
CHAPTER 11

Recipient Country Policies

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Recipient Country Policies

INTRODUCTION

Leaders of developing countries in the Islamic Middle East face a central challenge. With greatly diverse human, capital, and natural resources, they are making a determined effort to transform their economies rapidly, largely through the introduction of foreign technologies. In doing so, they are attempting to avoid excessive dependence on foreign suppliers of technology, to maintain their political legitimacy and to preserve Islamic traditions. Despite these common challenges, however, the policies of these countries reveal substantial variation in the ways they address these issues.

While many of them are establishing policies and programs affecting technology transfer, none of these countries in the Middle East has implemented an explicit and comprehensive technology transfer policy. Instead, technology transfer choices are normally made within the context of broader development strategies, and these have depended on the resources of each country, the vision of political leaders, and the social context. OTA's examination of policy approaches is designed to focus on the problems and promise of technology transfer for these recipient nations.

This chapter reviews policy choices made by Middle Eastern countries that affect technol-

ogy transfer. Development goals and strategies are compared; the capabilities of central planning institutions to formulate and implement technology transfer are discussed; and specific regulatory, financing, and manpower issues are addressed. In each case, stress is laid on the central tradeoffs—between public and private leadership in economic development, between building an indigenous technological base and reliance on foreign assistance. Finally, technology transfer choices are set in the broader context of foreign policies.

The analysis highlights common themes in the approaches taken by these countries, perhaps the most central being attempts to liberalize economies to promote the growth of private sector firms, particularly in the manufacturing sector. Strongly associated with this trend have been efforts to regulate the involvement of foreign firms and organizations to enhance technology absorption, limit dependence, and promote political goals. While success has been uneven and approaches have varied, leaders in all of these countries have attempted to promote these dual goals of economic liberalization and regulation of foreign business.

DEVELOPMENT STRATEGIES

Development strategies have important implications for technology transfer choices. Development plans, of course, do not necessarily provide a good indication of actual performance. Crafted mainly as a guide to development, plan shortfalls have often been great and priorities often reshaped.¹ Plans do, how-

ever, reflect the aims of Middle East planners; they indicate where development priorities lie and how they change over time. For this reason, it is useful to examine briefly the development plans of each of the six countries under review as a basis for understanding policies relating to civilian technology transfer.

Despite the broad similarity in aims, there have been significant differences in the de-

¹See, for example, Ministry of Planning, Saudi Arabia, *Education Statistics Manual*, summary, 1979.

velopment strategies that each country has chosen. Some countries—Egypt, Algeria, and Iran—initially emphasized rapid development associated with heavy industrialization. Iran’s “industrial dream,”³ Algeria’s aim for heavy industrialization,⁴ and Nasser’s ambitious plans for Egypt in the 1960’s were all examples of the desire to develop at a rate that would move each country into the 20th century within a matter of years. Saudi Arabia, Kuwait, and Iraq, in contrast, had somewhat more broadly based development strategies from the start, and the emphasis on heavy industry, if present at all, came at a later stage of development. In the 1960’s, Egypt, Algeria, and Iraq emphasized a socialist approach to development; Kuwait, Saudi Arabia and Iran stressed the importance of market forces, even though the government played a leadership role in all three. Government budgets also differ in size: Saudi Arabia’s planned budget for 1984/85 is 60 percent higher than Iran’s, and exceeds by a far greater margin those of Egypt, Algeria, Iraq, and Kuwait.

During the past decade all of the countries under review have reevaluated their development strategies, and in some cases dramatically shifted priorities. This occurred earliest in Egypt, with the adoption of the “Open Door” policy in 1973 in an effort to liberalize the Egyptian economy. In all of the countries under review, in the late 1970’s and 1980’s, the scope of plans was scaled back and sectoral priorities were shifted in response to oil revenue declines.

ALGERIA

Algeria began its development program by stressing rapid industrialization in the context of a socialist model of development. Toward the end of the 1970’s, however, priorities shifted toward emphasis on the long-neglected agricultural and infrastructural sectors, and the economy was liberalized. Socialism has not been abandoned, but has been made what Western observers termed more “pragmatic” to meet the demands of contemporary Algerian society.

In 1967, the Algerian Government launched its program of massive heavy industrialization, an orientation that continued well into the second and third plan periods. In the 1970-77 period, Algeria invested heavily in industry to the virtual exclusion or neglect of agriculture. During that period, the plan called for investment of 44 to 45 percent of the total budget in industry.⁵ Especially after 1978, with the death of President Boumedienne, domestic critics within the government planning community began to criticize the strategy of heavy massive industrialization. Facing financial constraints, moreover, planners reassessed the role of the private sector and foreign involvement.

In the late 1970’s, there was a marked shift in Algerian priorities toward the development of infrastructure, human resources, and agriculture. Efforts were made to open the economy more to private sector initiative and foreign participation, Table 91 shows the breakdown of expenditures for the latest 5-year plan, 1980-84. This plan calls for total investments of \$104,527 million, almost half of which is to be allocated for programs studied and/or approved in previous plans. Gross domestic product (GDP) is projected to grow at 8.2 percent annually. The largest investment, totalling \$40,339 million, will be in industry, but its share of total planned investment has declined to 38 percent. And while industrial development is still fundamental to Algeria’s long-term policy, the focus has shifted from heavy to light industry. The country’s critical housing sector received an allocation of \$16,656 million, or about 17 percent of total planned investment, and education and training and social infrastructure together com-

³By 1978, Algeria had achieved a status which was unique in the Middle East. The rate of investment in domestic industrial development (and related) projects was approximately 40 percent. But this high level of investment was at the expense of improved social, housing and consumer levels, and caused regional imbalances in Algeria’s development. For planned and actual investments in agriculture and industry 1970-77, see “Investissements Synthèse du *Bilan Economique et Social de la Decennie*, prepared by the Ministry of Planning and Regional Development (Algiers: Republique Algerienne Democratique et Populaire, May 1980), p. 5.

Table 91 .—Algeria: Planned Government Investments 1980-84 (AD '000 million)

| | Preprogrammed schemes | New schemes | Total | Expenditure, 1980-84 | Expenditure beyond 1984 |
|--|--------------------------|----------------|-------|-------------------------|----------------------------|
| industry | 79.5 | 132.2 | 211.7 | 154.5 | 57.2 |
| Hydrocarbons | 28.4 | 49.2 | 77.7 | 63.0 | 14.7 |
| Agriculture | 17.8 | 41.6 | 59.4 | 47.1 | 12.3 |
| Forests | 0.7 | 3.3 | 4.0 | 3.2 | 0.8 |
| Agriculture | 6.0 | 17.9 | 23.9 | 20.0 | 3.9 |
| Water | 10.9 | 19.1 | 30.0 | 23.0 | 7.0 |
| Fisheries | 0.2 | 1.3 | 1.5 | 0.9 | 0.6 |
| Transport/economic Infrastructure | 19.9 | 36.2 | 56.1 | 37.9 | 18.2 |
| Communications | 6.8 | 12.5 | 19.3 | 12.5 | 6.8 |
| Railways | 1.8 | 7.1 | 8.9 | 5.0 | 3.9 |
| Telecommunications | 1.8 | 6.2 | 8.0 | 6.0 | 2.0 |
| Storage and distribution | 8.8 | 9.0 | 17.8 | 13.0 | 4.8 |
| Industrial zones | 0.7 | 1.4 | 2.1 | 1.4 | 0.7 |
| Housing, education, and training | 30.3 | 35.4 | 65.7 | 42.2 | 23.5 |
| Social infrastructure | 6.7 | 14.3 | 21.0 | 16.3 | 4.7 |
| Health | 3.6 | 6.2 | 9.8 | 7.0 | 2.8 |
| Collective equipment | 2.4 | 10.9 | 13.3 | 9.6 | 3.7 |
| Production enterprises | 3.4 | 21.6 | 25.0 | 20.0 | 5.0 |
| Total, | 196.9 | 3636 | 560.5 | 400.6 | 159.9 |

Exchange rate \$1 = AD 38325 (1980)
Totals may not add because of rounding

SOURCE Government of Algeria statistics and Middle East Economic Digest Nov. 21 1980 p 20

prised about 16 percent of total planned investment. The current plan thus represents a distinct shift away from the earlier preoccupation with heavy industrialization.

E G Y P T

Egypt also had a socialist orientation and a similar emphasis on heavy industrial development during the 1960's, but this changed dramatically in 1973 with the economic liberalization initiated through Sadat's "Open Door" policy. During the 1960's, rapid industrialization along socialist lines, intended to reduce dependency on ex- or neo-colonial powers, was the dominant theme of Nasser's development strategy. Initially the Egyptian economy grew reasonably rapidly: industry and services increased their output and employment shares, while less emphasis was placed on the development of the traditional sector, agriculture. Concurrently, central planning became pervasive throughout the economy. By the late 1960's and early 1970's, however, the rate of economic growth in Egypt began to slow, and the rate of both investment and domestic savings sharply declined. Inef-

ficiencies in the economy, costly external adventures such as the Yemen and-I 967 wars, heavy defense expenditures, and a rapidly increasing population posed heavy burdens. In addition, the industrial strategy of Egypt, which had relied on import substitution or on building indigenous industries protected by high tariff walls, proved problematic. Instead of a decreased import bill, the rising import costs of raw materials and spare parts could not be offset by the export of locally produced products.

With the death of Nasser in 1970 and following the October War of 1973, the principles of a new economic strategy were put forth in President Sadat "October Working Paper. " In order to accelerate economic growth, the private sector was given a greater role and foreign investment was encouraged. The Open Door policy emphasized expansion of production capacity and the introduction of modern technologies (management systems as well as equipment) to realize that production. The Open Door policy has not achieved its stated goals, particularly the dynamic expansion of the private sector in industry and investment. But while fundamental economic reform re-

mained elusive, Egypt's economy grew at a comparatively vigorous rate during the 1970's.³

The death of Sadat marked another change in development priorities, as a troubled world economy, the "oil glut," and growing imports severely eroded Egypt foreign exchange balance. Although at the time Egypt was in the second year of the 1978-82 plan, a new 5-year plan was submitted in 1979. Table 92 shows projected targets in the present Egyptian plan for 1982/83-1986/87. The present plan calls for a total fixed investment of 34,790.6 million Egyptian pounds, with priorities directed to infrastructure (housing, utilities, electricity, transport, and communications) industry, and projects to increase exports. According to

"GDP grew 8.1 percent annually during the 1970-81 period, and the manufacturing sector at 8.7 percent, The World Bank, *World Development Report — 1983* (New York: Oxford University Press, 1983), p. 150. For a detailed analysis of the complex relationship of public and private sectors in Egypt, see John Waterbury, *The Egypt of Nasser and Sadat* (Princeton, N.J.: Princeton University Press, 1983), especially ch. 8.

Table 92.— Egypt, Planned Investments, 1982-83 to 1986.87 (in million Egyptian pounds)^a

| Sector | Total investments |
|---|-------------------|
| Agriculture and land reclamation .. | 1,678.4 |
| Irrigation and drainage .. | 2,061.3 |
| Industry and mining .. | 8,616.9 |
| Oil .. | 1,336.7 |
| Electricity .. | 2,903.9 |
| Contracting (building and construction) | 941.7 |
| Total commodity sectors .. | 17,538.9 |
| Transport, storage, and communications .. | 5,779.1 |
| Suez Canal .. | 335.1 |
| Commerce and trade .. | 461.0 |
| Finance and insurance .. | 119.2 |
| Tourism .. | 452.5 |
| Total production services .. | 7,146.9 |
| Housing .. | 4,636.8 |
| Public utilities .. | 2,858.6 |
| Education services .. | 920.8 |
| Health services .. | 651.0 |
| Other services .. | 1,037.6 |
| Total social services .. | 10,104.8 |
| Total fixed investment .. | 34,790.6 |
| Investment spending .. | 695.5 |
| Total investment .. | 35,486.1 |

Some totals may not add because of rounding.

^a\$1 0.8260 Egyptian pounds (July 1983)

SOURCES Egyptian-British Chamber of Commerce Stephen Timewell and Robert Bailey, "Weighing Up the Prospects for Success Special Report Middle East Economic Digest July 1983 p 4

Egypt's General Authority for Investment and Free Zones, "the most important characteristic of the current plan is its emphasis on agriculture/agroindustry and infrastructure as targets for investment. This represents a shift from the reliance on basic industry as the key to future growth which characterized earlier plans, although development of manufacturing industry as well as petroleum and tourism is still given an important place."⁴ The emphasis is on transforming more of Egypt's economy to an industrial base without minimizing the present and future roles of the nonindustrial sectors.

I R A N

Like Egypt and Algeria, Iran under the Shah embarked on a program of industrialization. But unlike those two countries, Iran's program was market-oriented from the start. In Iran's case the reevaluation that began in the late 1970's was accentuated by internal revolution.

The Shah had consolidated his royal power in the early 1960's and initiated a reform program called the White Revolution.⁵ By the early 1970's, the Shah declared that Iran would become one of the top military and industrial powers in the world by the turn of the century, and that by 1990 Iranians would enjoy the standard of living enjoyed by West Europeans. These dreams were called the Great Civilization, a sweeping 19-point program, which was reflected in Iran's Fifth Plan (1973-78). First—unlike Algeria and Egypt of the 1960's—the overall framework of the economy was to remain market-oriented, with the public sector providing the social overhead as well as a regulatory and supervisory function. At the same time—as in Algeria and Egypt—industrialization would be accelerated. For this, the government would carry on some

⁴The General Authority for investment and Free Zones, The Official Guide to *Investment in Egypt* (Cairo, Egypt, 1982), p. 11.

⁵The White Revolution was a multifaceted modernization program begun in 1963. It consisted of six reforms, with one of the most important being land reform. These formed a basis for other reforms made subsequently,

functions of entrepreneurship and financing. Third, stress was laid on "basic needs" in health, education, and welfare and on enhancing "freedom and decisionmaking capabilities. Finally, priority was given to large, capital-intensive projects, to be initiated by the government if the private sector hesitated.

As shown in table 93, this plan called for a total investment of \$36.8 billion during the 5-year period, of which \$22.2 billion was to come from the public sector and \$13.5 billion from the private sector. Rapid growth in oil income, moreover, permitted an upward revision of the fifth 5-year plan, with greatly increased spending on economic development, social welfare, defense infrastructure, and public administration. The revised plan, submitted in 1974, provided for a near doubling of investment, to \$69.59 billion. Investment priorities remained with industry, oil and gas, and housing, but the shares of investment in transport and communications slightly increased.

Performance, however, did not meet expectations. In the mid to late 1970 economic activity was slowed by work stoppages, supply shortages, overloaded infrastructure, inflation, and inefficiency. It became increasingly clear that "Iran's economic activity could not continue at the same frenzied pace; it had to decelerate gradually into a more sustainable tempo in order to ensure continued long-term growth.") A new cabinet, installed

in 1977, attempted to restabilize the economy by promoting more "absorbable" growth, greater intersectoral coordination, and better overall socioeconomic balance. But these policies were nipped in the bud by the 1979 revolution.

Immediately after the revolution, some industrial projects were suspended or stopped, and development plans set back as leaders called for a shift to smaller scale industries. At present, the war with Iraq consumes a large part of the Iranian budget (according to Prime Minister Moussavi, approximately 30 percent of the budget is connected in some way with the war),⁷ but oil revenues remain high, and by the early 1980's Iran's development efforts began again in earnest. For the fiscal year beginning March 21, 1984, a \$48 billion budget was presented to the Majlis, or Iranian parliament. of this, \$5.5 billion was budgeted for education. Roads and transportation, health care and food and social security accounted for the next largest items in the budget. Approximately \$2 billion was earmarked for industry, and industrial production is projected to rise rapidly.⁸ Major pieces of legislation have been enacted, such as land reform and foreign trade nationalization. Projects begun under the Shah have been rein-

⁷See "Prime Minister Presents Draft Budget to Majlis," *Tehran Domestic Service in Persian*, Nov 29, 1983, translated in FBIS, *Daily Report, South Asia*, Nov 30, 1983, p. 13.

⁸See Vahe Petrossian, "Khomeini's Iran Radiates Self-Confidence," *Middle East Economic Digest*, Mar 18, 1983, p. 20; see also Vahe Petrossian, "The Iranian Economy Back to Essentials," *Middle East Economic Digest*, Apr 6, 1984, p. 18.

⁴Jahangir Amuzegar, "Growth Without Pain: The New Iranian Development Strategy," *Middle East Problem Paper*, No. 18 (Washington, D.C.: The Middle East Institute, 1978), p. 1.

Table 93. —Iran: Total Fixed Investment 1973-78 (billion U.S. dollars)

| | Original | Revised | Share of revised budget (%) | Increase on original budget (%) |
|-------------------------------|----------|---------|-----------------------------|---------------------------------|
| Industry and mines | 818 | 1253 | 18.0 | 53 |
| Agriculture/natural resources | 2.67 | 458 | 6.6 | 72 |
| Transport and communications | 279 | 729 | 105 | 161 |
| Housing | 596 | 13.78 | 197 | 130 |
| Oil and gas | 683 | 11.72 | 16.8 | 72 |
| Others | 1041 | 1077 | 287 | 90 |
| T o t a l | 3634 | 6959 | 1000 | |

NOTE: Conversion based on \$1 Rs67.50

SOURCE: Compiled from Bank Markazi Annual Report, 1974-76, p.34, from St. Martin Press, 1978, p.31

Robert Graham, *The Illusion of Power*, (New York

stated. Despite earlier statements that Iran did not need the presence of outside experts, the Iranian Government is slowly bringing back foreign experts from Western Europe, Asia, and the Soviet bloc.

I R A Q

Like Algeria and Egypt in the 1960's, Iraq began its economic development program with a socialist orientation; but unlike these two countries, the goal was not rapid industrialization. Instead, Iraq placed greater emphasis in the 1960's on agriculture and light industry. And beginning in 1972, major efforts were made to create a triadic economy based on oil, resource-based industries, and agriculture. Initially, this was conceived as a three-step process: In 1972, oil production and export facilities such as terminals and pipelines were expanded and modernized. Next, heavy investments were made in export-targeted, resource-based industries in 1974-75. The development of downstream facilities related to hydrocarbons and petrochemicals was a centerpiece of this effort. The third step in the development plan involved consolidation and elimination of manpower and infrastructural problems. Significant emphasis was placed on agricultural development for the long term. Educational, medical, and housing sectors, which contribute to productivity of labor, were also central concerns.

As elsewhere in the Middle East, a decline in real oil prices in the late 1970 caused a re-evaluation of development strategies. But for Iraq in particular, the necessity to trim back development plans was exacerbated by the outbreak of war with Iran. Initially, Iraq adhered to a policy that emphasized continuing both the war effort and economic development policies full steam. Today, however, with no end to the war in sight and tremendous declines in oil revenues, Iraq has been forced to abandon this policy. In 1983 the decline in aid from the Gulf States, coupled with the shut-down of Gulf oil terminals and the Syrian pipeline, led to severe austerity measures, with only the most strategic development projects

continuing to receive public funding.⁹ In the latest 5-year plan (1981-85), expenditures were projected to reach \$75 billion, with emphasis on services, electricity, transport, and construction.

S A U D I A R A B I A

Saudi Arabia and Kuwait (discussed later) are both market-oriented, oil rich, and relatively poor in indigenous labor. They are attempting, through the purchase of advanced technology with their tremendous oil wealth, to diversify their economies away from oil. But whereas Saudi Arabia has emphasized industrial development, Kuwait as a city-state has shied away from this-outside of the petroleum sector.

From the early 1970's Saudi Arabia's development strategy focused on balanced economic development in a free market economy. Saudi Arabia's relatively balanced and modest first 5-year plan (1970-75) reflected these aims. Spending, including defense, was only \$8.8 billion (1970 rate of exchange) and was primarily aimed at basic infrastructure, such as ports, roads, and schools. When the oil price increased in the middle of the first plan, there was no chaotic rush to development; instead, the first plan was extended by 2 years, to 1975, generally along the same guidelines. The second Saudi 5-year plan (1975-80) was aimed at industrial development and human services, particularly higher education and telecommunications, with health services (in contrast to those of Kuwait) receiving only 2 percent of the budget. Total spending rose to a supposed \$142 billion, or more than 16 times that of the first 5-year plan. But as a result of substantial underspending and earnings much higher than anticipated, reserves grew to more than \$100 billion by 1980. During the decade of the 1970's, then, initial emphasis on infrastructure gave way gradually to stress on industrial plans and manpower development.

⁹ Human losses from the war with Iran—estimated at over 50,000 as of December 1981—have drained Iraq of much-needed manpower resources. See Roger Matthews, "Iraq: The Real and Unreal War," *Financial Times*, Dec. 9, 1983.

With the decline in oil revenues in the early 1980's, Saudi development plans were cut back, although shifts in sectoral priorities were not as great. Table 94 shows total government expenditure by sector for the second and third development plans. The third 5-year plan reflects a continuing commitment to finish basic industrial plants. But instead of the past emphasis on high growth in all sectors, relatively free import of foreign labor, and infrastructure development, the plan now stresses selective growth, consolidation of the foreign labor force, and economic and human resource development. Infrastructure, for example, received half the total development budget in the second plan, but only a planned 35.5 percent of the budgeted funds in the third plan. Instead, the third plan places heavy emphasis on training Saudis and replacing foreigners, reflecting the concern about the failure to reach the manpower training goals of the second development plan.

Beginning in 1982-83, Saudi Arabia began to slow (and even cut in absolute terms) the level of public expenditure. In 1983-84, expenditures were reportedly about \$68 billion, and revenues were about \$64 billion, producing a deficit estimated at \$3 billion to \$14 billion. Saudi Arabia made a comparatively smooth adjustment to lower income levels.¹⁰

Edmund O'Sullivan, "Saudi Arabia: Learning to Live on 1/3 Less," *Middle East Economic Digest*, Mar. 9, 1984, p. 20.

Like other Middle Eastern countries (e. g., Egypt in its free zones), Saudi Arabia stresses regional development in its plans. One feature which stands out in this regard in scope and scale are two industrial development projects, Yanbu and Jubail, which the Saudi development plan accords special consideration (see ch. 5). In this respect, the objectives of the third plan include the construction of massive whole new ports and cities for basic petroleum and energy-related industries, as well as the building of needed industrial and community infrastructure and the training of Saudis to man the industrial plants,

Today, the Saudis have begun planning the fourth 5-year plan period, scheduled to begin in the spring of 1985. With much of the essential infrastructure already in place, efforts will continue to diversify the oil-centered economy. The challenge of building the manufacturing sector in a period of slower growth in oil revenues will undoubtedly be a central issue in the years ahead.

KUWAIT

Of the Middle Eastern countries under review, only Kuwait decided early not to build large nonoil industries, recognizing that it was too small to support more than a few industries, and mostly those associated with petroleum. Instead, Kuwait has plans to emerge as

Table 94.— Saudi Arabia: Planned Government Expenditures, 1975-80 and 1980-85
(in SR billion, current prices)^a

| Function of expenditures | Total planned expenditures ^b 3rd plan (1 980-85) | 2nd plan ^c percent (1 975-80) | 3rd plan percent (1 980-85) |
|---|---|--|-----------------------------------|
| Economic resources development . . . | 261.8 | 251 | 373 |
| Human resources development . . . | 1296 | 15.9 | 185 |
| Social development . . . | 61.2 | 9.4 | 87 |
| Physical infrastructure . . . | 249.1 | 496 | 35.5 |
| Subtotal: development | 701.7 | 1000 | 1000 |
| Administration | 31.4 | 67 | 45 |
| Emergency reserves, subsidies | 496 | 159 | 71 |
| Total civilian expenditure . . . | 7827 | 1226 | 1116 |

^a\$1 U.S. = 3.33 SR (1980 year average)

^bThe total excludes 1) transfer payments 2) noncivilian sectors, and 3) foreign aid

^cBased on actual and estimated values for 1975-80; 1980-85

^dAdministration includes ministries and agencies with primary administrative functions and judicial and religious agencies

SOURCE: Kingdom of Saudi Arabia Ministry of Planning, Third Development Plan, 1400-1405, A.H. 1980-85, A.D. p.88

a financial and service center for the region. In the early to mid-1970's, therefore, government investments were concentrated mainly in public works and services. Despite the establishment of the General Authority of the Shuaiba Industrial Area, industrialization has remained a lower priority, and the approach has been cautious and gradual.

As in other Middle Eastern countries, the financial pressures ensuing from lower oil revenues caused a basic change in the pace of Kuwaiti development which began in the late 1970's. In 1983, project expenditures were substantially reduced, and several large projects long underway were temporarily stopped or canceled.¹ But in light of continued high investment income for Kuwait, these changes represented more of a scaling back of existing plans rather than a reorientation of priorities.

Government investment in industry is mainly confined to oil-related enterprises, where the goal is to upgrade and expand the refining sector and perhaps to build a petrochemicals complex. Outside of the oil sector, Kuwaiti plans have stressed expenditures in urban development, ports, transportation and roads, power generation and transmission, and social programs (table 95). The government, although providing some incentives, leaves industrial development to Kuwaiti entrepreneurs.

To summarize, all of the Middle Eastern countries under review have had generally similar development goals: sustained economic development, infrastructure building, development of manpower resources, and improvement in basic living standards. All of them have reevaluated development strategies during the last decade, with the result that emphasis has in most cases shifted away from exclusive stress on heavy industrialization and toward economic diversification. Nevertheless, specific development goals vary widely (ranging from Kuwait aim of becoming a financial center to Algeria's stress on agriculture and light industrial development) as do approaches to

Table 95.—Kuwait Government Draft Budget: Expenditures by Ministries (Kuwait Dinars, in millions)^a

| Expenditure by ministries | 1981-82 | 1982-83 | Percent change |
|---|---------|---------|----------------|
| Defense, Interior, and Justice | 312.8 | 338.0 | 8.0 |
| Education | 221.5 | 246.0 | 11.0 |
| Health | 171.7 | 191.5 | 11.5 |
| Information | 40.0 | 39.2 | -2.0 |
| Social and Labor Affairs | 43.2 | 48.9 | 13.2 |
| Electricity and Water | 538.7 | 619.0 | 14.9 |
| Public Works | 260.2 | 231.5 | -11.0 |
| Communications | 75.8 | 73.8 | -2.6 |
| Finance (General Adm. and General Accounts) | 1,127.8 | 1,012.4 | -10.4 |
| Oil | 3.3 | 90.5 | 374.2 |
| Planning | 21.8 | 27.9 | 28.0 |
| Housing and Government Property | 1.6 | 1.2 | -25.0 |
| Commerce and Industry | 44.5 | 44.3 | -0.5 |
| Endowments and Islamic Affairs | 9.5 | 9.6 | 1.0 |
| Foreign Affairs | 23.9 | 20.2 | -15.9 |
| Amiri Court and Others | 33.4 | 38.7 | 15.8 |
| Supplementary allocation | 66.6 | 124.3 | 86.6 |
| Total expenditures | 3,007.7 | 3,168.0 | 5.3 |

^a1 KD = \$359 U.S. (1981 average)

NOTE: Does not include investment income

SOURCE: National Bank of Kuwait vol One No 2 October 1982

these goals. These different development strategies have important implications for technology transfer.

IMPLICATIONS FOR TECHNOLOGY TRANSFER

Technology transfer from abroad has been a major requirement of all the development strategies pursued by Middle Eastern countries. Initially, however, little explicit attention was given to technology transfer in official policies. Iran was probably the most vigorous in its early pursuit of Western technology transfer; other countries such as Algeria and Egypt initially relied more on the Soviet Union. In the past decade, however, all of these countries have come to place high priority on the acquisition of Western technology. In addition, as development goals were reevaluated, issues concerning the scale and type of technology transfer, the relationship to foreign suppliers, and the role of science and technology policies were more directly addressed.

¹A case in point was the indefinite postponement of a billion dollar petrochemical complex. See "Coping in the Gulf," *The Washington Report*, May 30, 1983, pp. 4-5.

One key issue has been the decision about whether to import capital- or labor-intensive, industrial or nonindustrial, technologies. With a limited manpower base, Saudi planners have chosen capital-intensive technology in order to build world-class industries. In prerevolutionary Iran, where the population was many times greater, leaders likewise attempted to acquire state-of-the-art, capital-intensive technology while talking about employment-generating, foreign exchange-saving, or linkage-creating technologies.

In those countries poorer in capital but richer in labor, this has become a central issue. In Egypt it is being debated and official policy remains unclear. Some planners argue that capital-intensive technologies are needed in some sectors to complement continuing labor-intensive production in others. Other planners, however, oppose this approach, which they see as weakening local manufacturers while making Egypt even more dependent on foreign suppliers. In Algeria, where development plans shifted away from heavy industrialization, labor-intensive technology importation has become more prominent. While capital-intensive technology transfers remain central to the development strategies of all those countries, in some cases there has been growing interest in labor-intensive technologies.

A second major issue has revolved around relationships with foreign suppliers of technology. Desiring technology developed abroad, but wishing to limit dependence on foreign technology, these countries have adopted widely differing approaches.

Kuwait's approach to technology transfer has been to purchase directly from foreign suppliers. In some cases, this has involved the equity purchase of foreign firms. To Kuwaiti planners, investment in foreign companies and technology transfer go hand in hand. Probably the best known example is Kuwait Petroleum Corp. (KPC) purchase of Santa Fe International Corp. in 1981. The purchase of Santa Fe for \$2.5 billion has given KPC substantial upstream capability in exploration and oilfield services. C. F. Braun & Co., Santa Fe's sub-

siary, provides KPC with in-house process engineering capacity, already being utilized in a major domestic refinery upgrading scheme. Kuwait 25 percent investment in the West German firm Hoechst reportedly led to an ammonia supply agreement with that company.¹² This investment-oriented approach has been questioned at home by those concerned with costs and by observers in the West who worry about foreign acquisition of domestic firms. While investment in a foreign firm does not guarantee technology transfer, it may open up markets for products and facilitate long-term interactions.

In Saudi Arabia, on the other hand, planners have emphasized technology transfer through joint ventures. "Foreign capital investment in the field of manufacturing, the Saudi Consulting House states, "particularly in the form of a joint venture for which considerable incentives are granted, is highly encouraged in the Kingdom. The basic objective is to effect a transfer of technology and management know-how."¹³

Saudi leaders welcome continued foreign involvement because they believe it ensures technology transfer. The Saudi "strategy" requires the joint venture foreign partner to provide advanced technology, sometimes to market the product, and often to provide training for Saudi nationals. Egypt also encourages joint ventures, but more for financial than manpower reasons. In Saudi Arabia, the shortage of technical manpower is a main stimulus.

In years past, Algeria, Iraq, and prerevolutionary Iran, more wary of foreign involvement, have all stressed acquisition of technology in turnkey plants, with technical assistance designed to lead more quickly to independent operation. Iraqi planners set a strategy whereby foreign expertise may be utilized in Iraq for a period of time to train indigenous cadres, but only on a short-term basis.

¹²Shakib Otaqui, "Kuwait's Economy Defies Crash and Crisis," *Middle East Economic Digest*, Aug. 26, 1983, p. 19.

¹³*Guide to Industrial Investment* (Riyadh: Saudi Consulting House, 1981), p. 102.

Algeria has also traditionally emphasized technology transfer through turnkey operations, for many of the same reasons. But unlike Iraq, Algerian planners began in the early 1970's to promote joint ventures with foreign partners, albeit on a more limited basis than did Saudi Arabia. The Chadli government currently supports joint ventures with foreign firms on a close to equity basis rather than large-scale turnkey contracts because such joint ventures will, it hopes, encourage more technology transfer through in-house training of Algerian personnel and the greater long-term commitment of the foreign partner to the joint enterprise.

As technology transfer has increased, many Middle Eastern countries have attempted to establish a more coherent plan for linking science and technology development. Especially during the past few years, many of the countries under review have begun national planning exercises to define policies better in this area. Policy makers concerned about the ad hoc nature of their approach to technology transfer and limited technology absorption believe that policies must be greatly improved in this area.

For some years now, Egyptian leaders have been working to build a science and technology policy for their country, (App. 11A includes a summary of major recommendations from studies on science and technology in Egypt.) An Egyptian 5-year plan for science and technology, completed in December 1982, marks the first time that such a plan has been attempted, and is an impressive achievement. The plan is very broad in scope. One problem has been linking the general discussions of science and technology to the immediate needs of the end-users of technology. For example, a draft code on technology regulation is under development, but sectoral priorities have not

been set. This exercise has undoubtedly increased coordination and awareness among government agencies, however.

In many of the other countries under review, organizations have been established to formulate national science and technology policies. In Saudi Arabia, for example, an independent agency—the Saudi Arabian National Center for Science and Technology, or SANCST—was created in 1977 to formulate and coordinate a national science policy for the Kingdom, to direct scientific research to areas of national interest, and to oversee the acquisition of foreign technology. Two objectives have been central to Saudi discussions of a science and technology policy: the transformation of society's material conditions through the selection, transfer, and management of advanced technology while simultaneously preserving cultural values; and the development of the Kingdom's natural and human resources by reducing the economy's dependence on foreign manpower and on depletable hydrocarbon resources.

All of the countries have viewed scientific research as important to building an indigenous technical base. Science is, however, generally rather removed from the immediate needs of industrial end-users of imported technology in developing countries. It is therefore striking that in all of these countries, technology transfer has become an issue in its own right. As a matter of national debate among key leaders, the emphasis has often been on coordinating the various government agencies involved in an attempt to formulate a more consistent policy. In practice, however, routine decisions about which technologies to import, from whom, and under what conditions tend to be driven by development plans as implemented by the functional agencies.

PLANNING AND ADMINISTRATIVE INSTITUTIONS

Institutions that plan and carry out development strategies are critical for technology transfer because they incorporate technical, commercial, managerial, financial, and research expertise required to diagnose problems effectively and to select and fully absorb technologies. The purpose of this section is to review institutional mechanisms developed in Middle Eastern nations. The central themes are changes in institutional structure, and the relationship of public and private sectors in formulating and implementing technology transfer policies.

As in other developing countries, Middle Eastern leaders face two central institutional issues important for technology transfer: creating an effective network of institutions to formulate and implement technology transfer policies and defining the respective roles of the public and private sectors. The countries under review range from those, such as Egypt, where the number of organizations involved in technology transfer is very large and the decisionmaking apparatus very diffuse, to countries such as prerevolutionary Iran, where decisionmaking was highly centralized under one man. Similarity, variation is evident along the second dimension as well: Saudi Arabia and Kuwait encourage the private sector to play a central role in technology transfer, while socialist countries such as Algeria and Iraq have in years past more carefully circumscribed the private sector role.

Despite these differences, the countries under review have much in common. First, these countries are not unique in their efforts to create efficient institutions and in their struggle with issues such as centralization versus decentralization of decisionmaking. Second, it should be stressed from the outset that the public and private sectors are actually closely interrelated in the countries under review; and while it may appear on the surface that the two are at odds, they are very much mutually dependent. In all of the countries

under review, moreover, the state plays the pivotal role in technology transfer, while the role of the private sector has been limited.

It is particularly striking that in recent years, all of the countries under review have increasingly pursued policies aimed at more administrative decentralization and a greater degree of economic liberalization in promotion of the private sector. This has been true even in those countries, such as Algeria and Iraq, that have pursued a socialist and centrally directed course of development.

In attempting to develop effective institutions, policy-makers in the Middle East must deal with concerns of various political and social groups. Powerful groups—such as those that have vested interests in the status quo—often oppose reform aimed to improve efficiency. Institutional questions therefore should be viewed not only as matters of efficiency, but also as political and social issues.

EGYPT

In Egypt, a large number of government organizations—ministries, authorities, agencies, and departments—participate in the planning, project implementation, and operation of public companies, and the number of government employees is comparatively high. By the mid-1970's, more than 1 million employees were concentrated in government administration. During the latter part of the 1970's, the number continued to grow reflecting a tradition of guaranteeing a job to all university graduates. By the late 1970's the Egyptian Government employed about one-third of the total work force and paid nearly two-thirds of the national wage bill.¹⁴

Within this wide range of people and institutions, the Ministry of Industry and Mineral Wealth—which is responsible for the formula-

¹⁴Waterbury, op. cit., p. 244

tion of industrial policies that influence technology transfer and their implementation—is a key institution. Its main operating arm, the General Organization for Industrialization (GOFI), formulates the long-term industrial strategy and makes routine decisions that directly affect technology transfer to Egypt. The main functions of GOFI that relate to technology transfer include the formulation of industrial development plans to guide the public and local private sectors; cooperation with foreign and domestic organizations and firms transferring technology; collection of data on industrial production and assistance in the dissemination of information on technological innovation; identification of investment opportunities; conduct of preinvestment and feasibility studies for industrial projects; participation in conjunction with concerned companies in concluding contracts for machinery and equipment deliveries; review of applications submitted by foreign investors; and examination of applications submitted to the Ministry of Industry for licenses to establish or expand Egyptian industrial private enterprises. GOFI has a broad mandate and exercises considerable authority in dealing with specific cases of technology transfer.

In addition to GOFI, a number of other institutions are involved in different aspects of technology transfer. Under Law 43 of 1974—the main law governing foreign investment in Egypt (see below)—the General Authority for Foreign Investment and Free Zones (GAFI) was established as its primary implementing agency. While the Board of GAFI must approve all private investment proposals, however, the technical evaluation of proposed investments is made by the appropriate line ministry and is ultimately reviewed by GOFI.

The Academy of Scientific Research and Technology (the ASRT) functions as a coordinator of science and technology policies, as mentioned above. The ASRT, in turn, is comprised of a number of specialized research councils, such as the National Council of Education, Scientific Research, and Technology (NCESRT), the National Council of Production and Economic Affairs (NCPEA), and principal

committees, that work to build policy consensus in various areas. The ASRT and its committees, however, are not the actual implementors of technology transfer.

As mentioned earlier, the private sector has also been promoted in Egypt since the early 1970's. Today, however, the role of the non-agricultural private sector in the Egyptian economy is still limited, and the public sector predominates. The large Egyptian Government bureaucracy has gained a reputation for inefficiency and lack of coordination among the large number of public enterprises, government agencies and organizations, and private companies. Indeed the present Egyptian 5-year plan expresses concern over problems in the public sector, including "poor administration, managerial and technical capabilities, inadequate allocations for replacement and renewal of assets, increasing indebtedness and liquidity problems, increasing losses due to the government's attempts to control price movements . . ." ¹⁵ Technology transfer is constrained by long delays in approving foreign investment projects and lags in delivery of goods. ¹⁶

Economic and bureaucratic reform remain common themes among Egyptian planners. But while Egyptian planners stress the need to streamline the public sector and provide the private sector greater scope, most of the investment envisaged in the present 5-year plan is allocated to the public sector, and decentralization of decisionmaking has progressed slowly. Egypt's Minister for Investment Affairs and International Cooperation, Wagih Shindy, has since assuming his post in 1982 announced a series of "antibureaucracy measures" directed at encouraging foreign investment.

¹⁵Quoted in Charles Richards, "Made in Egypt—A President's Dream," *Middle East Economic Digest*, Special Report, July 1983, p. 20. Although the public sector accounts for about 90 percent of current industrial investment, for example, it provides less than three-fourths of industrial output.

¹⁶For a discussion of this, see David Ignatius, "Egyptian Bureaucracy Galls Both the Public and Foreign Investors," *The Wall Street Journal*, Mar. 24, 1983, p. 1. For a discussion of some of the private and public sector debates, see Henry Bruton, "Private Enterprise and Social Welfare," *Investment Review*, July 1980, p. 3.

These include shortening the review period for foreign investment proposals and consolidating the authority to eliminate the confusing overlap of responsibility among various *ministries*. While it is too soon to know whether the effect of these measures will be to improve the Egyptian investment climate, these steps indicate strong commitment among some Egyptian leaders to reform.

ALGERIA

Although there are many who play a role in technology transfer to Algeria, decisionmaking in Algeria as it relates to technology transfer is comparatively centralized, with a limited role reserved for the private sector. The main actors are the ministries and the 60 to 70 state companies, or the *sociétés nationales*, under their jurisdiction. The Ministry of Planning and National Development, the most significant organization in setting overall priorities for technology transfer, determines the goals of the 5-year plan and any subsequent modifications. Other ministries are responsible for decisions concerning their particular sectors. The ministries currently responsible for setting priorities and planning for the government in the five sectors studied by OTA, for example, are the Ministries of Planning and Regional Development, of Energy and Petrochemical Industries, of Health, of Posts and Telecommunications, and of Transportation and Fisheries (for civil aviation), and the President's Commission for the Development of New Forms of Energy (for nuclear power). State companies such as the oil and gas company Sonatrach are the end-users of the technology in most cases.

Algeria's private sector has traditionally played only a small role in technology transfer. During the first 6 years after President Boumedienne came to power (1965-71), most of the industrial and service sectors and all major foreign and domestic enterprises were nationalized and organized into national, state-owned corporations. It is estimated that by 1972, Algerian state-owned companies con-

trolled 90 percent of the industrial sector and employed 70 percent of the industrial personnel; the public sector was clearly dominant in most areas of economic development and almost all areas of technology transfer.

Nonetheless, despite this heavy centralization of the public sector, a small but significant private sector has continued to exist in Algeria, with the public sector clearly dominant and the private sector concentrated in light industry and the services. The Algerian Government encouraged this by offering strong material incentives to private investors, for example, to invest in projects deemed vital by the government.¹⁷ In the mid-1970's, under the new Chadli government, the private sector was further expanded. With a significantly better record for productivity than the state or public sector, the private sector was officially encouraged to participate in the development process and was allowed greater leeway in its participation.

In theory, the authority to make decisions about technology transfer is clearly specified. The appropriate minister (e.g., of Energy and Petrochemical Industries) decides on a given project after a state company (e.g., Sonatrach) makes the proposal. The sector of Sonatrach that has initiated the project then negotiates the project, being responsible for the publication of the tender, the selection of the most appropriate offer made by international contractors, and the negotiation and implementation of the contract terms. However, the minister may exercise veto power. Once the contract is approved by the minister, the state company responsible for initiating the project purchases equipment and begins implementation.

In practice, however, a high degree of centralization in decisionmaking requires a large number of intermediate steps that often result

¹⁷-As outlined in the Investment code of 1967, these included a 10% Car total or partial exemption from real estate tax; reductions on some import duties; tax exemptions; and other incentives to attract particularly large private sector investments in industry.

in considerable delays. Technology transfer at every step of the process in Algeria, from visits of the chief executive officers of major U.S. firms to Algiers to the signing and execution of contracts, has been fraught with delays and a degree of bureaucratic arbitrariness that seriously impedes smooth and harmonious cooperation.¹⁹ According to foreign businessmen, approximately 60 signatures may be required by Sonatrach to authorize the purchase of spare parts for a gas liquefaction plant. In general, delays from 1 to 2 years from contract letting to final contract approval are apparently not uncommon.

To combat these shortcomings, the Chadli government has instituted a number of measures to decentralize decisionmaking in many public sector institutions and to further legitimize the role of the private sector. It has also introduced a number of measures to cut down on corruption²⁰ and to streamline the operations of existing institutions—such as the establishment of the Audit Council. The recent decentralization of Sonatrach into 13 sectors, for example, and the reorganization of other state companies (e. g., Sonacome, the State mechanical engineering company) suggest a greater concern with efficiency in Algeria's public sector. In addition, a resolution adopted in late December 1981 by the Central Commit-

tee of the Front de Liberation Nationale (FLN) Party assigned a greater economic role to Algeria's private sector. The Planning and Regional Development Ministry, for example, has set up a new department to promote industrial opportunities for private businessmen in Algeria.²¹ But while the private sector is being strengthened, the Algerian Government has not departed from preserving the leading role for the state in the "strategic" sectors and most aspects of technology transfer. The role of the private sector thus remains circumscribed, and the public sector is still clearly dominant in large-scale industry, finance and imports, and much of agriculture.

IRAQ

In Iraq, technology transfer decisions in particular, and planning and supervision of economic growth generally, are centralized in the presidency, the Revolutionary Command Council (RCC), the Ba'ath Party, and the ministries of government. The RCC and the party set economic targets and priorities, with input mainly from the Central Bank, the Planning Ministry, the Finance Ministry, and the line ministries." While major project goals are formulated at all levels, proposals compete for attention at the RCC and planning levels and the RCC serves as final arbiter.

The inner workings of the RCC and Ba'ath are not well understood outside Iraq. Keeping in mind that directives from administrative or party superiors may be interposed at any point in the process, however, the basic elements of decisionmaking can be briefly described. Details of the proposed project are

¹⁹"In an increasingly regulated, increasingly supervised and increasingly inefficient world, the Algerian bureaucracy maintains its standing as one of the most difficult with which to deal . . ." John Nellis, "Maladministration: Causes or Result of Underdevelopment? The Algerian Example," *Canadian Journal of African Studies*, vol. 13, No. 3, 1 W, pp. 410.

²⁰Interviews in 1983 with two French officials directly involved in negotiating contracts with Algerians for infrastructure projects (e. g., dams, railroads and rapid transit systems) suggested that the many intermediate steps—negotiations on contract terms, the written acceptance of the contract by both parties, the issuance of a letter of award by the Algerian party, the formal signing of the contract, ministerial approval of the contract by the relevant ministry, financial approval of the contract by the Ministry of Finance, issuance of an import license (authorisation generale)—are fraught with delays and red tape.

²¹For a discussion of this and other measures to monitor or cut down on corruption in public sector organizations, see R. Kh. "The In-House Opposition Which Bendjedid Inherited From Boumedienne and Augmented is a Preventive Measure That Did Not Forestall Opposition Outside the Government," *Al-Nahar*, 41-*Arabi Wa Al-Duwali*, No. 190, November 1982, pp. 22-28; translated in FBIS, "Stat us of Local Opposition Analyzed," Joint Publications Research Service, Near East South Asia, Jan. 1, 1983, pp. 1-3.

²¹In addition, beginning in January 1983, the 31 wilayates, or provincial governments in Algeria have been given the authority to receive contracts from private Algerian firms to initiate public projects with the provincial government or with municipal governments, although this may not exceed about 30 million A L, (approximately \$6.6 million). See "Algeria Relaxes Private Sector Barriers," *Middle East Economic Digest*, May 13, 1983, p. 40.

²²The National Assembly, recently resurrected, has not attained the importance it held in planning before the rise of the Ba'ath Party, particularly in its highly centralized current form. Also significant here could be the Regional Energy Commission, but this has yet to become apparent.

sketched out by planning board officials, often in consultation with foreign experts and advisors. Preferences for certain kinds of equipment have been developed by the line ministries, based on political considerations, past performance, reputation, and other factors such as terms of credit. Bids are invited largely through resident commercial attaches. Three criteria have been important in the selection of a project to be implemented by a foreign concern in Iraq: the project's importance for the country's welfare, its speed of implementation, and its size. A final decision to proceed is made by "the Committee, composed of the Oil-Affairs, Follow-up, and Agreement Implementation Committees.

Once a project has been selected, it is carried out under the direct supervision of the committee or, if the committee so decides, of a ministry or other official or semiofficial authority. The committee is the legal authority to which the contractor must appeal for making "necessary decisions relating to the project" and for granting "any exemptions. A technical coremittee is also formed to coordinate and study the mode of implementing the project. The technical committee may award special exemptions and privileges, such as tax exemptions and lifting restrictions on work permits. Thus the contracting officials have considerable discretion in defining the terms of the contract. The Ministry of Industry, especially its Standing Committee for Growth and Development and its Organization of Industrial Investment, regulates technology transfer.

In practice, several observers have cited a relatively high degree of centralization and coordination in Iraqi economic planning. A significant factor accounting for this coordination in policy, these observers feel, has been the personal loyalty due the President and the similarity of background of a number of leading participants; several, for example, have come from the village of Tikrit, are relatives of the President, or have served with the President in other capacities.

Nonetheless, the system is not monolithic in Iraq. The technocrats, who have been increasingly Western-educated, are afforded opportunities to make proposals that may be at odds with those of the main political leaders. In Iraq, the input of technocrats is considered important, but their views may be overruled at any point by a relatively small group of political superiors. As Iraq's President Saddam Hussein has stated:

You cannot deal with the major economic and technical questions without consulting the technical experts. But do not leave the job of economic leadership to them. Give them no opportunity to assume the role of leader. Instead, they must always work under the direction and leadership of the revolution, which has unlimited capacity and expert technical knowledge. It knows the revolution, understands the methods by which to alter society in general and which direction the change should take, and uses every economic movement to serve itself and its aims.²³

Although the private sector has traditionally played a very small role in Iraq, in recent years the government has attempted to liberalize the economy and invite private firms to play a larger role. In Iraq's first 5-year plan, for example, 50 million Iraqi dinars were set aside for industrial private investment; the present plan (1981-85) includes 380 million dinars for the purpose. "The Iraqi Government has also been expanding the industrial cooperative bank, offering low-interest loans to private industrial investors. And Law No. 115 enacted in 1982 offered other incentives to private investors. The permitted ceiling on the size of private investments was raised and tax exemptions were offered to private indus-

²³See Amir Iskander, *Saddam Hussein: The Fighter, The Thinker, and The Man* (Paris: Hachette Realites, 1980), p. 233.

²⁴See "Government Encourages Private Sector," translation of *The Baghdad Observer* (Clela Khoshaba), Sept. 24, 1983, p. 4, in JPRS Near East South Asia, Dec. 14, 1983, p. 20. In response to these and other measures, the amount of private investment in Iraq has clearly grown. According to official Iraqi estimates, private investment in industry grew from 11.244 million 1972-81 period to 11.150 million in 1982.

trial firms; profits which are reinvested into research and development and the purchase of patent rights and know-how, for example, are now tax exempt. Iraqi decisionmaking is thus comparatively centralized, but differences in the viewpoints of the political and technocratic leaders nevertheless surface, and the private sector has been promoted. Political leaders, however, make the final decisions. The war with Iran has led to many strains on the system, leading to delayed negotiations with and payments to foreign contractors.

IRAN

The administrative framework for technology transfer was quite centralized in prerevolutionary Iran. It rested largely in the hands of the monarchy.²⁵ The cabinet, consisting of some 20 to 30 ministers and other technocrats handpicked by the Shah himself, was responsible for translating the Shah's broad objectives into actual plans. But unlike many other constitutional monarchs, the Shah played a personal and direct role in the decisionmaking process.

While the various ministries were in charge of implementing projects, the Plan and Budget Office (PBO) drew up the national development plans. Under the nominal jurisdiction of the Prime Minister, the director of PBO enjoyed a great deal of autonomy and direct access to the Shah. PBO drafted the 5-year development plan as well as the government's current expenditures budget. A second layer of more functionally specific institutions provided funds or addressed specific aspects of project implementation. The two most important funding institutions to facilitate the goals of industrialization were the Industrial Credit Bank (ICB)—affiliated with PBO and mandated to provide loans, equity financing, and technical assistance, primarily to the public sector companies—and the Industrial and Mining Development Bank (IMDBI), a quasi-governmental bank whose functions included

loan, equity, and technical assistance to the private sector.

In addition to financial institutions, the Ministry of War also had access to financial resources and sometimes directly imported or set up its own industries. The Military Industries Organization (MIO), an umbrella organization established by the Ministry of War, set up firms such as the Iran Electronics Industries (IEI). IEI, for example, was established with the goal of making the military, and eventually the entire economy, self-sufficient in a wide range of electronic products. It set up subsidiaries and signed a variety of technical assistance contracts with major U.S. electronics firms such as Westinghouse and Control Data Corp., and by the eve of the revolution in Iran at the end of 1978, had assembled a professional cadre of about 2,000 electronics engineers and other specialists.

In the civilian sector, a similar nucleus of industrial innovations and entrepreneurship was the Industrial Development and Renovation Organization (IDRO), created by Parliament in 1967. IDRO was an autonomous government corporation mandated to: 1) establish and operate certain heavy industries; 2) renovate and rejuvenate the deteriorating government factories through technical, managerial, and financial assistance; and 3) contribute to the development of technical and managerial skills in Iran. IDRO created a management and technical training school (Industrial Management Institute), a consulting group (Technology), several dozen manufacturing firms such as the Arak and Tabriz machine tools factories, and the Metallurgical Research Center Co. But while the government of Iran was the prime instigator of development and technology transfer, as IDRO exemplified, the private sector grew to be a significant part of the economy and, in particular, an important source of investment. Iran saw the rise of industrial private entrepreneurs, oriented toward export industries, who were increasingly involved in technology transfer.

Postrevolutionary Iran initially appeared to be a sharp departure from the Shah's Iran.

²⁵See Robert Graham, Iran: *The Illusion of Power* (New York: St. Martins Press, 1978), chs. 8 and 12.

Some institutions of government were dismantled, new Islamic institutions were created, and state control of the economy was expanded. Recently, however, Iranian Government and religious leaders have reestablished some institutions from pre-1979 and appear to be trying to provide a bigger role for the private sector. In contrast to earlier statements, Iranian leaders have recently encouraged a greater role for the private sector in the Iranian economy.²⁶ Thus, in Iran today as before, the relationship of the government to the private sector firm remains an unsettled issue. The dominant role of government planning, however, remains the central theme.

SAUDI ARABIA

Government decisionmaking in Saudi Arabia remains primarily in the hands of the royal family, but many other people are also involved in economic decisionmaking.²⁷ The key participants in the formulation and administration of technology transfer policies are the ministries, a number of specialized agencies that have been created during the past 12 years (including industrial, consulting, and research organizations), and funding organizations such as the Real Estate Development Fund and the Public Investment Fund.

The key ministries responsible for industrial development are the Ministry of Industry and Electricity and the Ministry of Planning. The latter is responsible for preparing the Kingdom's 5-year development plans. The former

²⁶For a discussion of the role of the private sector in post-revolutionary Iran, see "Kind Words for the Private Sector," *Middle East Economic Digest*, Nov. 25, 1983, p. 11. The article quotes Ayatollah Montazeri as stating on Nov. 9: "Past experience has shown that government without reliance on the private sector and without adequate protection for it will be unable to meet popular needs . . . If the government wishes to establish an efficient system of distribution without the need for engaging more and more salaried personnel, it should work in cooperation with the private sector . . ." Majlis Speaker Hashemi Rafsanjani is quoted as advocating a greater role for the private sector as well, albeit within limits: "The private sector should be present, and free enterprise is one of our primary principles."

²⁷For a detailed description of Saudi Arabia's political system, including the Council of Ministers, see Fouad Al-Farsy, *Saudi Arabia: A Case Study in Development* (London: Kegan Paul, 1982), ch. 4.



Photo credit Aramco World Magazine

King Khalid holds impromptu court at inauguration of Ju 'aymah Fractionation Plant and Marine Export Terminal, 1980

is responsible for processing foreign investment applications and for regulating domestic industrial development and industrial cities.

Of the specialized agencies, four are most important in the development of hydrocarbon-based industries, and hence for technology transfer associated with them: the Saudi Basic Industries Corp. (SABIC), the Royal Commission for Jubail and Yanbu, The General Petroleum and Minerals Organization (Petromin), and ARAMCO. A government holding company under the chairmanship of the Minister of Industry, SABIC'S purpose is to carry out an industrialization program based on Saudi Arabia's gas and oil resources. With an authorized capital of over 10 billion Saudi riyals (SR) in the late 1970's, SABIC has set up a number of petrochemical and metal projects in cooperation with foreign investors. SABIC also setup the Royal Commission specifically to guide the development of Jubail and Yanbu, two industrial cities on the east and west coasts, respectively. Petromin, the Kingdom's oldest hydrocarbon development organization, and ARAMCO (now fully owned by the Saudi Government) have for years been important actors in technology transfer.

The Saudi Consulting House (SCH), an independent organization, provides consulting services to government agencies and private

investors. Formed as a spinoff from the Ministry of Commerce in the mid-1970's, it provides professional and technical services in three areas: engineering and technical services, economic industrial and management services, and legal services. Also a spinoff of the Ministry of Commerce, but still under its jurisdiction, the Saudi Arabian Standards Organization (SASO) maybe increasingly important to technology transfer to Saudi Arabia because its purpose is to develop national standards for all commodities. SASO has participated in international and regional organizations since its founding in 1972 and has been assisted by the U.S. National Bureau of Standards under the auspices of the U.S.-Saudi Joint Commission.

In addition to these institutions, R&D is promoted by other institutions, some mentioned earlier, such as the Saudi National Center for Science and Technology (SANCST). The University of Petroleum and Minerals is also a major resource for industries; it houses the Saudi Arabian Institute of Scientific Research, which has links with research institutes in the United States, Europe, and Japan and is undertaking projects in environmental science.

The Public Investment Fund (PIF) is the key funding institution for basic industries and technology transfer. Chaired by the Minister of Finance, and capitalized at a total of 16.6 billion SR (about \$4.88 billion) in 1978, PIF has been involved in major petrochemical joint ventures under the third plan and is also empowered to buy and sell shares in newly established companies. Other funding organizations include the Saudi Industrial Development Fund (SIDF), the Real Estate Development Fund (formed in 1975), and the Saudi Arabian Agricultural Bank, which was formed in 1962 but did not become very active until the late 1970's.

Unlike Algeria, Iraq, and 1960's Egypt, promotion of the private sector has always been at the core of Saudi development strategies. Emphasis on the private sector has increased in recent years. In Saudi Arabia, incentives

such as loans on favorable terms have been provided to private investors by SIDF. In addition, promotion of joint ventures between Saudi Arabia's growing private sector firms and foreign partners was to be carried out through the planned National Industrialization Co.²⁸ Other incentives include tariff exemption on imported equipment and materials; tax incentives assistance with studies and operations; provision of low-cost utilities and fuels; and the provision of infrastructure, including industrial estates. Thus, the general approach is for the state to take a lead in the planning and execution of major industrial projects at an early stage and to promote private enterprise in nonoil manufacturing.

K U W A I T

In Kuwait, the development of financial institutions has been the main effort, in line with Kuwait's efforts to become a financial center in the Middle East. Central to this effort are Kuwait's three large investment banks, or the "three Ks," as they are commonly called: the Kuwait Foreign Trading Contracting and Investment Co. (KFTCIC); the Kuwait Investment Co. (KIC); and the Kuwait International Investment Co. (KIIC). KFTCIC, formed in 1965, is the largest of the three and is 80 percent government owned. Unlike the other two, it is actively involved in the Eurocredit market and in direct investment abroad. KIIC, on the other hand, established in 1973, is smaller, almost exclusively privately owned, and involved primarily in Kuwait's domestic economy, primarily in tourism, shipping, and the hotel industry. In the middle, both in terms of size and in combination of public and private sector ownership, is the KIC, formed in 1962 with 50 percent ownership by the government and 50 percent by private interests. The

²⁸The SIDF provides interest-free loans of up to 50 percent of capital to industrial projects with a service charge of 2 to 3 percent, and managerial advisory services. See also, Michael Petrie-Ritchie, "Saudi Arabia's NIC Seeks Foreign Partners," *Middle East Economic Digest*, Apr. 6, 1984, p. 45. The same article reports that the number of privately owned industries grew from 600 in 1975 to 1,600 in 1984 (with a total of almost \$8 billion invested).

KIC's main purpose is to develop investment opportunities for Kuwaiti surplus capital, emphasizing joint ventures with Kuwaiti equity participation.

In addition to the three Ks, Kuwait's six commercial banks, three specialized banks (real estate, industrial development, and savings and credit) and other financial institutions such as the Kuwait Finance House (KFH, Kuwait's only Islamic bank) play a key role in Kuwaiti development and technology transfer. Most important among them is the Central Bank of Kuwait (CBK) which is the second largest commercial bank in Kuwait. In addition to acting as banker and financial advisor to the government, the CBK also finances Kuwaiti development projects. Although its international operations are extensive, the thrust of the bank's activities is domestic. Major domestic projects in which CBK participates are the industrial relocation of Sabhan, the supply and installation of switchgear at Shuaiba North power station, road construction and other services, and performance guarantees for refineries and drilling platforms. To handle overall responsibility for the general management and supervision of Kuwait investments (over \$75 billion in 1983), the National Investment Authority was approved by the National Assembly in June 1982. The National Investment Authority will gradually take over management of all Kuwait's reserves, which amounted reportedly to \$74 billion in mid-1983.

Outside the financial sector, several other Kuwaiti institutions are also important for technology transfer. In addition to the ministries that are involved in purchasing and transferring technology, the state-owned Kuwait Petroleum Co. (KPC) is the main institution acquiring technology in the hydrocarbon sector. KPC has been involved in long-term investment development of Kuwait oil industry. During the past few years, KPC's domestic operations have been extensive: oil and gas exploration, drilling, and production fall under the purview of its Kuwait Oil Co. (KOC); production, marketing, and sales of petrochemical products fall under the Petrochemical In-



Photo credit: Embassy of Kuwait

National Assembly of Kuwait

dustries Co. (PIC); crude oil and gas refining and marketing of refined products fall under the Kuwait National Petroleum Co. (KNPC); and overseas exploration falls under the Kuwait Overseas Petroleum Exploration Co. (KOPEC). Chapter 5 discusses Kuwait's downstream investments in Europe, where refined products will be marketed.

The Kuwait Institute for Scientific Research (KISR) is the key institution for R&D. With a wide mandate, KISR supports assessments of industries and technological development in Kuwait and joint scientific projects with foreign organizations. KISR's National Scientific and Technical Information Center (NSTIC) is considered a major source of information on science and technology, KISR currently is involved in research ventures with international institutions such as the Battelle Institute in West Germany, the Institute of Petroleum in France, the IFAS in Sweden, Nevada's Desert Institute and Chicago's Gas Institute in the United States, and with several American universities.

In Kuwait there have been attempts to control the growth of the civil service to make government more efficient and less dominant in the economy. As a city-state, Kuwait's goal of becoming a regional financial center sets it in contrast to the other nations under review.

TECHNOLOGY TRANSFER: KEY POLICY ISSUES

REGULATION

Middle Eastern countries have established laws and regulations to encourage technology transfer and to ensure that a capability to operate and maintain technology is gained, that unfavorable impacts are minimized, and that dependence on foreign assistance is limited. The specific legislation and regulations of each country, therefore, include both incentives, in response to the demand for technology and know-how for rapid development, and regulations, in response to the desire for extending indigenous capability and control. On the one hand, all of the countries under review have offered incentives for technology transfer such as tax holidays, guarantees against nationalization, and security of investments and import/export regulations. On the other hand, regulations have been introduced to channel foreign investment into certain economic sectors or geographical areas of the country, to ensure a level of local ownership, and to require training of indigenous personnel. The use of agents—required in some Middle Eastern countries, and prohibited in others—provide both incentives and disincentives for technology transfer. And licensing—although limited—has also been accompanied by regulations that require provision of technical services in each of the countries under review.

Despite these overarching similarities, there is substantial variation among the countries. The legislation and regulations of Egypt, Saudi Arabia, Kuwait, and prerevolutionary Iran, for example, have tended to be more supportive of technology transfer than those of Iraq and Algeria. In the latter two countries, regulations have generally been more stringent, but both countries appear to be loosening controls. Similarly, the prominence of Islamic law varies throughout the region, although its direct impact on technology transfer has generally been limited.

Egypt

A complex combination of incentives and regulations is perhaps best illustrated in Egypt. Although not specifically designed as a legal instrument for regulating the transfer of technology, Law 43 of 1974—subsequently revised in Law 32 of 1977—sets the legal context in which technology transfer occurs. Devised as part of Sadat Open Door policy, its purpose is to attract foreign investment and technology transfer—mainly from the Western industrial nations—to develop the country and to channel that investment into areas of the private sector.

With regard to incentives, investors who form a company under Law 43 are given tax breaks, financial support, and assurances about nationalization and import/export regulations. Under a comprehensive tax reform law passed in 1981, companies covered by the law enjoy a tax holiday of 5 years; they are excused from all taxes on income and distributed profits for a period of 5 years from the year following commencement of the project. This exemption also covers reinvested profits, special reserves, and undistributed profits earned during the 5-year period but not distributed until later. Foreign employees under Law 43, moreover, are not subject to a general income tax; instead, they pay special purpose taxes associated with it. Law 43 enterprises are subject to few foreign exchange controls and are guaranteed against nationalization or expropriation of private property. And while Egypt export-import regulations were liberalized in 1975 for the business community as a whole, Law 43 companies enjoy further exemptions.

In addition to these incentives, Law 43 stipulates a number of regulations governing types of technology transfers permitted and other performance requirements. The benefits of Law 43, with few exceptions, are available

only to foreign investors who set up joint ventures with Egyptian companies (public or private) or Egyptian individuals. According to Article 3 of Law 43, foreign investment must first of all be in projects requiring international expertise and foreign capital and must fall into categories contained on the list prepared by the General Authority and approved by the Council of Ministers. Projects proposed in the fields and activities not included on such lists may nevertheless be considered when they are of particular importance to the development plan and general policy of the state. Law 43 gives special priority to projects that will generate exports, reduce the need to import basic commodities, and stimulate regional development. For example, it encourages foreign investment in construction outside of the major cities, like Cairo and Alexandria, and especially in newly created "free zones."²⁹

Egypt has recently become more encouraging of joint ventures. In general, approved projects must involve some Egyptian participation—although apart from classes involving local currency banks, construction contracting projects, and technical consulting firms, there is no legal minimum percentage.³⁰ This contrasts with the investment incentive laws of many of the other countries under study that impose strict limits on the extent of foreign participation (generally 49 percent) in all but very high-risk projects. Nonetheless, in practice Egyptian leaders emphasize proj-

ects involving majority Egyptian participation.

Saudi Arabia, Prerevolutionary Iran, and Kuwait

As in Egypt, legislation in many of the oil-rich states, such as Saudi Arabia and prerevolutionary Iran, has also been designed to attract foreign investment. While financing is less a concern for these countries, foreign investment is encouraged as a means of gaining foreign technical and managerial expertise.

In Saudi Arabia, joint ventures are viewed as a means of encouraging Saudi involvement in industrial development, and firms with Saudi partners are given preference in contract awards. The Saudi Government therefore provides significant incentives for forming joint ventures. The government provides up to 60 percent of the financing for new industries at 3 to 6 percent interest rates. The Saudi Government formerly offered crude oil supplies at a rate of 500 barrels per day (bbl/d) for each \$1 million of actual investment by a foreign partner in petrochemical projects. While SABIC no longer offers crude oil incentives, several benefits remain: low-cost loans, infrastructure benefits, and tax holidays.

In prerevolutionary Iran, foreign investment was also encouraged, largely through the Law for the Attraction and Protection of Foreign Investment (1955) and the Law for Broadening the Industrial Ownership Base (1975). In addition, a series of bilateral agreements with the United States (the Mutual Security Act of 1954), West Germany (the Promotion and Reciprocal Protection of Investments, 1965, retroactive to 1955), and (after 1973) with Great Britain, Italy, and France were negotiated to foster foreign investment and other goals.

Saudi Arabia and Iran have also instituted a number of restrictions. Saudi planners have begun to exercise greater selectivity in projects, favoring manufacturing enterprises. Foreign commercial representation is limited to Saudi nationals, and Saudi law stipulates that preference be given in contract awards to joint

²⁹Law 43 establishes free zones, where foreign companies are generally not only free from host government regulation, but are offered a number of incentives as well. As the Egyptian Investment Authority notes, "the free zone concept is a key component of the Egyptian Government's plan to stimulate export-oriented industries, and was therefore designed for investors who plan to export the majority of their production." In contrast to other Law 43 enterprises, free zone ventures do not require Egyptian capital participation; they may be 100-percent foreign owned. They also enjoy special incentives, especially in tax exemptions, exemptions from customs duties, and freedom from certain exchange control restrictions. For example, a free zone project is exempt from all Egyptian taxes. Instead, it pays an annual fee equal to 1 percent of the value of its goods entering or leaving the free zone, and it pays rent.

³⁰Banking ventures which plan to engage in local currency transactions must be at least 51 percent Egyptian owned. Likewise, construction and contracting projects and technical consulting firms must have 50 percent and 49 percent Egyptian participation respectively.

ventures more than 51 percent Saudi-owned. And a recent resolution by the Council of Ministers requires that 30 percent of the work under Saudi Government contracts must be subcontracted to local Saudi contractors. While this resolution has been somewhat controversial and serious questions remain as to interpretation, it reflects a growth of regulations encompassing foreign employment, training of indigenous workers, tendering of bids and technology transfer.³¹ Iranian legislation prior to the revolution governing technology transfer did not stipulate 51 percent ownership, but administration of Iranian law made it impossible to create wholly owned subsidiaries there and was increasingly explicit in limiting foreign equity holdings.

Kuwait has for some time generally been somewhat more restrictive of foreign investment than have Saudi Arabia or prerevolutionary Iran, although Kuwait is considered to have a liberal trade policy. Kuwait's Industrial Law of 1965 limited foreign commercial representation to Kuwaiti nationals, generally limiting foreign entry to Kuwait and raising the cost of doing business there. The Law of Commercial Companies (1960) requires a majority Kuwaiti interest in all forms of business enterprise. In joint ventures, 51 percent of the capital in a joint venture with a foreign partner must be Kuwaiti, and any non-Kuwaiti participant must be guaranteed by a Kuwaiti. In addition to these restrictions, however, Kuwait has also extended a number of incentives to investors—in areas such as tax and customs duty exemptions, profits, tariff protections, and government purchases.

Algeria and Iraq

Toward the other end of the spectrum are Iraq and Algeria, where restrictions are more stringent. But there are signs this situation

may be changing. The overarching law affecting technology transfer in Algeria is the 1966 Investment Code, as amended in 1982. The law, as amended, allows for foreign companies to invest in the Algerian manufacturing sector as joint venture partners with Algerian state-owned firms. New legislation proposed by the National Assembly in 1983 introduces new economic incentives for joint ventures such as tax holidays and special tax treatment for reinvested profits. These proposals also permit foreign firms to repatriate the distributed portion of their net annual profits, but the amount is not to exceed 15 percent of the value of foreign equity in the investment. These incentives are designed to encourage the acquisition of new technology that may be more "appropriate" for the new enterprise's success and profitability, and to thereby avoid expensive imports and acquisitions that the foreign firm may have sold to the Algerian firm if it were operating independently. In the area of management, these incentives encourage in-house sharing of managerial skills between the new partners in an attempt to make the state-owned sector more efficient in the long run.

The Algerian Government also stipulates several conditions in its contracts with foreign suppliers: 1) the suppliers must guarantee the quality of the final product they contract for; 2) the bona fide offers of foreign firms must be guaranteed by the foreign supplier's government against bankruptcy, default, or failure to honor the terms of the contract; and 3) the training of Algerians must be mandated in every contract. (This is also true in many of the other countries; see below.) In addition, the following conditions are also stipulated: 1) all joint ventures must allow for local manufacturing and licensing and must contain provisions for introducing new technology or know-how to Algeria; 2) joint ventures must be made with state-owned companies; and 3) a detailed contract (*protocole d'accord*) must be drawn up before a joint venture is entered into, which must include licensing and training provisions but which cannot set production limits or fix prices for products manufac-

³¹See H. Richard Dallas, "The 30 Percent Rule: Understanding and Complying With Resolution No. 124, *Middle East Executive Reports*, March 1984, pp. 9 and 21-4. See also "Saudiization: The Emerging Trends, *Middle East Executive Reports*, June 1984, p. 16. The article reports that an Offset Committee has been established to promote technology transfers in advanced technology sectors.

tured. Foreign firms cannot be granted a monopoly in Algeria.

In Iraq, legislation and regulations concerning technology transfer are more restrictive. The basic law covering mechanisms for interacting with foreign firms in Iraq is the Commercial Company Law No. 31 of 1951, as amended. This law provides the structure for the formation and management of partnerships, companies, branches, or agencies of a foreign company. The few joint ventures involving foreigners in Iraq are involved primarily in special projects in technical fields. For these projects, three forms of partnership are recognized by Iraqi officials: collective company (general partnership), commandite company (limited partnerships), and partnership at will.

Local Agent Laws

The use of local agents is an important, and often required, means of winning contracts throughout some countries of the Middle East, such as Saudi Arabia and Kuwait. Where required, such agents are used to garner political influence in bidding contracts. Their role, however, has generally been expanded to involve assuring contract performance and maintaining continuing client relationships. Hiring well-placed agents, therefore, has been one of the most important means of penetrating new markets for firms with little prior experience in a country.

The Saudi Agent Law, for example, specifies that every foreign company must be registered through a Saudi agent, meaning either a Saudi company or corporation. A foreign contractor who has no Saudi partner must have a Saudi service agent. The only exception is in the provision of sales and services to the Saudi Ministry of Defense and Aviation. Kuwait's New Commercial Law of 1981 also requires that all business conducted in Kuwait be carried out through a Kuwaiti agent or through a Kuwaiti majority-owned company. An exception might be made for consultants and engineers, as long

as they are not offering management services; otherwise, they, too, must have a local agent.³²

Elsewhere, the use of agents is greatly limited, if not specifically proscribed, by law. In Algeria, for example, the use of agents is prohibited by law, since all foreign trade is transacted by the government or the national companies. Use of agents is governed by the "foreign intermediaries" law of February, 1978, which explicitly proscribes the use of foreign agents for foreign firms in Algeria that might solicit contracts. Foreign suppliers are required to sign an affidavit certifying that they did not use agents.

Licensing

For all of the countries under review, a relatively small share of technology transfer occurs through direct licensing to local firms, and most technology transfers occur between joint venture partners or within a multinational to a subsidiary in the Middle East. As discussed in chapter 4, technology transfer to the Middle East has occurred largely through technical service contracts, which were valued at \$4.4 billion during the 1978-82 period (see table 30). Even in petrochemical production, where large payments for licenses have been made, these have been associated with large projects which include construction, project management, training, and operations and maintenance. Transfer of know-how to developing countries in the form of technical assistance has grown in recent years, but it is in many cases impossible to assess the value of discrete payments for patents or licenses.

Some Middle Eastern recipient nations have introduced restrictions both in the magnitude of licensing payments allowed by law and in the structure of the licensing agreements themselves. For example, in many of the countries under review, foreign investment laws

³²See Quent in Fleming, *Guide to Doing Business on the Arabian Peninsula* (New York: Amacom, 1981), pp. 51-57. See also "Saudi Arabia: Commercial Agency Law," *Middle East Economic Digest*, Apr. 4 and 27, 1984.

place limits on the amount or rate of licensing payments and place restrictions on patents and trademarks. In Egypt, which is itself an exporter of technology to other Middle East countries, protection for patents is granted for 15 years initially, renewable for 10 or more under certain circumstances.³³ Algerian Patent Law (Ordinance No. 66-54 of Mar. 3, 1966) specifies a 20-year period for which patents of inventions will be issued. In Algeria, patents of invention must be used within 3 years from their grant or 4 years from their filing date, whichever is later.

Like foreign investment, moreover, the structure of licensing agreements has changed as well. Although licensing agreements are formally vehicles for the simple sale of a license or patent, today they have come to represent a complex package of increasingly high technological and managerial proportions. Broadly speaking, there are two ingredients in a technology license agreement: the transfer of patent, trademark, and other rights and the provision of technical and managerial assistance to a licensee. The majority of technology transfers include organizational and production management assistance as well as the transference of rights and documentation, so that the recipient country will be able to translate the rights and technical documentation into viable production output. In many Middle Eastern countries, the proportion of technical and managerial services in licensing packages is relatively high. In Algeria, for example, the "technical services paid for by enterprises" component of technology license payments amounts to 70 to 80 percent of the total. In most cases, however, only scanty information

is available on payments for licenses and patents.

Islamic Law

Another aspect of Middle East law which may affect technology transfer is that found in the *Koran*.³⁴ All of the countries in the Islamic Middle East adhere to Islamic tenets in their judicial system. Approaches differ, however: Saudi Arabia emphasizes comparatively strict adherence to *shari'a* (sacred Islamic) law, while Kuwait has developed a system of codified laws seen as consistent with Islamic texts. "Islam has often been a unifying force in regional efforts at cooperation in technology transfer and scientific research, and efforts have been made to promote 'Islamic science.'³⁶ But in all of the countries under review—with the possible exception of Iran—the role of Islamic law has not been significant in technology transfer and has not been a constraint to the notion of technological change. In Iran, justice systems are based entirely on precepts and interpretations of Islamic law. But even here, there have been controversies concerning the meaning of these precepts for technology transfer, reflecting varying interpretations of Islam.³⁷

FINANCING

For the six countries under review, paying for technology imports has posed less of a problem than it has for most developing countries. Stated in simple terms, financing involves allocation of revenues among various development priorities, decisions which in turn determine patterns of technology transfer. One facet of the issue is whether a country's exports during a given year are sufficient to

³³ By taking a flexible approach, the Investment Authority states, "the government is trying to make it as easy as possible for Egyptian private and public sector industries to get the benefits of useful new technology." The General Authority for Investment and Free Zones, *The official Guide to Investment in Egypt*, op. cit., p. 40. For discussion of Egypt's role as a technology exporter, see TagiSagali-Nejad, "Transfer of Technology From Egypt," paper presented at American Economic Association, New York, Dec. 28-30, 1982. For UNIDO estimates of technology transfer to developing countries, see United Nations Industrial Development Organization, *Second World-Wide Study of the Petrochemical Industry*, May 19, 1981, IDWG, 3363, p. 275.

³⁴ The sacred text of Islam.

³⁵ See Herbert J. Liebesny, *The Law of the Near and Middle East* (Albany, N.Y.: State University of New York Press, 1975), pp. 107 and 111.

³⁶ See "Riches and Poverty in the Muslim World," *Financial Times*, July 12, 1977, p. 15; and Ziauddin Sardar, *Science, Technology and Development in the Muslim World* (London: Croom Helm, 1977), passim.

³⁷ See Riad Ajami, *Arah Response to the Multinationals* (New York: Praeger Publishers, 1979), pp. 136-137.

cover imports, as indicated in current account balances. Because all of these countries depend on oil exports as a major source of revenues, as indicated in table 96, they have all been challenged to adjust to a period of lower oil revenues in the early 1980 's. Related issues involve the degree and type of dependence on foreign sources of funding (including aid), as well as policies concerning foreign investments and use of foreign reserves. Finally, the capabilities of domestic financial and commercial institutions (public and private) influence exchange rates as well as capital formation domestically. The discussion that follows focuses primarily on the first two sets of issues involving the relationship of the economies of recipient countries to foreign sources of capital and investment.

With regard to their capabilities to finance development projects involving technology transfer, these countries fall into two groups: those that finance with and those that finance without foreign assistance. For the oil-rich countries of the Middle East, such as Saudi Arabia, Kuwait, Iran, and Iraq, imports have been financed without assistance from foreign official credit agencies. As shown in chapter 2 in table 1, these four countries built up sizable cumulative current account surpluses in the 1973-80 period. As oil revenues have recently fallen, financing has become a concern even for these countries, but as discussed in chapter 3, most of them still have large reserves and investment incomes.

For those countries whose exports and reserves have not been sufficient to cover im-

ports and debt service, such as Egypt and Algeria, questions of financing technology transfer have been very important. Both Algeria and Egypt accrued cumulative current account deficits of approximately \$10 billion each during the 1973-80 period. The Iraq-Iran War has reduced Iraq's oil exports and led to a drawdown in reserves, with the result that beginning in 1981 the country was unable to cover imports with exports. Iraq, thus, in the short term has joined the group of countries where financing is a major problem. Despite the common concern about financing among these countries, their approaches to financing technology imports differ, with Algeria presently relying primarily on hydrocarbon exports; Egypt, on foreign aid and borrowing in addition to oil exports and remittances; and Iraq, on producer credits and the reshaping of financing terms, long-term commitments for oil purchases, and loans from other Arab countries.

Egypt

Very little financing for development projects in Egypt now comes, or will come in the immediate future, from the national budget. Instead, the current pattern is to finance technology transfer through debt (medium or long term), government-to-government financial assistance, international donor grants or loans, or supplier financing in the form of concessionary loans. Accordingly, Egypt is most dependent on external sources of financing. U.S. economic assistance (of about \$1 billion) and aid from other Western nations to Egypt amounted

Table 96.—Oil Exports and Government Revenues, 1980

| Country | Oil exports as percent of total exports | Oil exports as percent of GDP ^a | Oil revenue as percent of government revenue ^b |
|--------------------|---|---|---|
| Saudi Arabia | 963 | 72.4 | 89.3 |
| Kuwait | 99.9 | 878 | 91.2 |
| Iraq | 99.2 | 651 | 852 |
| Iran | 944 | 16.3 | 643 |
| Algeria | 918 | 308 | 554 |
| Egypt | 230 | 74 | 200 |

^a1980

^b1979 (Iraq 1977, Iran 1978)

^cNet Oil exports.

SOURCE: Jahangir

*Porters, Economic Development in an Interdependent World, Washington D.C.: International Monetary Fund, 1983, table 1, column 2, p. 11

together to more than \$2 billion annually in the early 1980's.

Egypt has been seeking to facilitate financing of technology transfer through revitalization of private sector banks, encouragement of foreign development banks, and efforts to maintain levels of remittance flows. Because the banking industry is dominated by public sector banks, the main form of financing is that negotiated by the central government and arranged for through the four public banks. After a restructuring of the banking system since 1973, private banks now sometimes play a role in financing projects involving technology transfer. The new Cairo Hospital, for example, a \$30 million project, is a combined Kuwaiti-Egyptian investment with a scheduled 25 percent return on investment and a 3- to 5-year payout.³⁹

Investment banks also play a limited role in financing technology transfer to Egypt. While there were few offshore banks in Egypt prior to 1973, Law 43 created a much expanded group of investment and business banks. As of 1981, there were 25 special banks registered with the Central Bank, of which 17 were branches of foreign banks, and 8 joint

³⁹Loans covered 70 percent of costs (\$12 million) and were provided by a consortium of private banks at an interest rate of 11.5 percent for a 7-year period.



Photo credit: U.S. Agency for International Development

Baking bread in Egypt. U.S. Public Law 480 assistance provides wheat and flour to Egypt, while efforts are made to increase agricultural output of Egyptian farmland

ventures with a growing loan portfolio and deposit base. These banks may establish investment companies and, with 51 percent Egyptian ownership, may also operate with local currency. But while this group of investment and business banks has experienced enormous growth in Egypt, their investments have been more in tourism and real estate than in capital projects.

The Egyptian Government is reportedly attempting to ensure the continued flow of remittances, a major source of foreign exchange earnings. Under an agreement reportedly concluded with Iraq, remittances from Egyptians working in Iraq will be regulated through Egyptian public sector banks, to assist Egyptian workers to remit their earnings from Iraq and to create more foreign exchange in Egypt's commercial bank pool.³⁹

Thus, the base for more extensive financing of the purchase of technologies has expanded in Egypt in the past 9 years, but Egypt remains dependent on foreign aid and borrowing. The extent to which other domestic sources of financing will serve that purpose more extensively in the future depends in part on reform of the public sector and growth in the private sector.

Algeria

Although none of the countries under review rank among the more extreme LDC debtors such as Brazil or Mexico, Algeria, like Egypt, has also incurred large debts during the past two decades. However, Algeria has recently attempted to turn away from foreign aid and borrowing. Instead, present Algerian policies stress that the main sources of financing should be exports of natural gas and crude oil, followed by increased private investment and binational loans. Indeed, since 1980, Algeria imposed a moratorium on foreign borrowing. Organizations such as the International Monetary Fund or the Common Market are no longer major lenders. In the present 5-year plan, 60 percent of funds for investments are

³⁹"Pad to Raise workers' Remittances From Iraq," Cairo, MENA, in Arabic, Aug. 20, 1983, reported in FBIS

expected to come from the foreign exchange earned from estimated annual revenues of \$12 billion from petroleum and natural gas.

The explanation for this policy must be traced to the high government debts accumulated during the 1970's. During the 1960's and 1970's, public enterprises accumulated enormous debts which were financed in large part by advances from the treasury. By 1980, the national enterprises had accumulated bank debts of almost \$5 billion, and the manufacturing sector alone accounted for almost \$3 billion of this debt. Since 1978, the Algerian state has held a monopoly over foreign trade. The *sociétés nationales* and the government ministries have been the exclusive importers of foreign technology and have been financed by resources from hydrocarbon revenues and by foreign loans and grants of credit.

In 1980, the Chadli government made it official government policy that hydrocarbon revenues be used effectively to stimulate production.⁴⁰ One major effect of this decision was practically to eliminate international borrowing by state enterprises in 1980-82. In 1983, however, Algeria turned to the World Bank and Arab funds for financing.⁴¹

Emphasizing hydrocarbon exports as the major source of foreign reserves, Algeria's financing policies have been strongly related to oil prices. Like Nigeria and Venezuela, Algeria has gained a reputation as a "maverick" within the Organization of Petroleum Exporting Countries (OPEC) by frequently demanding higher than agreed-on OPEC prices per

barrel of crude oil," but has usually succeeded in selling all oil lifted to foreign purchasers. Recently, exports of natural gas have offset any shortfall Algeria may have felt from the slack oil market in the early 1980's. Because of an impressive hydrocarbon production record, Algeria will probably continue to enjoy relatively easy access to international lending markets at favorable interest rates throughout this decade. Long-term prospects hinge on Algeria's ability to expand nonoil revenues to replace dependence on hydrocarbon exports.

Iraq

Iraq is a newcomer to heavy borrowing. During the 1970's, foreign reserves grew. Beginning in the late 1970's, however, the situation began to change, and the war with Iran has rapidly depleted foreign reserves. According to one estimate, Iraq's \$12 billion surplus in 1980 fell to an annual deficit of \$8 billion to \$10 billion by 1983.⁴²

In light of dramatically declining reserves caused by war expenditures and declining oil revenues, Iraq has turned for financing to producer credits and to long-term commitments for oil purchases. In addition, the Iraqi Government has relied on substantial external borrowing. In contrast to the early pattern of reliance on loans from the Soviet Union and Eastern Europe, major support has been provided by neighboring Gulf States, including Kuwait, Saudi Arabia, and the United Arab Emirates (UAE) in the form of interest-free loans, repayable over a period of 10 years. It was estimated in early 1983 that these loans totaled \$25 billion for the period since the inception of hostilities with Iran. For Iraq, in particular, the war with Iran and a slack oil market have seriously affected the country's ability to finance civilian technology transfer.

⁴⁰Algerian economist Bennisad wrote recently: "the international solvency of Algeria resides in her present, in her revenues from the exploration of oil and in the immediate future in the execution of contracts for the export of natural gas. See M. E. Bennisad, *Economie du Développement de l'Algérie, sous-développement et socialisme, 1962-82* (Paris: Economica, 1982), p. 252.

⁴¹As discussed in ch. 3, total debt has remained high: in 19/31 the total estimated disbursed external debt was \$17.5 billion, and the debt service was estimated at 25 percent of imports. In 1983, Algeria's \$4 billion in foreign debt service payments amounted to 34 percent of its exports. The debt service ratio is expected to fall in 1984 and thereafter. See Nigel Harvey, "Jligeria," *Middle East Economic Digest*, May 4, 1984, p. 52.

⁴²For a brief period in 1981, Algeria received \$40 per barrel for her premium "sweet" crude (i. e., low-sulfur content petroleum). In 1982, after extensive negotiations, Algeria eventually reduced its price per barrel to \$37.50, which was more in line with the OPEC price of \$34 per barrel.

⁴³Tom Sealy, "J\$est (Germans in the Iraqi Quagmire *Financial Times*, (Oct. 17, 1983.

Saudi Arabia

Saudi Arabia's oil export revenues allowed for increased expenditures on technology transfer in the 1970's. In recent years, however, financing has become a more salient consideration. By the early 1980's, public spending was tightly restrained, affecting the volume of business in all sectors. The government cut spending in the fiscal year 1982-83 (ending April 1983) by 15 percent compared to the previous year's actual level. During that period, Saudi Arabia sharply reduced its contracting.

In April 1984, the Saudi Arabian Government announced plans for a \$74 billion budget, the same level as the previous budget which was underspent by 14 percent. Income is budgeted at \$61 billion. The deficit is to be financed by drawing down reserves.⁴⁴ The current period of greater austerity has been marked by several measures affecting technology transfer, efforts to improve the cost effectiveness of government expenditures, and a salary and recruitment freeze for public officials. While reserves are still large, more concern surrounds the effective management of this wealth.

These trends set a context for increasing involvement by commercial banks. The central bank of Saudi Arabia, the Saudi Arabian Monetary Authority (SAMA), has in the past dominated lending for local industrial projects. SAMA has introduced measures designed to promote the growth of commercial banks. Saudi Arabia's fiscal policy has been conservative and rather tightly controlled.

Kuwait

Kuwait has followed largely the same pattern as Saudi Arabia, by adopting stringent fiscal policies in 1981, Government subsidies were gradually reduced, and a fundamental change occurred in the overall way in which

budgets were prepared. Since the 1982-83 budget, only schemes that are ready to go into effect have been included in the development budget, and funds are budgeted in a much more discriminating way than before.

As an aspiring regional financial center, Kuwait has an extensive banking system, comprised of the central bank and an array of commercial banks, specialized banks, and several major nonbank financial institutions.⁴⁵ As discussed earlier, these often play a major role in financing development projects. In addition, the Kuwait Fund for Arab Development has provided major funding for development projects in other countries. Unlike Egypt, few foreign banks operate in Kuwait; most of the commercial banks are totally Kuwaiti-owned. Instead, services for particular banks in Kuwait, for example, have been provided by foreign banks such as the Chase Manhattan Bank (for the commercial Bank of Kuwait) and the Credit Lyonnais of France (which oversees the operation of the al-Ahli Bank). Generally speaking, foreign banking in Kuwait is internationally oriented, as evidenced by operations of the Islamic Development Bank, the Non-Aligned Fund, the Afro-Arab Development Bank, and OPEC and Organization of Arab Petroleum Exporting Countries (OAPEC) facilities. The Kuwaiti stock market collapse in 1982 may have tarnished the credibility of the Kuwait market, but few direct effects on technology transfer have been noted.

Iran

Prorevolutionary Iran saw little need for foreign financial aid in connection with technology transfer projects. Generous loans, grants, and concessions provided by the government and private banks to the private sector alleviated the need for large-scale external financing by individual firms. According to the last annual report of the Industrial and Mining Development Bank (IMDBI) prior to the revo-

⁴⁴"Pressures Mount on Public Spending," special Report on Saudi Arabia, *Middle East Economic Digest*, July 1983, p. 8. See also "Saudi Budget Signals a Thaw," *Middle East Economic Digest*, Apr. 6, 1984, p. 47.

⁴⁵For an excellent description of Kuwait's banking system, see R. El Mallakh and Jacob A. Ata, *The Absorptive Capacity of Kuwait* (Lexington, Mass.: Lexington Books, 1981), chs. 3 and 4.

lution (1977-78), the bank had a total investment of nearly \$4 billion in firms that it helped establish.⁴⁶ In addition, about 30 public and private banks, some in collaboration with U.S. banks, also provided capital for new ventures and for expansion projects. By the late 1970's, however, Iran experience a mild recession, and some projects were scaled back. Since the revolution, Iran's situation has changed dramatically, but the country has been in a position to maintain oil exports. With continuing oil revenues and expanded barter and other arrangements, imports expanded again in 1983 after falling precipitously in years before,

Thus financing technology imports has become a major concern for these countries, the Gulf States included. The terms offered by foreign suppliers are an increasingly important consideration as is long-term productivity of investments, both domestic and foreign.

MANPOWER POLICIES

The policies of all of the recipient countries attempt a balance between reliance on foreign labor needed for rapid economic development, and the training and use of a native labor force to shape that development in the future. Manpower issues are most pronounced in countries such as Saudi Arabia and Kuwait, where labor resources in general, and skilled labor in particular, are most scarce. Egypt marks the other extreme, where a large, relatively skilled population and an extensive network of educational institutions already exist. There, the key policy issues include emigration of indigenous skilled personnel to other countries of the Arab world and effective utilization of trained manpower at home.

Employment of Foreign Workers and Project-Level Training

In an immediate sense, manpower policies affecting technology transfer are felt most directly at the project level. All of the coun-

tries under review have established regulations that limit the participation of foreign personnel and require foreign companies to train indigenous workers. In general, these regulations have been relatively successful in assuring participation by indigenous personnel. They have, however, brought problems as well: because of a frequent dearth of indigenous personnel willing or able to participate in certain sectors in some of these countries, enforcement has often been lax; and where such regulations have been enforced, they have often led to redundancy and sometimes even delays in indigenous skill development. While in recent months a downturn in economic growth in Gulf States has led to an exodus of foreign workers, the long-term challenges of establishing policies that regulate the involvement of expatriate labor will remain.

The Saudi Labor and Workmen Law of 1969 (the "Labor Law") requires minimum percentages of Saudi employment in all foreign enterprises working in Saudi Arabia. According to this law, a firm's workforce must be 75 percent Saudi and at least 51 percent of its payroll paid to Saudis, but these requirements are often reduced when a sufficient number of skilled Saudis is not available.⁴⁷ It is difficult to assess the degree to which such regulations have been enforced, or the success of training programs. The case of ARAMCO stands as a relative success, because indigenous Saudis have continued to move up the ladder and assume many high-level managerial and technical posts. In fact, ARAMCO's management training program served as a model for Saudia Airlines. In other cases, however, the result has been labor redundancy in joint ventures, as total employment levels have been raised to accommodate greater numbers of indigenous personnel and skilled foreign workers, since it is often impossible to recruit enough Saudis with appropriate skills. Foreign firms have reportedly faced delays in obtaining ap-

⁴⁶See I M 131)1, AnnualReport2536,1977-78(Tehran:IMBD1, 1978)

⁴⁷For a discussion of the Saudi Labor Law, see Paul Herzog, "Problems Commonly Confronting Employers Under the Saudi Labor and Workmen Law," *Middle East Executive Reports*, July 1979, p. 2. See also Laron L. Jensen, "Marketing in Saudi Arabia," [U. S. Department of Commerce, *Overseas Business Reports*, December 1979, pp. 37-39.



Photo credit Aramco World Magazine

ARAMCO employees in training session

proval for exemptions when qualified Saudis could not be found.

Similar employment requirements are found in Egyptian law, and there a trend toward increased stringency is apparent. Egyptian regulations stipulate that no more than 25 percent of the personnel of foreign companies in Egypt may be expatriate. Proposals were under discussion in 1983 to stop issuing work permits to foreign companies if more than 10 percent of their staff is expatriate.⁴⁸

Likewise, Kuwait has regulations requiring foreign companies to hire Kuwaitis for 25 percent of their work force. Partly to enforce this, foreign companies in Kuwait require a "No Objection Certificate" for every new employee. In many cases, these regulations have been regarded as mere formality, and the Ministry of Commerce and Industry often waives the first requirement if no qualified Kuwaitis are available. Two factors distinguish the Kuwaiti approach. First, the early decision to permit women to work gives Kuwait a broader labor base than that of, for example, Saudi Arabia. Secondly, Kuwait's strategy of equity acquisition in foreign firms also has manpower implications. At Santa Fe International, the hope is that the training of Kuwaitis will lead to the development of a permanent high-level career

⁴⁸See Colin MacKinnon, "Egypt's Not Issuing Work Permits," *The Middle East Executive Reports*, October 1983, p. 7.

track. So far, there have been no apparent pressures to integrate Kuwaitis quickly into the actual operations of the company, and company headquarters and main base remain in the United States. But in the opinion of one senior Santa Fe official, the seconding of personnel for combined training and integration will take place naturally and over a long period of time. The Chairman of the Board, Shaikh Abdul Malik Gharabally, is a Kuwaiti and an experienced petroleum official.

In other Middle Eastern countries, regulations and laws concerning foreign manpower at the project level have in principle been equally stringent, but their enforcement has often been more lax. In Iraq, for example, Regulation No. 30 of 1973 prohibits foreign labor in excess of 10 percent of the work force of a project. Because of the demand for technicians and managers to relieve war-caused labor shortages in development projects, however, exemptions for skilled labor can usually be obtained. In contracts with foreign companies, most machinery and equipment exporters are required to establish maintenance centers in which to train Iraqis, and the foreign exporter must supply 25 percent of each center's training staff. The centers are to be supervised by public sector companies for 10 years, after which they are to be bought by the Iraqis. Companies supplying computers must ensure that training is given to operators and maintenance engineers, and manufacturers are also sometimes required to set up regional support centers.

In other Middle Eastern countries, such as Algeria, regulations on foreign labor have generally been even more lax and the policies ill-defined. Today, however, Algerian policies governing foreign employment are now being refined to deal with the growing number of foreign personl operating and constructing new facilities and plants. Some Algerian planners argue that this has inhibited development of an indigenous expertise. By 1978, more than 86,000 foreign technicians were employed in Algeria.⁴⁹ In Algeria, responsibility for train-

⁴⁹J. Minces, *L'Algerie de Boumedienne* (Paris: Presses de la Cite, 1978), p. 50.

ing has been shifted to the foreign contractor. Algerian leaders believe that the immediate need "is for maintenance workshop and services within each corporation or group of corporations."⁵⁰ Algeria's 1980-84 plan provides for a national apprenticeship program to encourage onsite training. The government intends to expand technology transfer requirements in contracts, such as requiring contractors to train local staff to run the plants that they establish. This relatively new trend in contracts developed from a dissatisfaction with turnkey contracts wherein plant and equipment was provided without the expertise to operate them.⁵¹

General Education and Training Programs

From a national perspective, building a technically skilled indigenous manpower base has been a major concern. Efforts have concentrated on expanding the general educational level of the population; creating new institutes

and organizations to transmit technical skills; expanding technical skills by sending students for training abroad; providing greater incentives to attract indigenous populations to enter technical fields, and facilitating better job placement on graduation. Despite these efforts, however, many problems remain, and these policies will continue to demand revision and reevaluation in the years ahead.

Table 97 illustrates the substantial expenditures spent on education in the countries of the Middle East. The Arab countries spent an average of 15 percent of the government budget for 1977-78 on education, ranging from 13 percent in the oil-rich countries to over 22 percent in the oil-poor countries. By 1975, educational expenditures in the Arab world, per capita and per student, had grown to a level considerably above the average for LDCs worldwide.⁵² Emphasis was placed especially on scientific and technical education.

Middle Eastern Technical Training.—All of the countries under review are attempting to expand their national system of technical education, often with foreign assistance, but approaches have varied widely. Efforts to develop an educational infrastructure, especially in the scientific and technical fields, have been

⁵⁰A. Benachenhou, "Foreign Firms and the Transfer of Technology to the Algerian Economy" (Geneva: International Labor Office, October 1976), p. 26.

⁵¹For example, in the Societe Nationale de Siderurgie, the Algerian Steel [CO., Algerians operating the steel mill will be replaced temporarily by Japanese production workers, with the hopes that Algerian workers will learn by observing the correct methods of operating the mill and will appreciate the impact of the operators' competence on industry performance.

⁵²See Paul Shaw, *Mobilizing Human Resources in the Arab World* (London: Kegan Paul International, 1983), p. 162.

Table 97.—Total Expenditures on Education Per Capita in the Middle East, 1970-75^a

| Country | U.S. dollars per capita | | | U.S. dollars per enrolled student ^b | As percent of all public expenditures | |
|--------------------------|-------------------------|------|------|--|---------------------------------------|------|
| | 1965 | 1970 | 1975 | | 1970 | 1974 |
| Developed countries | 140 | 268 | 636 | 1,227 | — | — |
| LDCs | 7 | 19 | 47 | 110 | — | — |
| Arab world | 14 | 51 | 102 | 324 | — | — |
| Oil rich ^c | 24 | 197 | 226 | 1,085 | — | — |
| Oil-poor | 11 | 21 | 77 | 134 | — | — |
| Selected Arab countries: | | | | | | |
| Iraq | 18 | 30 | 119 | 142 | 204 | 8.9 |
| Kuwait | 132 | 346 | 674 | 1,616 | 11.8 | 14.7 |
| Saudi Arabia | 19 | 471 | 284 | 3,637 | 9.8 | 8.2 |
| Algeria | 19 | 37 | 124 | 211 | 12.9 | 14.3 |
| Egypt | 10 | 17 | 61 | 98 | 146 | 17.6 |
| Syria | 11 | 26 | 52 | 115 | 93 | 8.5 |

^aPer enrolled student and as a percentage of current government expenditures.

^bThis column includes all students enrolled in the primary, intermediate, secondary

and higher levels.

^cComprised of eight countries: Bahrain, Iraq, Kuwait, Libya, Oman, Qatar, Saudi Arabia, and the UAE.

^dComprised of 12 countries: Algeria, Egypt, Jordan, Lebanon, Mauritania, Morocco, Somalia, Sudan, Syria, Tunisia, North Yemen, and South Yemen.

SOURCE: Paul Shaw, *Mobilizing Human Resources in the Arab World* (London: Kegan Paul International, 1983), p. 165; compiled from UNESCO, *Statistical Yearbooks*, various volumes.

especially prominent in Saudi Arabia and Kuwait. Enrollment in Saudi Arabia's 30 technical and vocational training schools rose from about 500 to over 11,000 students during the 1970's, while the number of graduates rose from 500 to 5,550.⁵³ In 1981, Saudi Arabia's General Organization for Technical Education and Vocational Training (GOTEVT) was established, a merger of the Ministry of Education's technical education department with the vocational training division of the Ministry of Labor and Social Affairs. The organization offers vocational training at all levels. Seventeen new vocational training centers are currently in various stages of construction, with another 11 to be built by 1985: these are expected to more than double GOTEVT's present training capacity of 8,000.

Similarly, in Kuwait, the Public Authority for Applied Education and Training was established to function as an umbrella organization promoting training programs relevant to a number of ministries and sectors. It has a separate budget account from related ministries and aims to encourage teacher retraining in technical fields and student education. The Institute of Applied Technology, under the jurisdiction of the authority has been allocated a \$1.5 million budget for programs involving 1,000 students. It has relatively new facilities and offers a number of specialized courses in almost every technical area, as requested by various government agencies. The goal of the program is to develop shop floor managers and to allow students to attend both lecture courses and practical workshop sessions. The Telecommunications Training Institute is illustrative of institutes in Kuwait that are more closely connected with one ministry—in this case the Ministry of Telecommunications. With an enrollment of about 350 students, the institute offers 1- and 2-year courses in areas covering the whole spectrum of telecommunications technologies.

In Egypt, where the numbers of trained personnel and varied educational institutions are

relatively high, the emphasis on training is less on expansion as on upgrading and adjusting educational policies to labor demand. Egypt's educational institutions are comparatively extensive. In 1977-78 there were 179 higher education institutes with over 23,000 teachers and 550,000 students in Egypt. In Egypt, universities are overcrowded and the quality of education has suffered, partly as a result of policies that have emphasized open admissions. While vocational and technical education have not been stressed as much as university education, the present plan of the Ministry for Higher Education and Scientific Research calls for building 25 technical schools and 6 more secondary schools, using some World Bank Funding.

To develop industrial skills, specialized institutes of postgraduate studies have also been established in different branches of Egyptian industry, such as the El-Tebbin Institute for metallurgical studies. In addition, other measures have been introduced to reduce the shortage of skilled manpower in industry, such as establishing specialized applied research centers to provide technical training and to contribute to the technological development of industry (e.g., the Centre for the Development of Textile Industries), and raising the amount and proportion of investment allocated for vocational training in the 5-year plan through the Ministry of Industry.

Algeria is presently in the process of restructuring its entire educational system. Since the Ministry of Higher Education and Scientific Research was founded in 1970, the number of institutes of higher learning has expanded rapidly. The phasing in of a new system beginning in 1975 involved heavy emphasis on vocational and technical education. One major reform is the replacement of the existing primary and middle school system by a technical education course of 9 years, consisting of 3-year cycles; at the end of the second cycle, those with a technical orientation are channeled into preprofessional training schools. Those who complete the third cycle, and remain in the formal educational system, may go on to academic secondary school, special-

⁵³ "Kingdom's Vocational Training Bringing Country Closer to Saudiization," *Saudi Report*, August 1983.

ized technical school, or professional training schools.

By the 1978-79 academic year, Algeria had 22 technical schools, with close to 12,000 students and over 1,000 teachers. The 1980-84 plan allocates approximately \$76 million for building professional centers, and additional funds for building and equipping 268 training institutes and 300 vocational education centers. In addition, Algeria also emphasizes the development of technological institutes, conceived in 1964 as a solution to the shortage of qualified middle-level and senior technicians, a shortage exacerbated by the departure of the French following Algerian independence. These technological institutes are intended to attract those who have never had access to formal education and dropouts from the traditional educational system. One such technological institute, the INELEC (the Institut National d'Electricité et d'Electronique) was established with the cooperation of American universities and industrial firms in March 1976 to serve as an institute for training Algerians in electrical engineering and electronics. The American contractor, Education Development Centre (EDC), had the responsibility of recruiting professors and training Algerian teaching staff; 300 students were enrolled in 1978.

Prerevolutionary Iranian and Iraqi policies that involved expansion of vocational and technical education have been disrupted by the Iran-Iraq War and the revolution in Iran. In the 1960's to early 1970's, Iran placed great emphasis on improving higher education facilities and expanding research. Indeed, prior to the revolution, it had attained one of the highest levels of technological development in the Islamic Middle East, and educational development and technology transfer through educational exchange were actively pursued by the government. In 1977-78, there were 224 universities and colleges in Iran, with 146,000 students; there were about three times as many technical vocational schools.

The revolution in 1979, however, and the subsequent outbreak of war with Iraq, have

accentuated the shortage of engineering skills in Iran, as many senior and middle-level technicians and engineers left the country, and as the army continues to absorb scarce skills. More recently, it appears that government efforts to expand technical training are again intensifying.

Since the late 1970's, Iraq has placed special emphasis on increasing the number of vocational and technical institutes. In the late 1970's, the number of vocational schools and student enrollment grew rapidly. Between the 1976-77 and 1979-80 school years, for example, the number of vocational school students nearly doubled, from around 28,400 to 53,400. One of the most important efforts was the establishment in 1975 of the University of Technology (UOT) in Baghdad. With the objective of "training most Iraqi and foreign students in scientific, technical, and professional fields of study that are related to the process of economic and social transformation in Iraq,"⁵⁴ the University had 8,500 undergraduate students and 200 postgraduates in the early 1980's. The 1980 government program anticipated the establishment of 27 industrial, 17 agricultural, and 15 trade schools, at a total cost of \$14.2 million. A technical institute costing \$37 million was also planned to open in 1980-81 for 1,560 students in management, accounting, and technology.⁵⁵

The war with Iran, however, necessitated substantial revision of the 1981-85 plan. The impact of the war on the universities is evidenced by the cancellation of foreign university teachers' 1982-83 contracts and the decision to increase the teaching commitments of local university teachers by 50 percent or more; this step is expected to save over \$30 million to help finance the war effort.⁵⁶

To support the development of an education and training infrastructure, a number of con-

⁵⁴See Dr. Mohammed Shihab, in *The Baghdad Observer*, Oct. 24, 1983, p. 4. Translated in JPRS, Near East South Asia, Dec. 19, 1983, p. 42.

⁵⁵*Middle East Economic Digest*, June 20, 1980, p. 32; *Middle East Economic Digest*, Feb. 20, 1981, p. 24.

⁵⁶*Middle East Economic Digest*, Sept. 17, 1982, p. 30.

tracts with foreign firms have been devoted specifically to developing technical training at home. The major projects along these lines range from government-to-government agreements in Saudi Arabia, contracts with independent consulting firms in Egypt, to contracts with private universities in prerevolutionary Iran. Egypt, for example, has made wide use of outside consultants, and many of the new educational facilities are being constructed with foreign assistance—including several AID projects designed to improve the skills of Egyptian scientists and technicians and to solve technical managerial problems. One AID project provides in-house training to Egyptian managers in public and private sectors. The program involves diagnosis of problems, industry-specific training, and application of improved skills in solving specific problems. U.S. consulting firms, such as Arthur D. Little, and university programs, such as those from the Massachusetts Institute of Technology, are active in Egypt. Other projects have involved the World Bank, the European Economic Community, and West European and Japanese firms and governments in design and funding.

In Algeria, foreign assistance in expanding the vocational educational centers and in providing the necessary personnel and equipment has also been important. Vocational training centers are currently being built by Belgian contractors. A World Bank loan of \$87 million supports the construction of three maintenance training schools, three industrial training schools, and an institute for training maintenance trade instructors. The Soviet Union is scheduled to build 10 vocational centers. In Saudi Arabia, some of the most important projects to improve educational and vocational training have been carried out in conjunction with the U.S. Department of Commerce, under the U.S.-Saudi Joint Commission on Economic Cooperation.⁵⁷ Kuwait has generally

⁵⁷ The U.S.-Saudi Joint Commission was initiated in 1974 to assist in the internal development of Saudi Arabia through cooperative programs. Approximately 17 U.S. (government agencies have been involved in the commission. The U.S. Army Corps of Engineers has also played an important role in providing technical services.

preferred working with specialized outside consultants rather than cooperating on a government-to-government basis in technical training. In prerevolutionary Iran, one of the most important efforts to develop local training programs was conducted by creating links with various American universities. More than 25 American universities were involved in linkage programs with specific Iranian universities.

Iraq's efforts to expand vocational and technical institutes have also involved foreign aid and assistance; foreign contracts have also been used to promote training internally. The Soviet Union has helped establish engineering education, while Scandinavian countries have been involved in setting up technical institutes, and the Japanese and British in other technical projects. Recently, for example, Mitsubishi was asked to establish a technician training center and to provide industrial training, particularly in steelmaking and petrochemical production; the ILO signed a \$948,188 contract with the State Organization for Labor and Training to train people at Waziriya. A British corporation, Tecqipment Intremath, which has been providing curricula for technical schools in Iraq for several years, has a \$4.7 million contract to construct teaching laboratories and to provide in Great Britain training for technical college students and staff.

Another way in which Middle Eastern governments have sought to increase the level of skills and the number of skilled workers has been through government-sponsored training abroad. While little aggregate data are available, growing numbers of Middle Easterners are studying abroad, as indicated by data on foreign students in the United States (see ch. 13). In the 1981-82 school year, there were approximately 56,000 Iranian, and at least 10,000 Saudi students enrolled in U.S. colleges and universities and specialized training programs.⁵⁸ Specialized training programs in

⁵⁸ According to the Saudi Ministry of Planning, about 23,000 Saudi students attended schools of all kinds in the 1980-81 school year. Out of the 211 Saudis who received Ph.D.s abroad during the 1927-74 period, 97 of them received their degrees in the United States. See Al-Farsy, *op. cit.*, p. 164.

other countries have also been arranged. For example, 30 trainees from Petromin, the Petroleum and Mineral Organization, recently completed 2 ½ years of training in West Germany in various technical fields such as industrial mechanics, industrial electricity, handling of delicate equipment, and welding works. The program is sponsored by West Germany's Technical Cooperation Development Agency and is aimed specifically at training Saudi youths in technical subjects associated with the petroindustrial and petrochemical fields.

Present Challenges.— In short, the range of policies to train local personnel is extensive and varied, including requirements for training associated with specific projects to expansion of general vocational and technical training at home and abroad. Success has been significant, as indicated by the wide range of technical institutes established and the gradual movement of indigenous personnel into positions of responsibility. Nevertheless, significant challenges remain.

One key question is how to provide incentives to attract indigenous personnel to the technical sectors in the first place. Middle Eastern governments realize that technical training programs can be successful only if the local population is willing to participate. As discussed in chapter 3, in most of the countries under review, the indigenous labor force is concentrated in the government or service sectors of the economy, with relatively small proportions entering the scientific and technical fields. This situation is due mainly to two factors: first, a lack of wage and other incentives to enter technical fields; and second, a general aversion to many kinds of industrial and manual labor.

In Saudi Arabia, Kuwait, and Egypt, the government guarantees employment and a minimal wage for every citizen. For Saudis and Kuwaitis, this salary is quite generous, thereby providing little incentive to move to technical fields where the salary difference may be marginal. As a result, indigenous populations have tended to remain in traditional occupa-

tions, which are generally viewed as more prestigious. Recent articles in the Saudi press, for example, have noted the "abundance of graduates of the theoretical disciplines and a dearth of graduates of the scientific and applied disciplines."⁵⁹ According to these reports, the number of students applying to the scientific departments is "very troubling," insofar as it is far outpaced by the number of those applying to the humanities departments. Similarly, in Kuwait there is still a decided preference for business and finance, and despite the government's training efforts, few Kuwaitis are attracted to technical fields. While the government expands support for technical schools, most Kuwaiti students continue to earn degrees in the liberal arts. In Egypt, where a larger pool of technically trained personnel exists, the comparatively rapid rise in civil service jobs and wages has been a disincentive for Egyptians to enter the technical fields in the private sector.⁶⁰ A large number of those who have entered the technical fields, moreover, have subsequently chosen to work elsewhere in the Arab world, where wages are higher.

A second problem is that many students who study abroad may choose not to return home. While data on the number of returnees are limited, in 1977, 1,000 Algerians reportedly were sent abroad to the United States and elsewhere to train in gas and petroleum technology and civil engineering. Although most of these trainees were obliged by the Algerian Government to return home after their period of study, estimates were that the majority chose not to. Other countries throughout the Middle East, including Syria and Iraq, apparently face difficulty in encouraging recent uni-

⁵⁹See, for example, "Education Policy Criticized for Not Meeting Development Needs," translation of article in *Al-Yamamah*, Oct. 19, 1983, pp. 3-11; translated in *JPRS: Near East, South Asia*, Dec. 2, 1983, pp. 44-58. A recent study conducted by the King Sa'ud University that only about one-fourth of the graduates from the two universities are from the scientific departments, which comprise 15 colleges (1 *ibid.*, p. 46).

⁶⁰See Bent I Jensen and S. Radwan, *Employment Opportunities*, ch. 12, pp. 227-228. See also Waterbury, *op. cit.*, p. 244.

versity and technical school graduates to work at home.⁶¹

Still another problem relates to the distribution of trained personnel once they have been graduated. Expanded vocational training does not necessarily solve labor problems. A study in Kuwait conducted by the Ministry of Social Affairs and Labor in 1974, for example, found that almost 50 percent of graduates of vocational and technical training would not accept manual work even though their training was for such positions. In addition, over 86 percent of graduates who did work in their fields of specialization required retraining before they could be employed. In Egypt, employment and wage policies, which do not encourage students to enter scientific and technical fields in the first place,⁶² also provide little incentive to remain in Egypt upon graduation. A recent survey showed that as many as 45 percent of the graduates prefer to work for private firms or overseas than to work for the government, despite the fact that many of them do become civil servants.⁶³

To combat these problems, a number of policy measures have been discussed or adopted, but few have been sufficiently wide-ranging to change the situation rapidly. Suggested measures in Saudi Arabia to combat low student enrollments in the scientific and technical fields, for example, include limiting enrollment and/or withholding stipends for students in colleges of literature and administration, expanding stipends for students in the scientific and technical fields, or changing hiring policies so that the state would not be obligated to hire graduates in the nontechnical fields for whom demand may be minimal.⁶⁴ Indeed, especially

in the Gulf States, significant monetary incentives have often been offered to attract and keep indigenous personnel in technical fields. In Saudi Arabia, larger scholarships are offered for study in the new technological institutes. Students in training programs in the new industrial city of Jubail pay no tuition or boarding fees and receive, in addition, free transport, work clothing, and an allowance of about 675 Saudi riyals, or \$200 per month.⁶⁵

Similarly, in several countries, greater emphasis has been placed on job placement policies. In Kuwait, strong links between universities and enterprises have been established to facilitate job placement. The Kuwait University science faculty has strong, established links with hospitals, banks, and oil companies, as well as with KISR, where many graduates also work. In both Saudi Arabia and Kuwait, the government is the main employer of nationals. In Saudi Arabia, in fact, graduates work for the government for the same number of years that they studied at the university or else repay the cost of their education (about \$20,000).⁶⁶

Finally, Middle Eastern countries have tried to ensure that students who study abroad return home. These efforts have been particularly pronounced in Syria and Iraq, which offer both a series of restrictions on studying and working abroad and incentives to return home once a course of study has been completed. Iraq, for example, restricts study abroad for undergraduates and requires that all physicians and engineers traveling abroad submit a guarantee to return. Iraqis abroad with a master's degree or higher are offered several incentives upon their return, including land, loans to build a home, tax exemptions, transportation costs, travel expenses, and other salary incentives. These policies were apparently successful in Iraq.⁶⁷ But in most of

⁶¹See Shaw, *Mobilizing Human Resources*, op. cit., pp. 171-172. One source indicates that in 1980, 50 percent of Arab doctorate holders were not living in Arab countries. See Shamlan Y. Alessa, *The Manpower Problem in Kuwait* (Boston: Kegan Paul International, 1981), pp. 74-75.

⁶²For example, public sector employment is guaranteed in a certain wage grade for a certain formal level of education irrespective of specialization. In the public sector, it is therefore not possible to offer higher pay for specializations in short supply, such as certain types of influences, technicians, and professionals. See Heason and Radwan, pp. 217-224.

⁶³Sarah Graham Brown, main author, "Mosaic: Home Grown Graduates Part 4," *The Middle East*, August 1982, p. 1.

⁶⁴"Education Policy Criticized . . .," op. cit., pp. 44-58.

⁶⁵"Investing in Youth," *Euromoney*, October 1982, p. 31. This is true in most states on the Arabian peninsula. In Bahrain, a technical graduate is paid BS 350 (close to \$1,000 per month), on his first job, whereas literature graduates earn only BS 250. See Sarah Graham Brown, "Mosaic: Home Grown Graduates . . .," op. cit., p. 2.

⁶⁶Brown, op. cit.

⁶⁷Shaw, *Mobilizing Human Resources*, op. cit., p. 180.

the countries under review, including Iraq, despite the wide-ranging financial and other incentives, the preference for nontechnical employment persists,

Labor Migration Policies

Middle Eastern countries have attempted to regulate migration, but the issue of labor migration is complex, for both the labor-importing and labor-exporting countries. For the labor-importers, the tradeoff is between the immediate need for foreign expertise and the potential negative social or political effects. For the exporters, the tradeoff is between the "brain drain" and the foreign exchange gained from remittances of those working abroad.

Policies concerning labor migration have tended to shift with economic conditions. In the early stages of rapid economic development, when demand for labor was high, both the Saudi and Kuwaiti Governments established open migration policies whereby any person willing to work in their countries was allowed to do so. Especially in the early 1970's, both governments undertook a series of measures to encourage the in-migration of foreign workers, both skilled and unskilled. During the mid- 1970 's, for example, entry regulations for foreign workers in Saudi Arabia were eased, and income tax on foreigners was abolished altogether; the only deduction from earnings became the 5 percent social welfare tax, or the "zakat."⁶⁸ In Kuwait, such incentives included relatively high wages, rent-free homes, and other "perquisites."

By the late 1970's, however, both countries faced growing concern about the political, social, and economic effects of such a rapidly growing expatriate labor force. Consequently, laws and regulations governing the settlement and employment of foreigners were tightened. While both countries still offer incentives for skilled foreign workers, they have more strin-

gently implemented visa and other regulations governing foreigners already in the country."] Many foreign personnel reportedly have been laid off, including a reported 10,000 ARAMCO workers, mainly American.⁷⁰

Restrictions on foreign workers in the Gulf States vary widely. In Saudi Arabia, foreign personnel working in the Kingdom are concentrated in foreign enclaves. Kuwait, on the other hand, has encouraged rapid turnover of foreign personnel working on large projects. In both countries, noncitizens are limited in many areas (e.g., landholding, welfare benefits, housing), and naturalization and citizenship are quite limited.⁷¹

Other labor-importing countries have also established a mixture of incentives and regulations for foreign workers. While Iraq has traditionally placed restrictions on immigration and employment of foreign workers, the drain on manpower resources due to war has forced the Iraqi Government to seek expatriate management and operations teams to staff many industrial projects and health services.⁷² Like Saudi Arabia and Kuwait, therefore, Iraq has

⁶⁸ "!(c)(r~iin~ to this report, the number of visas issued was approximately 772,000, a drop of over 77,000 from the previous year. See "Kingdom Restricts Foreign Work Force," *The Middle East*, vol. 2, No. 4, March 20, 1983, p. 3.

⁶⁹ *Ibid.*, p. 3.

⁷⁰ See Shaheen Ayubi, "Kuwait Expatriate Labor Force Cause for Concern?" paper delivered at the Middle East Studies Association, Philadelphia, Pa., November 1982. A law passed in 1964 stated that only Kuwaitis are entitled to register in the Kuwait Lawyer's Association. See Shamlan Y. Alessa, *The Manpower Problem in Kuwait* (London: Kegan Paul International, 1981), pp. 44-45.

According to Ayubi, *op. cit.*, Article 1 of the Citizenship Law of 1959, as amended in 1960, 1965, and 1966, states that Kuwaiti nationality is recognized only for people who have been resident in Kuwait before 1920; all others are classified as non-Kuwaitis. Articles 4 and 8 specify that naturalization for non-Kuwaitis of Arab origin requires a 10-year residency before applying; for those of non-Arab origin, the requirement is 15 years. Article 4 also, however, places the limit on the number of foreigners who may be naturalized in any one year at 50. Ayubi, *op. cit.*, See also; Jacqueline S. El-Smael, *Kuwait: Social Change in Historical Perspective* (Syracuse: Syracuse University Press, 1982), p. 118.

⁷² For a discussion of this phenomenon in the health care and industrial sectors, see Jonathan (Crusoe), "Foreign Skills Plug Iraq's Manpower Drain," *Middle East Economic Digest*, Jan. 28, 1981, p. 19.

⁶⁸ See J. G. Kaikati, "Marketing Practices in Iran vis a vis Saudi Arabia," *Management International Review*, vol. 19, No. 4, 1979, p. 37.

attempted to offer significant monetary incentives—especially to highly skilled manpower from abroad. In the late 1970's, salary incentives in the Middle East for certain types of skilled personnel were highest in Iraq and Saudi Arabia. (In contracting, for example, a general manager in Iraq earned up to \$5,614 per month, as compared to \$4,941 in Saudi Arabia, also the upper limit for a chief consulting engineer there.⁷³) Thus, particularly for skilled manpower, the labor-importing countries offer financial incentives, while at the same time often restricting the integration of foreign nationals into local society.

In contrast, especially for Egypt and Algeria, the key issue is emigration. The case of Egypt illustrates the dilemma. While the government of Egypt would like to restrict the outflow of labor of certain types, particularly of Egyptian technicians, labor has also been one of Egypt's main exports, generating much needed foreign exchange. So far, the government has not imposed rigid restrictions on the emigration of skilled personnel. Egyptian planners nevertheless worry that the labor outflow may lead to domestic problems, since the exported skills may be in short supply in Egypt itself.

In Algeria, similar policy debates are taking place. In Algeria the flow of emigrants has been almost as large as that from Egypt, but mainly in the direction of France. During the latter part of the 1970's to 1980's, upwards of 30,000 skilled and unskilled Algerian workers were leaving each year in hopes of finding employment in France. Although this causes concern to Algerian planners, no policy on such emigration has been established.

The implications of the manpower situation for technology transfer are complex. As discussed in chapter 3, it is expected that the demand for foreign labor in the oil-rich countries will be reduced in the near term owing not only to reduced expenditures on large new projects, but also to the entry of many of the Gulf States into a stage of consolidation following

the rapid expansion of infrastructure in the past decade. But, while the total numbers of foreign workers can be expected to decline, requirements for highly skilled foreign manpower will certainly remain strong. These factors will continue to draw manpower from the Middle East labor exporting countries, leaving shortages in certain skilled occupational categories at home.

Expansion of scientific and technical education and more attention towards migration policies are helping to address some of these problems. But questions of gearing supply to demand, especially in the scientific and technical fields, and of regulating migration to meet domestic requirements remain major challenges in all of the countries under review and key factors which will continue to affect technology transfer.

TECHNOLOGY TRANSFER AND THE FOREIGN POLICY CONTEXT

Technology transfer choices are often shaped by broader foreign policy concerns, particularly issues of dependence and vulnerability as reflected in economic interactions, and political alliances and conflicts with other countries. This section briefly discusses implications for technology transfer of three types of foreign policy issues: the question of dependence on foreign governments or suppliers, the effect of regional conflicts on economic relations, and regional cooperation in development and technology transfer efforts.

The Question of Dependence on Suppliers

Prior to the 1970's, some Middle Eastern countries relied on a limited number of foreign suppliers for imports of technology, products, and food. In many cases, suppliers were chosen largely on the basis of historical or colonial ties, geographical proximity, and political alliances. Some countries such as Algeria and Iraq traded heavily with the Communist bloc. Others, such as Saudi Arabia and Iran, relied much more on the West.

⁷³ See Jonathan Crusoe, "The Cost of Living in the Middle East," *Middle East Economic Digest*, Feb. 4, 1984, p. 15.

The past decade, however, has seen a marked reappraisal of supplier relationships in all of the countries under review, and all have begun to diversify their reliance on foreign suppliers. As analyzed in chapter 3, trading patterns have become increasingly complex, and many countries which traditionally traded extensively with Soviet bloc countries are now relying on Western suppliers. Egypt, prerevolutionary Iran, and Iraq have made a marked shift from trade dominated by Eastern bloc nations, led by the Soviet Union, to trade dominated by the Western industrialized nations led by the United States and West Germany. Prior to the revolution, Iran shifted its imports from the Soviet Union and Great Britain to the United States, France, and Great Britain, with Japan becoming a more important supplier in 1975. For Iraq, the Soviet bloc was the major source of technology until the mid-1970's; beginning in about 1974, however, Iraq shifted to a variety of sources, mainly Japan, West Germany, Great Britain, Italy, and the United States. Similarly, Algeria has recently shown a preference for contracts awarded to EEC countries.

At the same time, there is some evidence that traditionally Western-oriented countries may now consider the Soviet bloc nations as potential suppliers, albeit in a still limited way, and that they have attempted to diversify Western suppliers. Saudi Arabia has pursued policies that leave the close Saudi-American alliance intact but that aim to develop a degree of independence from American influence through diversification among Western suppliers. Consequently, the market share of the United States in Saudi Arabia has declined. Similarly, Egypt since the Camp David Accords and the expansion of U.S. economic assistance has relied increasingly on the United States as a major supplier. Nevertheless, if Egypt is fully reintegrated into the Arab world, diversification of suppliers could occur.⁷⁴

There is little agreement whether diversification of suppliers is a conscious political strategy or simply the result of changes in the economic marketplace. Undoubtedly, elements of both play a role. Some countries, such as Saudi Arabia and Iran, have stressed economic factors in these decisions—i.e., the desire to obtain the best technology on the most favorable terms. In others, such as Iraq, the emphasis has been on avoiding political dependence. Saddam Hussein, for example, has noted the "political essence" of technology transfer and has expressed wariness over the potential loss of freedom of action that could come with heavy dependence on one supplier for technology transfer. Iraq's leader has stated,

Soviet technology is communist. American technology is American, bourgeois and capitalist. French technology is French, bourgeois and capitalist . . . Even when these states export their technology abroad, they are acting from political motives, as well as others, including transferring their political and social character to the societies to which they are exporting."

Algeria's former President Boumedienne emphasized in the 1970's the importance of economic independence for a country's development. Diversification of trading partners and control over the domestic economy were important themes, as well as Algeria's emphasis on a new world economic order based on equality among developing and developed countries." While it is unclear that these concerns alone would stimulate a conscious diversification of suppliers, they certainly play a role in choices of suppliers. Thus, shifts in choice of suppliers can reflect alignments with the superpowers and other political concerns, as well as a pragmatic choice based on technology quality.

In some instances, diversification of suppliers can lead to more economically advantageous deals for recipients, or possibly expanded political influence over the supplier (see ch. 10).

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Amir Iskander, *Saddam Hussein: The Fighter, The Thinker and The Man* (Paris: Hachette Reaht&, 1980), p. 371.

⁷⁴Harold Nelson (ed.), *Area Handbook for Algeria* (Washington, D. C.: American University, 1979), p. 239.

⁷⁴In January 1984, Egypt was readmitted to the Organization of the Islamic Conference.

Certainly Middle Eastern countries have had the opportunity to be more selective in technology acquisition, based on their wealth and on the West reliance on Middle Eastern oil. All of them have gained in capability to set the terms of technology transfer and to choose their suppliers. On the other hand, deliberate diversification of suppliers can also lead to problems in the integration and management of technologies from various suppliers. Regardless of the rationale, the trend toward increasing diversification has certainly stimulated competition among suppliers.

Regional Conflict

Perhaps the most salient example of the direct effect of regional conflict on policies affecting civilian technology transfer stems from the major political conflict in the region—the Arab-Israeli dispute. The effects lie in two main areas: in the desire of Arab countries to catch up with Israel's scientific and technological leadership, and in their desire to affect the political stance of supplier countries through such mechanisms as the boycott of foreign firms or companies trading with Israel.

The stringency with which Middle Eastern countries have enforced the boycott has, however, varied. Saudi Arabia and Kuwait, for example, have been among the more stringent adherents. While the Saudis have shown flexibility in attempting to use language acceptable to the United States and consistent with the boycott, enforcement might be stronger in the future, owing to the use of a new computerized boycott list and the desire of some middle-level Saudis to tighten up enforcement.

The boycott has often been laxly enforced by other countries in the region when it conflicts with other important policy goals. Iraq, for example, has traditionally enforced the boycott rather stringently in a way that reduced contract awards to American corporations. However, since the late 1970's and then the outbreak of war with Iran, Iraq has exhibited increasing flexibility in enforcement, and apparently has often invoked the "national interest" exemption to the Arab League's boy-

cott rules. This has allowed both the Iraqis and foreign companies to sometimes disregard the certification procedure which requires foreign firms to guarantee that goods did not originate in Israel, South Africa, or Hong Kong.

It is often difficult to measure the exact relationship of foreign policy to technology transfer. To cite one example, British Prime Minister Margaret Thatcher prohibited meetings between her government and a high-level Arab League delegation that included a representative of the Palestine Liberation Organization (PLO) in December 1982. Subsequently, Saudi officials hinted that the dispute might jeopardize the \$8 billion yearly trade between the two countries.⁷⁷ Although it is unclear to what extent this incident actually hurt British trade with Riyadh, threats of trade retaliation can nevertheless be easily invoked by both recipients and suppliers and often substitute for serious actions.

Regional conflict has also had an impact not only on supplier choices, but also, of course, on interactions among countries in the region.⁷⁸ Among the more salient examples of this are the isolation of Egypt in the Arab world, and the effects of Khomeini's revolution on the policies of other Middle Eastern states. In the case of the former, for example, the linkage between foreign policy concerns and technology transfer was dramatically clear. President Sadat initiated the *infitah*, or liberalization policy, in 1973 to promote political and economic cooperation with the West, especially the United States. Later, after Camp David, Arab trade with and capital flows to Egypt fell dramatically. Today, Egyptian trade and foreign relations are improving with the rest of the Arab world, with prospects for increased capital flows to Egypt and joint projects. Trends in technology trade thus have clearly reflected Egypt's political stance.

The revolution in Iran also had a significant effect on technology transfer to that country;

⁷⁷il. W. Apple, "Saudis Retaliate for Britain's Stand on PLO," *New York Times*, Jan. 5, 1983, p. A8.

⁷⁸Algerian handbook, op. cit.

trade declined, and imports from the United States in particular became reduced to a trickle. Furthermore, the revolution in Iran caused other countries in the region to re-examine their own development policies and raised concerns about the potential adverse political effects of rapid economic development.

Finally, as discussed in chapter 3, regional conflicts have also greatly expanded imports of military technology and equipment. Iraq's purchase of five super Etendard jet warplanes from France, or Saudi Arabia's purchase of AWACs from the United States, have been prominent examples. Many Middle Eastern countries, Israel included, devote a very high proportion of government expenditures to defense."

Regional Cooperation

Despite protracted regional conflict, the Middle Eastern countries have increased efforts to promote regional cooperation in industrial development and technology transfer efforts. Especially in light of the vast differences in resources which exist among the Middle Eastern countries, efforts have been made to share these resources in order to promote more effective regionwide development. An obvious example of regional cooperation is the aid provided by the capital-rich Arab nations to other Islamic nations. Kuwait was the first Arab state to establish a massive assistance program for poorer Arab nations and other Third World countries. Other Gulf States have followed suit, and aid and loans from the capital-rich Middle Eastern countries to those lesser developed occurs on a large scale. As table 98 illustrates, aid from OPEC countries has remained formidable. About 70 percent of Ku-

Table 98.—OPEC Aid in Comparative Perspective
(net ODA^a Disbursements)

| | OPEC | DAC ^b | CM EA ^c |
|----------------------|------|------------------|--------------------|
| \$ billion | | | |
| 1970. | 0.4 | 6.9 | 10 |
| 1980 | 91 | 27.3 | 22 |
| Percent of GNP | | | |
| 1970 | 1.18 | 0.34 | 0.14 |
| 1980 | 1.70 | 0.38 | 0.14 |
| Percent of total ODA | | | |
| 1970 | 5 | 83 | 12 |
| 1980 | 23 | 71 | 6 |

^aODA is official development assistance.

^bDAC countries include most OECD nations.

^cCM EA countries include the U.S.S.R., Bulgaria, Czechoslovakia, GDR, Hungary, Poland, and Rumania.

SOURCE: Organization for Economic Cooperation and Development, *Aid From OPEC Countries* (Paris: OECD, 1983), p. 14.

wait's assistance has been provided to Arab countries."⁸¹ OPEC countries provided over \$63 billion in confessional assistance between 1973 and 1982, most of it in the form of general support assistance offered without conditions, but in recent years levels of assistance have declined.⁸¹

A similar example of efforts for more regional cooperation is found in "trilateral ventures, which bring together Arab capital, Western technology, and Egyptian manpower. This concept has been discussed in the context of the Euro-Arab Dialogue, as reviewed in chapter 12. Political differences have presented obstacles to implementation of "trilateral ventures," particularly in Egypt.

A number of organizations have been established for regional cooperation in economic development, technology transfer, and other areas. They include the Gulf Cooperation Council, the Arab Fund for Social and Economic Development, the Kuwait Fund, and the Gulf Organization for Industrial Consultancy (GOIC).

⁸⁰R. El Mallakh, *Absorptive Capacity of Kuwait* (Lexington, Mass.: Lexington Books, 1981), p. 182.

⁸¹ Financial assistance from Arab development funds reportedly fell to \$1.1 billion in the first half of 1983, a 20-percent drop compared to the second half of 1982. However, the proportion of funds going to Arab countries grew from 34 percent of the total in the second half of 1982, to almost one-half (48 percent) of the total in the first half of 1983. See David Hawley, "Arab Aid Commitments Fall Sharply in 1983," *Middle East Economic Digest*, Nov. 18, 1983. See also Larry G. Nowels, "OPEC Aid to the Third World," *Congressional Research Service Review* 91-5, No. 3, March 1984.

"Between 1975-81, for example, Saudi Arabia's defense expenditures rose sharply, with per capita defense spending estimated at about \$1,700 in 1979. See U.S. Arms Control and Disarmament Agency, *World Military Expenditures and Arms Transfers, 1971-1980*, March 1983, pp. 53 and 65. Between 1971-80, about 10 percent of total arms exports worldwide went to the Middle East and North Africa. See Patrick Cockburn, "Middle East Military Imports Weather Fall in Oil Price," *Financial Times*, May 9, 1983, p. 5; and Saad Eddin Ibrahim, "Oil, Migration and the New Arab Social Order," in *Rich and Poor States in the Middle East*, Malcolm H. Kerr and F. I. Sayed Yassin (eds.) (Boulder, CO: Westview Press, 1982), p. 55.

The Gulf Cooperation Council (GCC), since its creation in the early 1980 's, has rapidly expanded economic cooperation in investment, customs, tariff, and in other areas among its six member states: Saudi Arabia, Kuwait, Bahrain, Oman, Qatar, and the UAE. Joint economic projects formulated in the June 1981 Unified Economic Agreement include removing trade barriers, establishing joint stock companies, lifting currency restrictions, and unifying industrial laws and banking and investment procedures. Today, another GCC initiative is to try to coordinate new business activities by Gulf nations. A technology transfer committee was set up in the GCC, which is now also considering a proposal for a "Gulf Center," which would promote technology transfer and technical development. Recently, the GCC established the Gulf Investment Co. (GIC) to act as an investment vehicle, and it is now also attempting to form a common market which its members hope will be operational by the end of the decade.⁸²

The Gulf Organization for Industrial Consulting (GOIC) is a regional organization devoted specifically to technology transfer in the industrial sector. Member countries of GOIC have already undertaken a number of projects, such as a fiberglass plant in Saudi Arabia, a steel mill in Bahrain, and have planned aluminum and petrochemical facilities. A feasibility study was initiated for a large petrochemical complex (see ch. 5). Most of the projects are now in the feasibility study stage.

The Arab Fund for Social and Economic Development (AFSED) is one of the most impressive of the regional organizations involved in technology transfer—although it considers technology transfer only one of a number of criteria in evaluating projects for selection. Establishment of a "Technology University" in the Arab world has also been discussed. In contrast to AFSED, the Kuwait Fund is primarily a financing organ, rarely involved in evaluating the projects it funds.⁸³

⁸²See, for example, "GCC Summit: Preview 1 I: Towards a True Unification," *Arab Banking and Finance*, No. 8, October 1983, p. 49; reprinted in "Obstacles Facing Economic Integration in Gulf Discussed," *JPRS: Near East, South Asia*, Dec. 21, 1983, pp. 7-8.

⁸³Soliman Demir, *Arab Development Funds in the Middle East* (New York: Pergamon Press, 1978).

Efforts have also been made to pool or jointly develop manpower resources. The Kuwait Institute for Scientific Research (KISR), for example, has advocated improving knowledge about technology on a regional level so that Arab countries can make better choices and rely more on their own consultants in technology transfer decisions. Kuwait's Social Affairs Assistant Undersecretary, Abdullah Ghalum Husayn, has proposed an Arab employment fund, stating that such a joint venture would lead to the promotion of national manpower resources, particularly in heavily populated regions.

Many efforts at regional cooperation have been promoted by countries emphasizing their common Islamic heritage. The Islamic Development Bank, for example, channels funds to development projects in Islamic nations worldwide. The bank's first project was approved for funding in 1976, and it now has 170 projects, 27 of which involve "technical assistance," although most of this has gone to feasibility studies. Some observers see the bank as a marriage of Islamic principles and modern financing; interest is not charged, but members nonetheless earn a profit. Between 1972 and 1982, the bank provided funding valued at \$3 billion; about two-thirds of that went for foreign trade financing for LDCs and about one-third for project financing. Project financing covers a broad range: loans, equity participation, leasing of equipment, profit-sharing, and technical assistance. The bank has financed a few projects solely; typically it teams up with other multinational development organizations or uses other Arab funds for project support. Increasingly, bank projects involve leasing of equipment and technical assistance. While bank officials tend to emphasize the importance of technology transfer, only about 25 percent of the projects are said to focus on technology transfer, largely because many of the projects are in nations that cannot yet absorb advanced technologies.

The Islamic Foundation for Science and Technology is being established as an outgrowth of the Organization of Islamic Countries. The foundation, presently being set up by Ali Kettani, has a governing board comprising the Secretary General of the Organiza-

tion of Islamic Conference (OIC), Kettani, and 14 scientists nominated by Foreign Ministers of various OIC states. The goals of the foundation are to bring together researchers throughout the Islamic world in order to avoid duplication of effort and to pool common resources. Among current projects are the establishment of a computer network that would allow scientists and technical personnel to have online access to technical information in English, Arabic, and French, and the promotion of advice and consultancy within the foundation. Other plans call for the establishment of a common research framework for member nations, with shared laboratories and facilities to the extent possible.

Kettani's vision is fundamentally Islamic, and is based on a belief that the weakness of science and technology in the Islamic Middle East is a problem the Islamic countries them-

selves must overcome. In his view, Western organizations can play a role in this process—but the problem and that role must be defined by the Islamic countries themselves. Since the foundation is only in its infancy, it is impossible at this stage to anticipate how quickly the vision will be fully implemented.

To generalize, efforts have been made to promote regional cooperation in the area of technology transfer, but results remain limited. This is due partly, of course, to the continued volatility and shifting alliances in the Middle Eastern region itself, which add additional incentives for most countries to focus on national development first. Regional cooperation is nonetheless an attractive concept for policy-makers in the region, and actions of the Gulf Cooperation Council and other groups suggest that there could be significant movement toward cooperation in certain areas.

CONCLUSION

Two overriding policy challenges related to technology transfer face planners throughout the Islamic Middle East: the challenge of using social, political, and economic resources effectively to promote economic, and especially industrial, development; and the challenge of doing so without unduly increasing dependence on foreign governments or suppliers. To meet these challenges, policy makers in the Middle East continue to debate about the pace and type of development strategy and of technology transfer, and the institutions most effective for meeting these ends. The second challenge is reflected in policies to regulate foreign involvement in technology transfer, both directly—through specific restrictions on the terms of technology transfer, manpower, and foreign investment—and indirectly, through general efforts to diversify suppliers.

All of these issues are complex, and the approaches to solutions have varied. Some Middle Eastern countries such as Saudi Arabia and Kuwait continue to emphasize the transfer of capital-intensive technologies into

market-oriented economies. Others, such as Algeria, may be shifting to less heavily capital-intensive technologies, while remaining Socialist. Some countries, such as Iraq, have made extensive efforts to limit foreign involvement. Others, such as Egypt and Saudi Arabia, have encouraged foreign involvement, but with significant regulation. As a number of economic and social indicators of development show, moreover, all of these countries have achieved a measure of success in economic development during the past decade.

Despite these successes, however, barely more than one or two decades have elapsed in most of the countries since development efforts were begun in earnest, and significant challenges remain. For the labor-short countries such as Saudi Arabia and Kuwait, manpower policies remain among the most critical policy areas, as these countries continue to attempt to train indigenous workers in technical skills and scientific and engineering professions. In these countries, the manpower problem may be said to have been temporarily

solved by policies of importing laborers and limiting and circumscribing their activities, while simultaneously encouraging the continued training of indigenous personnel in technical skills. But incentives for indigenous populations to enter technical occupations are still limited, and this remains a decided constraint on the successful implementation of policies to develop indigenous capabilities.

For those countries with more varied resources but limited financial reserves, such as Egypt and Algeria, issues of administrative reform, as well as financing, remain paramount. Among countries in the Islamic Middle East, Egypt presently has a rich human resource base, but its administrative and political context often produces inefficiency. The key challenge for Egypt remains in fully utilizing its human resources in light of political and administrative problems which act as constraints. Rapid reform may stimulate political opposition, but inaction may also produce negative consequences for the leadership. A key challenge for Egypt is to weave a delicate path between these two courses. For Algeria as well, issues of administration remain a critical policy area, as does the need to reverse the "brain drain" of skilled personnel. Policies to deal directly with these issues are only beginning to be formulated.

Both Iraq and Iran had a relatively well developed infrastructural and industrial base before the outbreak of war between them. A key issue for both, therefore, is to compensate for the diminution of resources—financial, human, and otherwise—from the continuation of the war effort. New resource demands may lead to substantial differences in the way technology transfer may be conducted. In Iraq, capital constraints on financing of technology transfer may become serious problems for the ruling regime. But for both countries, technology transfer policies depend on the course of the war. Today, the Islamic Iranian regime remains outwardly hostile toward Western tech-

nology. But increasing overtures to the West and the restarting of several projects begun before the revolution suggest prospects for Iranian reintegration into global trade.

For the Islamic Middle East as a whole, regional cooperation in technology transfer and industrialization continues to be emphasized. Indeed, economic integration would benefit most Middle Eastern countries, given the large resource imbalances among them. The persistence of regional conflict, however, remains a serious impediment to these efforts. The challenge for all Middle Eastern countries is to create the conditions for greater cooperation in the midst of conflict and to accommodate far-reaching economic and technological changes while keeping the essential core of Islamic tradition vital and relevant.

In short, technology transfer policies are in practice geared to the requirements of specific projects and sector development programs, despite efforts to establish a comprehensive framework. No nation can afford to purchase all available technologies, and the capacity to absorb advanced technologies is limited by a number of factors, especially shortages of technical manpower. Thus, Middle Eastern countries continue to be faced with tradeoffs in selecting technology purchases and suppliers, in formulating development strategies and goals, and in developing an indigenous capability to operate and maintain technology effectively while simultaneously seeking independence from foreign influence. The challenges facing all of the Islamic developing countries in the Middle East, therefore, remain formidable, and a large role for foreign assistance will be required for development aims to be attained. Foreign suppliers, for their part, must be sensitive to the demand of recipient countries to sustain their own independence and sovereignty over development and technological decisions and to the economic and political effects of these choices in the Middle East as a whole.

Table 11A-1.—Summary Recommendations of Major Policy Studies on Science and Technology in Egypt, 1972-80

| Study title | Date | Sponsoring agency/organization | Major observations/recommendations |
|---|------|--|---|
| Arab Republic of Egypt: Current Problems in Science and Technology (22 pp.) | 1972 | UNESCO | <p>There is a lack of integrated science/technology (S/T) policy at decisionmaking and executive levels</p> <ol style="list-style-type: none"> Recommend formation of inter-ministerial committee for research and development with power to examine and approve all Government of Egypt (GOE) plans and budgets Must solve problems of formulating a strategy for including the preparation of nationwide inventory of S/T resources There is a lack of updated S/T information especially modern books and journals. GOE must finance and encourage professional travel <p>Links between four major levels (researchers, users, executive, ministerial) of S/T policy formulation need to be strengthened. Create joint inter-ministerial committee for science planning</p> <ol style="list-style-type: none"> The proposed committee would formulate long-range 20 years' role of S/T in Egypt The autonomy of the Academy of Scientific Research and Technology (ASRT)^a should be preserved with strong ministerial support. The ASRT should organize a special unit on science policy Establish a National Center for Information on Research Potential and Performance to generate data for planning and budgeting and evaluation of research activities Revise present system of employing research workers to provide greater incentives |
| Arab Republic of Egypt: Science Policy-Making (22 pp.) | 1974 | UNESCO | <ol style="list-style-type: none"> Egypt lacks a formally enunciated science policy although there appears to be an implicit policy The ASRT has an important coordinating and guiding role. It manages a sizable research effort that requires considerable restructuring and redirection R&D groups in Egypt must be effectively involved in the process of technology transfer Effective intraorganizational linkages and communication are lacking Training programs should be developed to improve the management of R&D programs Research staff should have appropriate financial incentives Improved equipment, libraries, and support facilities are necessary for high-quality research effort A national science plan, including specific objectives for applied research, should be formulated in conjunction with a clear and concise national economic and social development plan Effective technology transfer at minimum cost requires revision of national legislation |
| Science and Technology Policy. Research Management and Planning in the Arab Republic of Egypt (symposium) | 1975 | ASRT National Academy of Science (U.S.) National Science Foundation (U.S.) National Research Council (U.S.) | <ol style="list-style-type: none"> Egypt lacks a formally enunciated science policy although there appears to be an implicit policy The ASRT has an important coordinating and guiding role. It manages a sizable research effort that requires considerable restructuring and redirection R&D groups in Egypt must be effectively involved in the process of technology transfer Effective intraorganizational linkages and communication are lacking Training programs should be developed to improve the management of R&D programs Research staff should have appropriate financial incentives Improved equipment, libraries, and support facilities are necessary for high-quality research effort A national science plan, including specific objectives for applied research, should be formulated in conjunction with a clear and concise national economic and social development plan Effective technology transfer at minimum cost requires revision of national legislation |

Table 11 A-1.—Summary Recommendations of Major Policy Studies on Science and Technology in Egypt, 1972-80 (continued)

| Study title | Date | Sponsoring agency/organization | Major observations/recommendations |
|---|------|--|--|
| National Science and Technology Policy in Egypt (60 pp.) | 1975 | UNESCO Arab League, Cultural and Scientific Organization | <ol style="list-style-type: none"> 1. There is <i>no comprehensive national science and technology p/an</i> or consensus as to national problems and priorities. The ASRT has an important role in facilitating articulation of these 2. It is difficult to get scientific personnel to commit to group/national research objectives if these are not consistent with their individual research interests 3. The scientific community is isolated from potential users of technology |
| Egyptian Development and the Potential Role of Science and Technology (268 pp.) | 1976 | USAID (University of North Carolina was the prime contractor) | <ol style="list-style-type: none"> 1. There is insufficient interaction between researchers and end-users of research findings 2. Development planning by government agencies, technology planning by public sector enterprises, and science planning by the ASRT and its related council is too compartmentalized. There is no communication between these respective planning units, between planners and project managers, and between planners, managers, and end-users 3. ASRT effectiveness must be improved to give it a stronger coordinative hand |
| A National Strategy of Scientific Research | 1977 | ASRT | <ol style="list-style-type: none"> 1. Solution to technology problems must be found with emphasis on resolving those where the expectation of success is high Any national scientific research an must focus on concepts and issues of strategy in: the transfer and adaptation of technology; food security; natural resources; housing; health; energy; scientific and technological information; management development; communications linkages; and the Open Door policy |
| Transfer and Development of Technology in Egypt (32 pp.) | 1980 | UNCTAD | <ol style="list-style-type: none"> 1 Only recently (circa 1978) has Egypt paid attention to the import of technologies in its official policies 2 There <i>needs to be an explicit policy for dealing with foreign technology</i> 3, There are a number of critical gaps in the present GOE arrangement regarding technology transfer and development, both at the poilcy level and in the coordination of the various institutions involved 4 A National Center for the Transfer and Development of Technology should be established and affiliated with the ASRT |

^aThis organization formed in 1971 replaced the Ministry of Scientific Research as the Unit responsible for SIT Planning

NOTE The Near East Bureau of AID was conducting an assessment of SIT programs in 1984

SOURCE Compiled for the Office of Technology Assessment

and coordination