expenditure.

### CONTRACTING SPECIALIZATION OF SUPPLIER COUNTRIES IN FOUR TECHNOLOGY SECTORS

The picture changes substantially when one examines contracts in the four technology sectors examined in depth in this report. Table 30 indicates that the United States was the dominant contractor country for the four-sector total, with 44 percent of the total identified contract amounts of \$19.7 billion going to the major industrial countries. This was true of all three types of contracts as well—technical services, equipment supply, and construction.

The United States was particularly dominant in technical services, as indicated by data presented in table 31 which examines the four sectors individually. U.S. contractors had 42, 96, and 78 percent, respectively, of the technical service contracts in communications, aircraft support systems, and medical services.<sup>28</sup>

<sup>27</sup>There would be a lag between contract award and machinery import, so 1981 contract awards should be compared to 1982 machinery imports.

<sup>28</sup>This is not to suggest that the United States is dominant in services exports in general. 1980 International Monetary Fund data, as compiled by the Office of the U.S. Trade Representative, show that the United States was only fourth in services exports worldwide other than transportation, travel and tourism: West Germany (\$15.5 billion), United Kingdom (\$13.3 billion), France (\$12.8 billion), and United States (\$10.8 billion). (Source: Office of the U.S. Trade Representative, U.S. *National Study on Trade in Services*, December 1983, table 3, p. 114.

Table 29.—Supplier Shares of Middle East Contracts, 1979-82<sup>a</sup>

Supplier	1979	1980	1981	1982	Total 4 years
Total amount <sup>b</sup> (billions of dollars)	\$41.1	\$36.2	\$67.6	\$40.8	\$185.7
Six major Industrial countries	70.7%	57.5%	57.2%	52.8%	59.3%
South Korea	9.1	12.0	13.4	16.5	12.9
East Europe	4.3	4.8	9.3	4.0	6.2
Local and Middle East	15.9	25.7	20.0	26.7	21.7
T o t a l	100.0	100.0	100.0	100.0	100.0
Six major Industrial countries (billions of dollars)	\$29.1	\$20.8	\$38.7	\$21.5	\$110.1
United States	22.9%	11.2%	17.1%	15.8%	17.2%
Japan	23.5	16.1	19.1	25.4	20.9
West Germany	17.2	14.6	22.8	11.6	17.5
United Kingdom	9.3	11.7	7.8	16.1	10.5
France	20.1	32.1	17.6	20.1	21.5
Italy	7.0	14.3	15.6	11.0	12.3
T o t a l	100.0	100.0	100.0	100.0	100.0

<sup>a</sup>Contracts were awarded in a range of categories including: above \$5 billion in 1981, defense, housing, industry, marine, petroleum, and roads and railways. Smaller total contract amounts were awarded in agriculture, aviation, education, health, urban development, public buildings, telecommunications, tourism, vehicles, and water.

<sup>b</sup>This total is for contracts identified by contractor's home country. Joint venture companies are characterized according to place of registration; consortia allocations have been divided proportionally. Countries or country categories not listed are not included in total.

SOURCE: MEED Consultants. *Middle East Contracts—Directory and Analysis*, 1982 second half, p. 9.

Table 30.—Supplier Share of Middle East Contracts in Four Technology Sectors, Aggregated, By Type of Contract,<sup>a</sup> 1978-82

Supplier	Type of contract			
	Technical services	Equipment supply	Construction	Total
Total amount (billions of dollars) ..	\$4.4	\$10.8	\$13.6	\$28.8
Six major Industrial countries .....	46.1%	69.1%	76.1%	68.9%
Other .....	23.2 <sup>b</sup>	30.3 <sup>c</sup>	16.2	22.5
Local and Middle East	30.7	0.6	7.6	8.5
Six major Industrial countries (billions of dollars)	\$2.0	\$ 7.4	\$10.3	\$19.7
United States	75.5%	37.2%	43.6%	44.4%
Japan	3.4	16.5	7.9	10.7
West Germany	2.8	10.2	7.0	7.8
United Kingdom	16.3	11.6	1.5	6.8
France	0.2	21.5	30.9	24.3
Italy	1.9	2.9	9.1	6.1
Total major Industrial countries .....	100.0%	100.0%	100.0%	100.0%

<sup>a</sup>Communications, commercial aircraft support systems, medical services and petrochemical facilities incomplete coverage especially for 1978-79 and 1982.

<sup>b</sup>Comprised entirely of one large Canadian communications technical services Contract (Bell of Canada).

<sup>c</sup>Comprised primarily of a few Sweden/Netherlands telecommunications equipment contracts.

SOURCE: Office of Technology Assessment. A detailed compilation of the contracts by supplier firms and awarding Middle Eastern countries for the 1978-82 period is available from OTA upon request.

**Table 31.—Supplier Shares of Middle East Contracts in Four Technology Sectors, By Type of Contract,\*1978-82 (percent or millions of dollars)**

Technology sector/ supplier country	Technical services	Type of contract		
		Equipment supply	Construction	Total
<b>Communications</b>				
Major industrial countries . . .	\$2669	\$6,079.6	\$167.7	\$6,514.1
United States . . .	42.0%	44.6%	1.0%	43.4%
Japan . . .	8.4	10.0	79.4	11.7
West Germany . . .	20.2	11.8	—	11.9
United Kingdom . . .	15.2	12.2	—	12.0
France . . .	0.2	19.8	19.6	19.0
Italy . . .	14.1	1.6	—	2.1
Total . . .	100.0%	100.0%	100.0%	100.0%
<b>Commercial aircraft support systems</b>				
Major industrial countries . . .	\$462.7	\$488.7	<b>\$2,873.8</b>	<b>\$3,825.3</b>
United States . . .	96.3%	0.2%	6.5%	16.5%
Japan . . .	—	2.3	2.6	2.3
West Germany . . .	0.3	3.5	20.4	15.8
United Kingdom . . .	2.8	15.8	3.5	5.0
France . . .	0.6	77.1	67.0	60.3
Italy . . .	—	1.0	—	0.1
Total . . .	100.0%	100.0%	100.0%	100.0%
<b>Medical services</b>				
Major industrial countries \$1,231.1		\$44.7	\$2,841.9	\$4,117.7
United States . . .	77.80/0	56.00/0	6.4%	28.3%
Japan . . .	—	4.1	21.4	14.8
West German y . . .	—	—	4.4 <sup>a</sup>	3.0
United Kingdom . . .	22.2	<b>39.9</b>	1.6	8.2
France . . .	0.1	—	43.5	30.1
Italy . . .	—	—	22.7	15.7
Total . . .	100.0%	100.0%	100.0%	100.0%
<b>Petrochemical facilities</b>				
Major industrial countries . . .	\$45.0	\$883.8	\$4,429.2	\$5,358.0
United States . . .	—	—	93.1%	76.9%
Japan . . .	100.0%	67.6%	—	12.0
West Germany . . .	—	2.1	0.2	0.5
United Kingdom . . .	—	17.5	—	2.9
France . . .	—	—	—	—
Italy . . .	—	12.8	6.7	7.7
Total . . .	100.0%	100.0%	100.0%	100.0%

\*It appears that West German firms received a number of sizable hospital construction contracts. Contract values were not available, however.

SOURCE: Office of Technology Assessment

The telecommunications figure would undoubtedly be higher if American participation in the large 1978 Bell of Canada technical services contract in Saudi Arabia were given weight.

In petrochemicals, technical service contracts were not reported separately to any extent. Nevertheless, a large component of technical services is undoubtedly included in the large U.S.-dominated petrochemical construction contracts. All this supports the hypothesis that the United States has had a compar-

ative advantage in the sale of technical services in the Middle East that matches the comparative advantage it has in human capital-intensive trade in general.

No such suggestion of a general comparative advantage in equipment supply can be gleaned from the four-sector contract data. U.S. contractors did well in telecommunications and medical equipment supply, but France and Japan were dominant in supply of equipment for aircraft support and petrochemical facilities, respectively. Except for the petrochemical

Table 29.—Supplier Shares of Middle East Contracts, 1979-82<sup>a</sup>

Supplier	1979	1980	1981	1982	Total 4 years
Total amount <sup>b</sup> (billions of dollars) . . . . .	\$41.1	\$36.2	\$67.6	\$40.8	\$185.7
Six major Industrial countries . . . . .	70.7%	57.5%	57.2%	52.8*	59.3%
South Korea . . . . .	9.1	12.0	13.4	16.5	12.9
East Europe . . . . .	4.3	4.8	9.3	4.0	6.2
Local and Middle East . . . . .	15.9	25.7	20.0	26.7	21.7
Total . . . . .	100.0	100.0	100.0	100.0	100.0
Six major Industrial countries (billions of dollars) . . . . .	\$29.1	\$20.8	\$38.7	\$21.5	\$110.1
United States . . . . .	22.9%	11.2%	17.1%	15.8%	17.2%
Japan . . . . .	23.5	16.1	19.1	25.4	20.9
West Germany . . . . .	17.2	14.6	22.8	11.6	17.5
United Kingdom . . . . .	9.3	11.7	7.8	16.1	10.5
France . . . . .	20.1	32.1	17.6	20.1	21.5
Italy . . . . .	7.0	14.3	15.6	11.0	12.3
Total . . . . .	100.0	100.0	100.0	100.0	100.0

<sup>a</sup>Contracts were awarded in a range of categories including above \$5 billion in 1981 defense housing industry marine petroleum, and roads and railways Smaller total contract amounts were awarded in agriculture aviation education, health, urban development, public buildings, telecommunications, tourism vehicles and water

<sup>b</sup>This total is for contracts identified by contractors home country Joint venture companies are characterized according to place of registration Consortia allocations have been divided proportionally Countries or country categories not listed are not included in total

SOURCE MEED Consultants Middle East Contracts-Directory and Analysis, 1982 second half, p 9

Table 30.—Supplier Share of Middle East Contracts in Four Technology Sectors, Aggregated, By Type of Contract,<sup>a</sup> 1978-82

Supplier	Technical services	Type of contract		
		Equipment supply	Construction	Total
Total amount (billions of dollars) . . . . .	\$4.4	\$10.8	\$13.6	\$28.8
Six major industrial countries . . . . .	46.1%	69.1%	76.1%	68.9%
Other . . . . .	23.2 <sup>b</sup>	30.3 <sup>c</sup>	16.2	22.5
Local and Middle East . . . . .	30.7	0.6	7.6	8.5
Six major Industrial countries (billions of dollars) . . . . .	\$2.0	\$7.4	\$10.3	\$19.7
United States . . . . .	75.5%	37.2%	43.6%	44.4%
Japan . . . . .	3.4	16.5	7.9	10.7
West Germany . . . . .	2.8	10.2	7.0	7.8
United Kingdom . . . . .	16.3	11.6	1.5	6.8
France . . . . .	0.2	21.5	30.9	24.3
Italy . . . . .	1.9	2.9	9.1	6.1
Total major industrial countries . . . . .	100.0%	100.0%	100.0%	100.0%

<sup>a</sup>Communications, commercial aircraft support systems medical services, and petrochemical facilities Incomplete coverage especially for 1978-79 and 1982

<sup>b</sup>Comprised entirely of one large Canadian communications technical services contract (Bell of Canada)

<sup>c</sup>Comprised Primarily of a few Sweden/Netherlands telecommunications equipment contracts

SOURCE Office of Technology Assessment A detailed compilation of the contracts by supplier firms and awarding Middle Eastern countries for the 1978-82 period is available from OTA upon request

**Table 31.—Supplier Shares of Middle East Contracts in Four Technology Sectors, By Type of Contract,<sup>a</sup> 1978-82 (percent or millions of dollars)**

Technology sector/ supplier country	Technical services	Type of contract		
		Equipment supply	Construction	Total
<b>Communications</b>				
Major industrial countries . . .	\$266.9	\$6,079.6	\$167.7	\$6,514.1
United States. . . . .	42.0%	44.60%	1.0%	43.4% <sup>b</sup>
Japan . . . . .	8.4	10.0	79.4	11.7
West Germany. . . . .	20.2	11.8	—	11.9
United Kingdom . . . . .	15.2	12.2	—	12.0
France . . . . .	0.2	19.8	19.6	19.0
Italy . . . . .	14.1	1.6	—	2.1
Total . . . . .	100.0%	100.0%	100.0%	100.0%
<b>Commercial aircraft support systems</b>				
Major industrial countries . . .	\$462.7	\$488.7	\$2,873.8	\$3,825.3
United States. . . . .	96.3%	0.2%	6.5%	16.5%
Japan . . . . .	—	2.3	2.6	2.3
West Germany. . . . .	0.3	3.5	20.4	15.8
United Kingdom . . . . .	2.8	15.8	3.5	5.0
France . . . . .	0.6	77.1	67.0	60.3
Italy . . . . .	—	1.0	—	0.1
Total . . . . .	100.0%	100.0%	100.0%	100.0%
<b>Medical services</b>				
Major industrial countries . . .	\$1,231.1	\$44.7	\$2,841.9	\$4,117.7
United States. . . . .	77.8%	56.0%	6.4%	28.3%
Japan . . . . .	—	4.1	21.4	14.8
West Germany . . . . .	—	—	4.4 <sup>a</sup>	3.0
United Kingdom . . . . .	22.2	39.9	1.6	8.2
France . . . . .	0.1	—	43.5	30.1
Italy . . . . .	—	—	22.7	15.7
Total . . . . .	100.0%	100.0%	100.0%	100.0%
<b>Petrochemical facilities</b>				
Major industrial countries . . . .	\$45.0	\$883.8	\$4,429.2	\$5,358.0
United States . . . . .	—	—	93.1%	76.9%
Japan . . . . .	100.0%	67.6%	—	12.0
West Germany . . . . .	—	2.1	0.2	0.5
United Kingdom . . . . .	—	17.5	—	2.9
France . . . . .	—	—	—	—
Italy . . . . .	—	12.8	6.7	7.7
Total . . . . .	100.00%	100.0%	100.0%	100.0%

<sup>a</sup> It appears that West German firms received a number of sizable hospital construction contracts. Contract values were not available, however

SOURCE: Office of Technology Assessment

The telecommunications figure would undoubtedly be higher if American participation in the large 1978 Bell of Canada technical services contract in Saudi Arabia were given weight.

In petrochemicals, technical service contracts were not reported separately to any extent. Nevertheless, a large component of technical services is undoubtedly included in the large U.S.-dominated petrochemical construction contracts. All this supports the hypothesis that the United States has had a compar-

ative advantage in the sale of technical services in the Middle East that matches the comparative advantage it has in human capital-intensive trade in general.

No such suggestion of a general comparative advantage in equipment supply can be gleaned from the four-sector contract data. U.S. contractors did well in telecommunications and medical equipment supply, but France and Japan were dominant in supply of equipment for aircraft support and petrochemical facilities, respectively. Except for the petrochemical

exporting countries—the United States, West Germany, the United Kingdom, and Italy—maintained their overall export positions through the decade (despite variations in particular types of exports or markets). Japan and France exchanged share positions, with Japanese firms dramatically expanding export shares while French firms lost ground.

The share of U.S. firms in contracting in the region was similar to that of the United States in total exports—18 percent in total exports

and 16 percent in contracts in 1982. However, for the four technology sectors examined in this chapter—telecommunications, aircraft support systems, medical services, and petrochemical facilities—the U.S. share for 1978-82 contracts was 44 percent. This higher market share in these advanced technology sectors confirms the view that the United States has a comparative advantage in R&D and human capital-intensive trade.

## CHAPTER 4 STATISTICAL APPENDIXES

### Appendix Table 4A.—Supplier Export Shares to Saudi Arabia, by Commodity Class, 1982

Commodity	SITC <sup>a</sup>	United	Japan	Germany	France	United	Italy	Total value = 100 percent (\$ millions)
		States	(percent)					
Food and live animals . . . . .	<b>0</b>	43.4	3.2	10.5	26.4	15.7	0.8	1,032
Beverages and tobacco . . . . .	1	36.6	28.6	0.5	0.8	22.9	10.6	322
Crude materials . . . . .	2	71.1	2.9	5.4	12.1	6.6	2.0	69
Mineral fuels . . . . .	3	8.5	0.2	0.8	26.5	4.3	59.7	486
Oils and fats . . . . .	4	73.4	1.0	10.6	6.5	6.0	2.6	30
Chemicals . . . . .	5	29.1	4.1	15.4	13.5	31.2	6.6	949
Manufactured, classified by material . .	6	22.7	45.1	11.3	10.3	9.1	1.4	4,739
Machinery and equipment . . . . .	7	32.8	27.7	17.9	5.4	8.1	8.2	13,757
Machinery, other than electric . . . .	71	42.7	21.3	14.4	7.4	13.2	1.0	4,850
Electrical machinery. . . . .	72	29.9	28.0	16.0	8.0	7.9	10.2	3,405
Telecommunications apparatus . . .	724	25.6	51.1	12.4	4.7	6.2	0.0	658
Electrical, medical and radiological . . . . .	726	40.7	7.9	37.4	1.5	9.3	3.3	45
Transport equipment . . . . .	73	30.4	39.1	21.2	2.3	4.3	2.6	4,676
Road motor vehicles . . . . .	732	21.0	48.7	24.7	1.8	2.9	0.8	3,687
Aircraft . . . . .	734	81.6	2.1	<b>0.0</b>	1.8	11.3	3.3	620
Miscellaneous manufactured goods. . .	8	27.5	24.2	10.7	9.9	10.4	17.3	2,014
Instruments and apparatus . . . . .	861	35.5	29.8	11.0	10.4	12.2	1.0	301
Not classified according to kind . . . .	9	<u>7.0</u>	<u>1.5</u>	6.6	<b>0.1</b>	<b>&amp; 5</b>	<u>76.3</u>	<u>693</u>
Total . . . . .		<u>29.7</u>	<u>27.5</u>	14.6	8.2	9.8	10.2	<u>24,090</u>

Note Percentages for the six supplier countries sum to 100 percent (except for rounding error)

<sup>a</sup>Standard International Trade Classification  
Scientific, medical, optical, measuring and controlling

SOURCE OECD, Trade Series C, obtained from Data Resources, Inc. on-line service

### Appendix Table 4B.—Supplier Export Shares to Iraq, by Commodity Class, 1982

Commodity	SITC <sup>a</sup>	United	Japan	Germany	France	United	Italy	Total value = 100 percent (\$ millions)
		States	(percent)					
Food and live animals . . . . .	<b>0</b>	<b>38.8</b>	<b>0.4</b>	<b>8.0</b>	47.2	3.8	1.7	336
Beverages and tobacco . . . . .	1	<b>0.0</b>	<b>0.3</b>	<b>5.7</b>	7.3	65.2	21.5	126
Crude materials . . . . .	2	<b>16.8</b>	<b>36.2</b>	<b>18.3</b>	13.8	13.0	1.8	28
Mineral fuels . . . . .	3	<b>3.6</b>	<b>7.2</b>	<b>16.3</b>	10.9	43.2	18.8	26
Oils and fats . . . . .	4	<b>10.6</b>	<b>2.3</b>	<b>6.0</b>	5.4	11.5	64.2	5
Chemicals . . . . .	5	<b>8.4</b>	<b>9.1</b>	<b>32.3</b>	18.6	24.0	7.7	362
Manufactured, classified by material . .	6	<b>1.9</b>	<b>34.2</b>	<b>25.8</b>	18.9	12.3	6.8	2,083
Machinery and equipment . . . . .	7	<b>8.2</b>	<b>24.2</b>	<b>28.9</b>	8.9	12.2	17.6	7,560
Machinery, other than electric . . . .	71	<b>14.3</b>	<b>25.4</b>	<b>28.1</b>	10.7	16.9	4.5	2,283
Electrical machinery. . . . .	72	<b>3.2</b>	<b>28.2</b>	<b>10.7</b>	17.8	16.8	23.3	1,985
Telecommunications apparatus . . .	724	<b>2.2</b>	<b>32.1</b>	<b>7.2</b>	30.3	28.2	0.1	526
Electrical, medical and radiological . . . . .	726	47.5	11.3	19.4	4.5	13.2	4.2	16
Transport equipment . . . . .	73	8.7	26.6	41.6	2.9	7.8	12.4	2,599
Road motor vehicles . . . . .	732	2.6	33.3	49.0	2.5	8.0	4.6	2,027
Aircraft . . . . .	734	73.8	0.0	<b>0.0</b>	5.4	1.7	19.1	299
Miscellaneous manufactured goods. . .	8	2.6	25.1	22.2	15.6	23.7	10.9	613
Instruments and apparatus . . . . .	861	3.5	17.9	31.7	16.1	29.7	1.1	132
Not classified according to kind . . . .	9	0.7	6.0	65.5	3.1	0.7	<b>23.9</b>	<u>184</u>
Total . . . . .		7.4	24.3	27.8	12.5	13.5	<b>14.6</b>	11,324

Note Percentages for the six supplier countries sum to 100 percent (except for rounding error)

<sup>a</sup>Standard International Trade Classification  
Scientific, medical, optical, measuring and controlling

SOURCE OECD, Trade Series C obtained from Data Resources, Inc on-line service

exporting countries—the United States, West Germany, the United Kingdom, and Italy—maintained their overall export positions through the decade (despite variations in particular types of exports or markets). Japan and France exchanged share positions, with Japanese firms dramatically expanding export shares while French firms lost ground.

The share of U.S. firms in contracting in the region was similar to that of the United States in total exports—18 percent in total exports

and 16 percent in contracts in 1982. However, for the four technology sectors examined in this chapter—telecommunications, aircraft support systems, medical services, and petrochemical facilities—the U.S. share for 1978-82 contracts was 44 percent. This higher market share in these advanced technology sectors confirms the view that the United States has a comparative advantage in R&D and human capital-intensive trade.

## CHAPTER 4 STATISTICAL APPENDIXES

### Appendix Table 4A.—Supplier Export Shares to Saudi Arabia, by Commodity Class, 1982

Commodity	SITC <sup>a</sup>	United	Japan	Germany	France	United	Italy	Total value = 100 percent (\$ millions)
		States	(percent)				Kingdom	
Food and live animals . . . . .	0	43.4	3.2	10.5	26.4	15.7	0.8	1,032
Beverages and tobacco . . . . .	1	36.6	28.6	0.5	0.8	22.9	10.6	322
Crude materials . . . . .	2	71.1	2.9	5.4	12.1	6.6	2.0	69
Mineral fuels . . . . .	3	8.5	0.2	0.8	26.5	4.3	59.7	486
Oils and fats . . . . .	4	73.4	1.0	10.6	6.5	6.0	2.6	30
Chemicals . . . . .	5	29.1	4.1	15.4	13.5	31.2	6.6	949
Manufactured, classified by material	6	22.7	45.1	11.3	10.3	9.1	1.4	4,739
Machinery and equipment . . . . .	7	32.8	27.7	17.9	5.4	8.1	8.2	13,757
Machinery, other than electric . . . . .	71	42.7	21.3	14.4	7.4	13.2	1.0	4,850
Electrical machinery . . . . .	72	299	28.0	16.0	8.0	7.9	10.2	3,405
Telecommunications apparatus . . . . .	724	25.6	51.1	12.4	4.7	6.2	0.0	658
Electrical, medical and r a d i o l o g i c a l . . . . .	726	40.7	7.9	37.4	1.5	9.3	3.3	45
Transport equipment . . . . .	73	30.4	39.1	21.2	2.3	4.3	2.6	4,676
Road motor vehicles . . . . .	732	21.0	48.7	24.7	1.8	2.9	0.8	3,687
Aircraft . . . . .	734	81.6	2.1	0.0	1.8	11.3	3.3	620
Miscellaneous manufactured goods.	8	27.5	24.2	10.7	9.9	10.4	17.3	2,014
Instruments and apparatus . . . . .	861	35.5	29.8	11.0	10.4	12.2	1.0	301
Not classified according to kind	9	7.0	1.5	6.6	0.1	8.5	76.3	693
Total . . . . .		29.7	27.5	14.6	8.2	9.8	10.2	24,090

Note Percentages for the six supplier countries sum to 100 percent (except for rounding error)

<sup>a</sup>Standard International Trade Classification

<sup>b</sup>Scientific, medical, optical, measuring and controlling

SOURCE OECD Trade Series C, obtained from Data Resources Inc on-line service

### Appendix Table 4B.—Supplier Export Shares to Iraq, by Commodity Class, 1982

Commodity	SITC <sup>a</sup>	United	Japan	Germany	France	United	Italy	Total value = 100 percent (\$ millions)
		States	(percent)				Kingdom	
Food and live animals . . . . .	0	38.8	0.4	8.0	47.2	3.8	1.7	336
Beverages and tobacco . . . . .	1	0.0	0.3	5.7	7.3	65.2	21.5	126
Crude materials . . . . .	2	16.8	36.2	18.3	13.8	13.0	1.8	28
Mineral fuels . . . . .	3	3.6	7.2	16.3	10.9	43.2	18.8	26
Oils and fats . . . . .	4	10.6	2.3	6.0	5.4	11.5	64.2	5
Chemicals . . . . .	5	8.4	9.1	32.3	18.6	24.0	7.7	362
Manufactured, classified by material	6	1.9	34.2	25.8	18.9	12.3	6.8	2,083
Machinery and equipment . . . . .	7	8.2	24.2	28.9	8.9	12.2	17.6	7,560
Machinery, other than electric . . . . .	71	14.3	25.4	28.1	10.7	16.9	4.5	2,283
Electrical machinery . . . . .	72	3.2	28.2	10.7	17.8	16.8	23.3	1,985
Telecommunications apparatus . . . . .	724	2.2	32.1	7.2	30.3	28.2	0.1	526
Electrical, medical and r a d i o l o g i c a l . . . . .	726	47.5	11.3	19.4	4.5	13.2	4.2	16
Transport equipment . . . . .	73	8.7	26.6	41.6	2.9	7.8	12.4	2,599
Road motor vehicles . . . . .	732	2.6	33.3	49.0	2.5	8.0	4.6	2,027
Aircraft . . . . .	734	73.8	0.0	0.0	5.4	1.7	19.1	299
Miscellaneous manufactured goods.	8	2.6	25.1	22.2	15.6	23.7	10.9	613
Instruments and apparatus . . . . .	861	3.5	17.9	31.7	16.1	29.7	1.1	132
Not classified according to kind	9	0.7	6.0	65.5	3.1	0.7	23.9	184
Total . . . . .		7.4	24.3	27.8	12.5	13.5	14.6	11,324

Note Percentages for the six supplier countries sum to 100 percent (except for rounding error)

<sup>a</sup>Standard International Trade Classification

<sup>b</sup>Scientific, medical, optical, measuring and controlling.

SOURCE OECD Trade Series C obtained from Data Resources Inc on-line service

Appendix Table 4C.—Supplier Export Shares to Egypt, by Commodity Class, 1982

Commodity	SITC <sup>a</sup>	United States Japan Germany France United Kingdom Italy						Total value = 100 percent (\$ millions)
		(percent)						
Food and live animals	0	65.0	1.8	5.9	24.0	2.5	0.9	881
Beverages and tobacco	1	62.0	0.0	0.4	1.2	11.5	24.9	124
Crude materials	2	58.9	2.1	12.6	11.4	11.9	3.1	74
Mineral fuels ...	3	209	0.0	1.8	12.7	5.7	59.0	222
Oils and fats	4	98.3	0.0	1.2	0.4	0.1	0.0	175
Chemicals	5	13.1	3.4	29.4	19.5	22.7	119	448
Manufactured, classified by material	6	22.3	20.5	19.4	19.0	9.6	9.1	770
Machinery and equipment	7	27.2	12.6	22.3	14.7	8.2	14.9	3,335
Machinery, other than electric	71	39.7	7.4	26.5	12.8	12.3	1.4	1,349
Electrical machinery	72	20.2	22.8	11.0	13.3	8.9	23.8	885
Telecommunications apparatus	724	20.6	49.8	5.5	13.6	10.4	0.2	268
Electrical, medical and radiological	726	23.7	16.8	39.2	10.5	9.3	0.6	9
Transport equipment	73	21.1	13.0	29.1	21.7	3.1	12.0	918
Road motor vehicles	732	14.1	21.5	35.9	15.5	3.5	9.4	487
Aircraft	734	39.0	0.0	0.0	49.2	3.7	8.1	218
Miscellaneous manufactured goods	8	23.0	19.0	16.0	12.9	20.2	9.0	249
Instruments and apparatus	861	29.0	15.1	20.4	12.7	21.2	1.7	78
Not classified according to kind	9	9	2.3	15.0	0	44.7	29.4	75
Total		33.3	10.4	18.0	15.8	9.3	13.2	6,353

Note Percentages for the six supplier countries sum to 100 percent (except for rounding error)

<sup>a</sup> Standard International Trade Classification

<sup>b</sup> Scientific, medical, optical, measuring and controlling

SOURCE OECD Trade Series C obtained from Data Resources Inc on-line service

Appendix Table 4D.—Supplier Export Shares to Iran, by Commodity Class, 1982

Commodity	SITC <sup>a</sup>	United States Japan Germany France United Kingdom Italy						Total value = 100 percent (\$ millions)
		(percent)						
Food and live animals	0	10.0	2.0	39.2	44.1	4.3	0.4	216
Beverages and tobacco	1	0.0	0.0	69.7	0.0	2.7	27.5	33
Crude materials	2	1.0	44.0	27.0	2.5	25.0	0.5	109
Mineral fuels ...	3	0.3	0.1	14.6	0.9	1.2	82.8	271
Oils and fats	4	22.8	1.4	65.7	7.6	1.7	0.7	10
Chemicals	5	2.3	11.9	42.5	9.2	18.2	159	468
Manufactured, classified by material	6	0.3	51.0	32.1	3.5	8.1	5.1	757
Machinery and equipment	7	3.6	20.0	34.6	7.3	16.7	17.8	2,069
Machinery, other than electric	71	7.6	32.6	34.2	4.5	18.5	2.6	724
Electrical machinery	72	2.6	14.6	33.6	3.5	11.3	34.4	434
Telecommunications apparatus	724	0.1	21.9	68.5	2.4	7.0	0.0	52
Electrical, medical and radiological	726	4.5	35.6	41.1	4.4	9.9	4.4	9
Transport equipment	73	1.2	15.1	41.3	13.7	21.4	7.2	754
Road motor vehicles	732	0.8	15.0	54.0	1.9	27.5	0.8	557
Aircraft	734	2.9	0.0	0.0	89.1	6.7	1.3	103
Miscellaneous manufactured goods	8	5.8	21.4	45.2	5.6	20.3	1.7	116
Instruments and apparatus <sup>b</sup>	861	5.7	30.9	35.5	3.8	23.0	1.1	55
Not classified according to kind	9	2.0	15.9	15.9	0.7	1.2	43.8	13
Total		3.0	23.0	34.4	8.1	13.7	17.8	4,060

Note Percentages for the six supplier countries sum to 100 percent (except for rounding error).

<sup>a</sup> Standard International Trade Classification

<sup>b</sup> Scientific, medical, optical, measuring and controlling

SOURCE OECD Trade Series C obtained from Data Resources Inc on-line service

**Appendix Table 4E.—Supplier Export Shares to Algeria, by Commodity Class, 1982**

Commodity	SITC <sup>a</sup>	United States Japan Germany France United Kingdom Italy						Total value = 100 percent (\$ millions)
		(percent)						
Food and live animals . . . . .	0	22.0	0.1	30.0	28.1	19.7	0.1	567
Beverages and tobacco . . . . .	1	4.3	0.0	0.0	0.9	1.4	93.3	205
Crude materials . . . . .	2	42.3	9.2	13.9	28.5	5.7	0.5	52
Mineral fuels . . . . .	3	33.4	2.2	8.6	5.3	26.9	23.6	183
Oils and fats . . . . .	4	56.6	0.1	19.7	23.6	0.0	0.0	29
Chemicals . . . . .	5	3.5	1.3	23.1	63.1	4.6	4.3	367
Manufactured, classified by material	6	4.7	14.4	29.0	45.3	3.6	3.0	967
Machinery and equipment . . . . .	7	11.3	15.4	22.8	35.8	3.7	11.0	3,164
Machinery, other than electric . .	71	12.3	16.0	27.3	39.0	3.4	2.1	1,272
Electrical machinery . . . . .	72	6.4	18.3	13.7	28.4	4.7	28.4	554
Telecommunications apparatus. . .	724	14.6	18.6	38.3	11.3	17.2	0.0	86
Electrical, medical and radiological . . . . .	726	<b>0.1</b>	7.7	23.8	60.3	4.6	3.6	31
Transport equipment . . . . .	73	14.1	15.5	22.5	41.1	4.3	2.6	1,169
Road motor vehicles . . . . .	732	10.9	17.9	22.3	43.5	3.6	0.8	1,013
Aircraft . . . . .	734	97.6	0.0	0.0	0.1	2.3	0.0	50
Miscellaneous manufactured goods. .	8	3.0	13.7	20.0	52.4	3.4	7.4	271
Instruments and apparatus . . . . .	861	1.8	12.3	27.2	51.6	5.5	1.6	88
Not classified according to kind . . .	9	7.0	2.1	35.0	1.4	3.7	50.8	29
Total . . . . .		11.3	11.6	23.2	36.6	5.9	11.4	5,834

Note Percentages for the six supplier countries sum to 100 percent (except for rounding error)

<sup>a</sup>Standard International Trade Classification

<sup>b</sup>Scientific, medical, optical, measuring and controlling

SOURCE OECD Trade Series C, obtained from Data Resources Inc on-line service

**Appendix Table 4F.—Supplier Export Shares to Kuwait, by Commodity Class, 1982**

Commodity	SITC <sup>a</sup>	United States Japan Germany France United Kingdom Italy						Total value = 100 percent (\$ millions)
		(percent)						
Food and live animals . . . . .	0	23.0	6.0	18.5	25.7	26.6	0.3	129
Beverages and tobacco . . . . .	1	41.8	5.3	0.5	0.9	37.5	14.0	66
Crude materials . . . . .	2	79.5	2.7	3.1	3.8	10.9	0.0	11
Mineral fuels . . . . .	3	16.6	2.8	6.5	10.9	10.2	53.0	40
Oils and fats . . . . .	4	69.0	0.1	6.3	4.6	11.8	8.2	3
Chemicals . . . . .	5	19.2	7.4	19.5	11.7	39.3	2.9	162
Manufactured, classified by material .	6	10.5	63.4	8.9	5.5	10.3	1.3	962
Machinery and equipment . . . . .	7	20.8	36.1	19.0	5.1	9.3	9.7	2,778
Machinery, other than electric . . .	71	25.8	39.4	19.5	4.2	10.6	0.4	784
Electrical machinery . . . . .	72	10.2	37.9	13.4	10.5	16.0	12.1	758
Telecommunications apparatus. . .	724	10.1	74.2	6.7	1.4	7.6	0.0	134
Electrical, medical and radiological . . . . .	726	25.4	3.9	26.8	0.2	31.6	12.2	7
Transport equipment . . . . .	73	26.5	36.4	24.1	2.6	4.8	5.6	1,119
Road motor vehicles . . . . .	732	24.1	41.3	28.6	1.3	3.6	1.1	805
Aircraft . . . . .	734	68.5	0.0	0.0	6.8	1.8	22.9	131
Miscellaneous manufactured goods. . .	8	11.7	29.1	13.1	11.7	14.0	20.5	514
Instruments and apparatus . . . . .	861	16.8	33.0	19.1	6.5	23.7	1.0	43
Not classified according to kind . . . .	9	5.5	0.9	20.9	0.1	9	65.8	277
Total . . . . .		17.4	36.2	16.2	6.3	11.7	12.2	4,942

Note Percentages for the six supplier countries sum to 100 percent (except for rounding error)

<sup>a</sup>Standard International Trade Classification

<sup>b</sup>Scientific, medical, optical, measuring and controlling

SOURCE OECD, Trade Series C, obtained from Data Resources, Inc on-line service