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Sectoral Survey 4

THE NON-ELECTRICAL MACHINERY INDUSTRY IN EGYPT

1982

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A GUIDE TO DOING BUSINESS IN EGYPT follows page 155 of this report.

PREFACE

This report is one of a series published by the General Authority for Investment and Free Zones and designed specifically to promote the participation of U.S. companies in investment projects in Egypt.

Funded by the U.S. Agency for International Development (U.S. AID) and prepared by the Chase World Advisory Group of Chase Trade Information Corporation, these reports focus on sectors of the Egyptian economy which offer the foreign investor specific investment opportunities in significant areas of the Egyptian economy ranging from pharmaceuticals; the processing and distribution of food crops; and the production and processing of livestock, poultry, and fish products; to construction materials, components, and systems; and electrical and electronic machinery.

There are ten reports in all. This fourth report, on the non-electrical machinery industry in Egypt, was prepared by a team under the direction of Leonard R. Hones of K.W. Tunnell Company, Inc.

INTRODUCTION

Egypt's industrial output, which now contributes about 15 percent to GDP and is considered the key to the country's development, is increasing very rapidly. Real industrial output has been increasing by over 10 percent per annum.

Egypt's rapid industrial growth has accelerated demand and stimulated the rest of the economy. Although most industrial expansion has been in import substitutions, this has not improved the country's overall balance-of-payments position inasmuch as the demand for imports in other areas has been stimulated simultaneously.

Virtually all large industrial factories were nationalized in the early 1960s. Public sector companies established then now report to the Ministry of Industry and coordinate their activities through High Sectorial Councils, each of which has a Technical Secretariat. Investment and expansion decisions are made at the ministerial level through the Government Organization for Industrialization (GOFI).

Private sector and joint venture enterprises have multiplied rapidly since 1974. Today the leading industrial sectors of the Egyptian economy are

textiles, food processing, metallurgy, chemicals, and engineering industries (see Table A).

Table A

ESTIMATED INDUSTRIAL OUTPUT, 1980

(L.E. millions)

Sector	Value Added
Textiles and apparel	439.3
Food processing	279.7
Metallurgy	277.2
Chemicals, leather, and rubber	199.2
Engineering industries	180.1
Wood and paper	101.9
Other	93.7
Mining	44.9
TOTAL	1,616.0

Source: Ministry of Planning.

Included in the "Engineering industries" sector in Table A are nine specific non-electrical machinery products; it is on these nine items that this report concentrates its attention. The specific products

studied are as follows:

(1) Small non-riding farm tractors, manually directed, with power-driven wheels and attachments for plowing, tilling, cultivating, and spreading fertilizer

(2) Standard-type industrial material-handling equipment, including power-driven hoists, jib cranes, conveyors, and other standard type components. Specifically excluded are construction cranes and large pre-engineered systems.

(3) Traditional machine tools, power-driven but manually operated, including drills, lathes, mills, planers, grinders, and shapers

(4) Industrial power-driven hand tools, including electrically or pneumatically operated saws, planers, drills, and wrenches

(5) Industrial woodworking machinery, power-driven but manually operated standard machines, including saws, lathes, joiners, sanders, and planers

(6) Air compressors, single stage, for industrial and commercial applications

(7) Blowers and suction fans, blade-type for

industrial and commercial applications

(8) Fluid pumps, single stage, horizontal and vertical, for above-ground applications

(9) Refrigeration and freezing equipment, principally for the food industry

During the course of this study, several additions were made to these categories to reflect actual market conditions. For example, in category (1) above, it was found that small riding-type tractors should be included. Also, residential refrigerators are now included in category (9).

The nine product areas were nominated for detailed analysis after preliminary interviews in Egypt with knowledgeable government and industry sources and through selection criteria including:

- o Significant in-country demand
- o Significant foreign imports
- o Existence of in-country production
- o Availability of trainable labor skills
- o Export opportunities
- o Available joint-venture partners
- o Availability of component or subassembly supply

Some or all of these criteria were met by the nine selected product areas.

In each product area, available in-country statistics of production and imports were analyzed. These statistics were verified or modified through field interviews with producers, importers, and sales agents for imported machinery, and, where possible, users of such machinery. Independent market estimates of demand reflect the integration of both primary and secondary data.

This report also reviews potential investment opportunities and, where possible, identifies joint-venture partners. In addition to the potential partners identified, there are undoubtedly a significant number of other Egyptian businessmen or companies interested in participation in non-electrical machinery ventures. Interested U.S. investors are therefore encouraged to contact any of the following organizations involved in the continuing review of investment opportunities:

- The Egyptian General Authority for Investment and Free Zones
- Chase Trade Information Corporation
- U.S. AID
- Egypt-U.S. Business Council

- U.S. Trade Representative, U.S. Department of Commerce

Two types of joint-venture opportunities are discussed in this report: specific and conceptual. The criteria for a specific joint venture are:

- Definition of a specific project that the Egyptian government considers important to national welfare and eligible for approval under Public Law 43
- The participation of a potential Egyptian partner who desires outside management and technical or financial assistance on a specified project

U.S. businessmen interested in specific projects will be encouraged to undertake reconnaissance visits to Egypt to meet potential partners and discuss proposed projects in detail. When sufficient interest is generated, both parties will be encouraged to undertake the necessary feasibility studies.

The criteria for a conceptual joint-venture opportunity are less precise. In this case, although there appears to be a need for the project, joint-venture partners have not been specifically identified. U.S. businessmen interested in these more general

opportunities are encouraged to make their interest known. After additional details are developed with the assistance of Egypt's General Authority for Investment and Free Zones, a search for potential Egyptian joint-venture partners can be initiated.

The purpose of these sectoral surveys is to identify potential investment opportunities and to encourage U.S. investors to express interest, seek guidance, and initiate investigations. The Egyptian Authority for Investment and Free Zones is prepared to provide interested parties with financial and investigatory assistance.

In addition, there are three impressive Egyptian organizations from which further assistance can be obtained.

- o Engineering and Industrial Design Development Center (EIDDC)
- o Helwan Manufacturing Complex (Military Factories)
- o Training Sector, Helwan Military Factories

These organizations can provide significant in-country backup to any metalworking venture in terms of product engineering design, tooling design and manufacture, and supply of components such as forgings, castings, or

weldments. Each of these organizations will be discussed in greater detail in Chapter 2.

1. EXECUTIVE SUMMARY

Between 1974 and 1980, Egypt's industrial production base increased in real terms at an annual rate of 10 percent. In prior years, highest growth occurred in textiles, food, metals, and chemicals. Engineering industries, which include non-electrical machinery products, were given somewhat lower investment priorities by the Egyptian government. The private sector also lacked the investment capital and technical knowledge to support new venture non-electrical machinery manufacturing facilities. Because of increased demand for such machinery, the Egyptian government established a broad range of metalworking manufacturing capacity within the military complex, with facilities ranging from steel foundries to machine tools. Most important, this complex is supported by a technical school which trains young men in all basic metalworking skills.

In 1981, the non-electrical machinery products that were analyzed for this study had an estimated total market demand of $205 million. Imports valued at over $107 million meet over 52 percent of this market demand. With this negative balance of trade (few exports are made from domestic production), the

Egyptian government encourages joint ventures between U.S. companies and the technical base of Egypt's engineering industries.

For the majority of the product types considered in this report, Egyptian firms most need contemporary product designs and assistance in establishing and managing manufacturing facilities and in controlling production lines.

Wherever possible, this report identifies private sector firms as well as public firms that welcome discussion regarding possible joint ventures with U.S. companies. For example, firms such as the Nasr Automotive Manufacturing Company are seeking sources for current farm tractor products.

U.S. manufacturers should also view Egypt's military complex as a resource for critical components such as iron and steel castings. The Helwan steel foundry, which currently has excess capacity, produces first-rate castings such as machine tool columns and bases. Similarly, the military forge shop produces forgings which meet American Petroleum Institute standards. U.S. companies should also view joint-venture opportunities in Egypt as a starting point from which positions in other Middle Eastern markets can be

developed. For example, there is a significant demand in the Egyptian market for low lift irrigation pumps. The Sudan, adjacent to Egypt, has as many acres under irrigation as does Egypt and can therefore effectively double the demand forecast for Egyptian-produced pumps.

Each of the non-electrical machinery products discussed below has significant in-country demand and future export prospects to other countries in the Middle East.

- The demand for small farm tractors is directly influenced by the government's goal to have the preparation of farm seed-beds completely mechanized by 1985. The current ratio is 66. Total demand for farm tractors is estimated at between 5,000-6,000 units annually. Of this total, it is further estimated that the first-year demand for small tractors (under 45 hp) would be 1,000 units. This would increase to 5,000 units after five years. Ultimately, the use of a total of 100,000 units appears likely.
- The material-handling equipment analyzed in this report has concentrated on small hoists and jib-type cranes. Forecasts of market

demand, based on imports, indicate a total annual market valued at $3-4 million. Import agents representing foreign manufacturers, who have confirmed this figure, also forecast an expansion of the hoist market from $4.4 to $8.3 million during 1985.

- o Machine tools, including manually operated lathes, milling machines, and drills are now manufactured by a military factory at Helwan. There is a market opportunity estimated at 1,450 units annually for up-to-date models of these machines. Future forecasts developed during this study estimate a 1985 market of 2,850 units for comparable machines.
- o Power-driven hand tools are not currently manufactured in Egypt. Demand forecasts indicate that best prospects exist for electric saws and drills for industrial and construction use. The fractional horsepower motor is paramount in the manufacture of such tools. Although only integral motors (over one horsepower) are now manufactured in Egypt, the technology of motor components exists. Market demand is estimated at 2,000-3,000 units

annually.

- Most woodworking tools are imported. Most woodworking companies are in the private sector and comprise 250 large shops of more than 25 employees and 1,500 small shops. Recent estimates indicate a market of 2,500 units of all types of machines, valued at $7.5 million annually.
- Because gas compressors have higher manufacturing requirements, air compressors were emphasized in this study. The annual demand for air compressors of over five horsepower is estimated to be between 1,100-1,600 units. Approximately 63 percent of these units are flow rated below 250 cu. ft./min.; 32 percent have a flow rating of 251-700 cu. ft./min.; and 5 percent have a flow rating of over 700 cu. ft./min.
- The fluid pumps studied included chiefly low lift centrifugal types used for irrigation and other non-hazardous fluids. In 1981, the total annual market demand for in-country use was estimated at 3,700 units. In-country demand is expected to increase to 6,000 units by 1985.

This, plus export opportunities of 2,200 in the same year, project a total demand of 8,200 units.

- o The refrigeration and freeze equipment studied concentrated on commercial and industrial food-freezing and preservation applications. However, because the infrastructure of this equipment is closely related to that of household refrigerators and air-conditioning equipment, these ancillary products also were studied.

  Because the preservation of Egypt's food harvests is so critical, industrial and commercial facilities are in urgent demand. The 1981 market for such equipment is estimated at almost $10 million. Approximately 40 percent of this market is for equipment required to freeze food products; 60 percent is for equipment required to store or transport frozen food. Knowledgeable industry sources in Egypt believe this market demand will double in the next five years.

The chapters that follow provide detailed analyses of these markets and suggest joint-venture opportunities with Egyptian partners.

2. AN OVERVIEW OF THE NON-ELECTRICAL MACHINERY INDUSTRY IN EGYPT

The Position of the Non-Electrical Machinery Industry in the Egyptian Economy

For centuries the Egyptian economy has remained basically agricultural. Until the mid-1970s, most of the labor force was either directly engaged in agriculture or involved in processing and trading agricultural products. Egypt's natural resources are limited to relatively moderate reserves of petroleum, phosphates, and iron ore. Because water and cultivable land are limited and natural resources are not abundant, in more recent years Egypt has concentrated upon industrialization.

In the early 1960s, Egypt nationalized all major industries and utilities and relegated the private sector to the minor role of crafts and cottage industries. The nationalization of industry was accompanied by price controls, government subsidies, and protective tariffs, measures that discouraged foreign investment and private capital formation for investment in Egyptian industry.

In the early 1970s, the Egyptian government acted to de-emphasize the public sector and encourage

private Egyptian and foreign investment in industry. Appendix 1 provides some insight as to the success of the Egyptian government's efforts to develop industry in general and traditional manufacturing in particular.

Several facts should be noted:

- The index of industrial production (100 = 1973) grew 12.3 percent per year through 1978 and is projected at 197 by the end of 1980.
- The value of industrial output grew $706 million (L.E. 494 million) per year between 1973 and 1978. The projected value of industrial output in 1980 was estimated at $7.152 billion (L.E. 5.00 billion). The portion of all industrial output provided by the engineering and electrical industry grew by $158 million (L.E. 111 million) annually and was projected to be $1.24 billion (L.E. 868 million) by 1980. The engineering and electrical industry (Item 3b in Appendix 1) produces some of the non-electrical machinery (NEM) that is the subject of this report. This industry, which accounts for a projected 17 percent of industrial output, is growing steadily.
- Gross fixed capital formation in Egypt has

been increasing annually from $660 million (L.E. 462 million) in 1973 to a projected $4.10 billion (L.E. 2.87 billion) in 1980. Of the capital formed, industry accounts for an increase of 29 percent.

- Employment in Egypt has increased, on the average, by 230,000 jobs annually, with industry accounting for about 31,000, or about 12.5 percent, of new jobs each year.

Because both the number of workers and individual wage rates have increased, total wages paid to Egyptian workers have increased yearly. According to 1980 projections, industrial workers in Egypt receive 18 percent of all wages paid while occupying 12.5 percent of the jobs available. The average annual wage for industrial workers was projected at $726 (L.E. 508) in 1980, up from $410 (L.E. 287) in 1973. Items 6 and 7 in Appendix 1 indicate that industrial workers are the second highest paid in Egypt, well behind petroleum workers and well ahead of agricultural workers.

Table 2-1, which illustrates the relationship between the NEM items covered in this report and the overall value of industrial output in 1978, shows that

the NEM items constitute only one percent of the total industrial output of Egypt. Few other NEM items are produced in Egypt.

Table 2-2 presents the relationship in 1978 between the NEM items discussed in this survey and the value of the output of the engineering and electrical industry, which includes some of the NEM produced.

Table 2-1

THE VALUE OF NON-ELECTRICAL MACHINERY
IN RELATION TO THE OVERALL VALUE OF INDUSTRIAL OUTPUT, 1978

BTN*	Description	1978 Value** of Output		1978 Overall Value# of Industrial Output		Percent of Total
		L.E.(MM)	$(MM)+	L.E.(MM)	$(MM)+	
84.10	Pumps for liquids	2.1	3.0	4,014	5,750	0.05
84.11	Air pumps/compressors	0	0			0
84.12	Air conditioning	7.7	11.1			0.19
84.15	Refrigeration	23.1	33.0			0.58
84.22	Lift/handling equipment	0.3	0.4			0
84.24	Agricultural machinery	0.4	0.5			0
87.01	Agricultural tractors	4.9	6.9			0.12
84.45	Metalworking machine tools	3.2	4.6			0.07
84.47	Woodworking machine tools	0	0			0

Table 2-1 (cont'd)

BTN*	Description	1978 Value** of Output		1978 Overall Value# of Industrial Output		Percent of Total
		L.E.(MM)	$(MM)+	L.E.(MM)	$(MM)+	
84.49 84.50	Power hand tools	0	0			0
	TOTALS	41.7	59.5	4,014	5,740	1.01

* BTN: Brussels Tariff Notation.
** See Appendix 2.
\# See Appendix 1.
\+ Based on October 1981 exchange rate: $1.43 per L.E.

Source: 1979 Yearbook, Federation of Egyptian Industries.

Table 2-2

THE VALUE OF NON-ELECTRICAL MACHINERY
IN RELATION TO THE OUTPUT OF THE ENGINEERING AND ELECTRICAL INDUSTRY, 1978

BTN*	Description	1978 Value** of Output		1978 Overall Value‡ of NEM Output		Percent of Total
		L.E.(MM)	$(MM)+	L.E.(MM)	$(MM)+	
84.10	Pumps for liquids	2.1	3.0	646	932	0.33
84.11	Air pumps/compressors	0	0			0
84.12	Air conditioning	7.7	11.1			1.19
84.15	Refrigeration	23.1	33.0			3.58
84.22	Lift/handling equipment	0.3	0.4			0.05
84.24	Agricultural machinery	0.4	0.5			0.06
87.01	Agricultural tractors	4.9	6.9			0.76
84.45	Metalworking machine tools	3.2	4.6			0.42
84.47	Woodworking machine tools	0	0			0

Table 2-2 (cont'd)

BTN*	Description	1978 Value** of Output		1978 Overall Value# of NEM Output		Percent of Total
		L.E.(MM)	$(MM)+	L.E.(MM)	$(MM)+	
84.49 84.50	Power hand tools	0	0			0
	TOTALS	41.7	59.5	646	932	6.39

* BTN: Brussels Tariff Notation.
** See Appendix 2.
\# See Appendix 1.
\+ Based on October 1981 exchange rate: $1.43 per L.E.

Source: 1979 Yearbook, Federation of Egyptian Industries.

Tables 2-1 and 2-2 indicate that NEM constitutes a very small portion of the industrial capacity in industry in general as well as in the engineering and electrical industry. Although the engineering and electrical industry is dominated by public sector companies, the private sector has made inroads in several areas in very recent years.

Demand Profile

For the purposes of this report, the demand for NEM in Egypt is composed of goods produced by Egyptian industry, plus imported and exported goods. Appendix 2 shows the production figures for 1978 of the NEM items discussed in this survey. The 1981 production figures for these goods, which were projected using historical data, are given in Appendix 3. Similarly, Appendix 4 presents data on 1979 imports and projections for 1981. According to the Bulletin of Foreign Trade (January-December 1979), published by the Central Agency for Public Mobilization and Statistics (CAPMAS), in 1979 exports of the machinery surveyed were negligible, and in 1981 nonexistent (see Appendix 5). Table 2-3 presents 1981 projections for production, imports, and demand for selected items of non-electrical machinery.

The figures in Table 2-3 indicate clearly that

demand for non-electrical machinery is far from satisfied by Egyptian production.

Table 2-4 indicates that, in 1981, only 47.8 percent of the demand for the non-electrical machinery listed will be met by Egyptian industry. Historically, the remainder has been imported. Appendixes 5-14 indicate the amounts of imports and the countries of origin for the selected products. Appendix 15 presents tariff rates for the selected NEM items.

Table 2-3

PRODUCTION, IMPORTS, AND DEMAND FOR
SELECTED NON-ELECTRICAL MACHINERY, 1981 PROJECTIONS

BTN*	Description	Projected 1981 Value					
		Production**		Imports‡		Demand‡‡	
		L.E. (MM)	$(MM)+	L.E. (MM)	$(MM)+	L.E. (MM)	$(MM)+
84.10	Pumps for liquids	4.1	5.8	14.3	21.8	18.4	27.6
84.11	Air pumps/ compressors	0	0	10.2	13.6	10.2	13.6
84.12	Air conditioning	6.9	9.9	3.4	4.9	10.3	14.8
84.15	Refrigeration	35.0	50.1	8.6	12.2	43.6	62.3
84.22	Lift/handling equipment	0.3	0.4	3.3	4.7	3.6	5.1
84.24	Agricultural machinery	0.4	0.5	0.8	1.2	1.2	1.7
87.01	Agricultural tractors	18.3	26.2	13.7	19.7	32.0	45.9

Table 2-3 (cont'd)

BTN*	Description	Projected 1981 Value					
		Production**		Imports‡		Demand‡‡	
		L.E. (MM)	$ (MM)+	L.E. (MM)	$ (MM)+	L.E. (MM)	$ (MM)+
84.45	Metalworking machine tools	3.5	4.9	12.3	17.6	15.8	22.5
84.47	Woodworking machine tools	0	0	6.5	9.3	6.5	9.3
84.49 84.53	Power hand tools	0	0	1.6	2.3	1.6	2.3
	TOTALS	68.5	97.8	74.7	107.3	143.2	205.1

* BTN: Brussels Tariff Notation.
** See Appendix 3.
‡ See Appendix 4.
‡‡ Sum of production and imports.
\+ Based on October 1981 exchange rate: $1.43 per L.E.

Source: 1979 Yearbook, Federation of Egyptian Industries.

Table 2-4

PERCENTAGE OF DEMAND PRODUCED BY EGYPTIAN INDUSTRY, 1981 PROJECTIONS

BTN*	Description	Projected 1981 Value				Percent of Demand
		Demand**		Production**		
		L.E.(MM)	$(MM)+	L.E.(MM)	$(MM)+	
84.10	Pumps for liquids	18.4	27.6	4.1	5.8	22.3
84.11	Air pumps/compressors	10.2	13.6	0	0	0
84.12	Air conditioning	10.3	14.8	6.9	9.9	67.0
84.15	Refrigeration	43.6	62.3	35.0	50.1	80.3
84.22	Lift/handling equipment	3.6	5.1	0.3	0.4	8.3
84.24	Agricultural machinery	1.2	1.7	0.4	0.5	0.3
87.01	Agricultural tractors	32.0	45.9	18.3	26.2	57.2
84.45	Metalworking machine tools	15.8	22.5	3.5	4.9	22.2

Table 2-4 (cont'd)

BTN*	Description	Projected 1981 Value				Percent of Demand
		Demand**		Production**		
		L.E.(MM)	$(MM)+	L.E.(MM)	$(MM)+	
84.47	Woodworking machine tools	6.5	9.3	0	0	0
84.49 84.50	Power hand tools	1.6	2.3	0	0	0
	TOTALS	143.2	205.1	68.5	97.8	47.8

* BTN: Brussels Tariff Notation.
** See Appendix 3.
\+ Based on October 1981 exchange rate: $1.43 per L.E.

Source: 1979 Yearbook, Federation of Egyptian Industries.

Raw Materials and Components

Roughly 55 percent of the components and raw materials used by Egyptian producers of non-electrical machinery are imported. Listed below are some of the critical components required for NEM products.

Components	Status
Sheet steel and plate	Mostly imported; available in-country by 1984
Insulated wire	Available in-country
Iron and steel castings	Available in-country
Electric motors	Available in-country (1-10 Hp)
Diesel engines (air-cooled)	New domestic joint venture
Forgings	Available in-country
Bearings	Imported
Gears	Imported
Machined components (i.e., shafts)	In-country capability
Electrical controls (i.e., relays)	Mostly imported

U.S. companies preparing manufacturing feasibility studies of non-electrical machinery opportunities in Egypt should request on-site visits to the government-

owned and -operated metalworking plants at Helwan. The Helwan complex includes a broad range of production shops with equipment and machinery capable of producing metal parts and components of moderate precision.

Although a complete appraisal of the facilities of this complex is not within the scope of this study, a brief listing is presented below to give a general idea of the significant fabrication and component production skills that exist at Helwan.

- o Helwan Iron and Steel Castings Company. This facility produces cast iron and cast steel components which meet International Standards Organization standards. Specific components produced include centrifugal pump housings, machine tool bases, diesel engine blocks, and structural components for coke ovens.
- o Helwan Company for Military and Civil Forgings. This facility contains both open-throat and closed die presses. Among other things, it produces oil field well-head valve bodies for a joint venture with McAvoy, an international leader in such equipment. Machining of the valve bodies is performed in a separate building operated by McAvoy and using some

Egyptian labor. These valves meet American Petroleum Institute Standards.

- o Helwan Company for Diesel Motors. This facility produces about 6,000 water-cooled engines annually. Licensing negotiations are being held with several European manufacturers for smaller air-cooled diesel engines. Such engines would be ideal for agricultural irrigation pump-sets.
- o Helwan Company for Machine Tools. This company produces manually operated milling machines, lathes, floor and bench drills, shapers, and small eccentric presses. Metalworking skill levels in this plant are high and include parts production and assembly. In recent years, three numerically controlled machining centers have been added.

These metalworking factories operate under the direction of the Minister of Military Production. Most have available capacity and are seeking contracts to produce for private sector industry.

In addition to the plants listed above, the Helwan complex also contains metalworking plants producing integral electric motors, non-ferrous castings, and

small pressure vessel fabrication as well as the main Helwan Iron and Steel Company plant, which uses blast furnaces and open-hearth furnaces for steel production.

Any U.S. company assessing non-electrical machinery opportunities in Egypt should recognize these basic metalworking strengths and sources for components and parts.

Manufacturing Methods

According to government and industry officials, Egypt's greatest industrial needs are technology and training. Modern manufacturing techniques such as material handling systems, numerically controlled machine centers, automated assembly and packaging lines, and the like are generally lacking. According to the chairman of a machine tool company, Egypt also lacks the technology and manufacturing know-how to design and manufacture quality products. Despite the fact that import duties are imposed on most components and complete assemblies, because of inefficient manufacturing equipment and methods, some Egyptian products cannot compete with imports in prices.

One of the goals of the "Open Door" policy that was inaugurated in the late 1970s was the introduction of modern technology to Egyptian manufacturing. The

policy established new roles for the participation of private Egyptian and foreign capital investment in Egyptian industry, previously completely owned or controlled by the central government. Initially, to improve productivity and product lines, much of the private investment was placed in public sector industries, with private investors generally becoming joint-venture partners with public companies. Recently, considerable interest in totally private industrial ventures by Egyptian and foreign interests has emerged, and the Egyptian government, investment banks, and foreign governments have established agencies and organizations to assist in the establishment of new industrial ventures.

Manufacturing Facilities and Investment

Manufacturing facilities in Egypt are quite different from their Western counterparts.

Egypt's temperate climate and infrequent precipitation permit the building of "open air" plants, which have few walls. Raw materials and some finished goods are sometimes warehoused without a roof covering. Some plants operate on dirt floors. Air conditioning and heat are not commonly provided. Because the raw materials for concrete and brick are abundant in

Egypt's vast deserts, until recently, manufacturing plants were constructed with concrete and brick, and these plants often took several years to complete because of inefficient scaffolding, conveyors, and mixing equipment. Structural steel was not only expensive to manufacture or import, but the technology required to erect a structural steel building was generally unavailable.

Today two Egyptian public sector companies, in joint ventures with foreign firms, provide fabricated steel and erect steel towers, bridges, and multi-story buildings. Modern cranes and other material handling equipment are being used, and considerable time is saved by building with steel instead of with concrete and brick.

The capital investment required to construct new facilities is made up of two components: land and the plant itself. First, in addition to being expensive, land with access to utilities is scarce. Typically, the availability of water and power is limited to urban centers, which may already be overtaxed with large influxes of population. The Egyptian government has addressed this problem by planning and constructing new cities and giving high priority to the installation of

utilities for new manufacturing facilities.

The second component of capital investment is relatively inexpensive. According to the vice president of a large Egyptian manufacturer, a newly completed 350,000 square meter facility to house a high-volume plant for manufacturing and assembling refrigerators was constructed at a cost of L.E. 18 million. At the October 1981 exchange rate, this comes to $6.81 per square foot.

Labor Supply and Skills

As noted earlier in this chapter, industry provides about 31,000 of the 230,000 new jobs created each year. The relatively small amount (12.5 percent) of new industrial employment is attributable to the fact that the adoption of modern, less labor-intensive techniques; the ability to train new industrial workers; and the new focus on industrial expansion are all relatively recent developments.

Unskilled labor is readily available in Egypt. The attractiveness of industrial wages--on the average, $726 annually (see Appendix 1)--over agricultural and other wages provides incentive for unskilled or semiskilled workers to seek and successfully complete training. Much of the training is conducted on the

job. However, in 1968 the Egyptian government established the Engineering and Industrial Design Development Centre (EIDDC) as a joint venture with the United Nations Industrial Development Organization. The EIDDC is affiliated with the Egyptian Ministry of Industry and General Organization for Industrialization (GOFI).

Among the technical services offered to public and private sector factories by EIDDC* are:

- o A wide range of technical training courses at engineer, supervisor, and technician level
- o Product and equipment design and preparation of drawings and technical specifications
- o Factory planning and layouts
- o Design, manufacture, and commissioning of factory material handling systems
- o Tool design and manufacture
- o Industrial design
- o Extension services for small-scale industries

According to government and industry officials, Egyptian workers are reliable, eager to learn, and industrious.

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* Source: Engineering & Industrial Design Development Center, Training Programme, 1981.

Distribution of Domestic and Imported Goods

Distribution of Egyptian-produced and imported goods is accomplished largely through relatively small retail outlets. Public sector retail stores are generally larger than their private sector counterparts and offer products produced chiefly by the public sector. These government-controlled stores also sell private sector and imported goods. The private sector retail outlets offer mainly privately produced Egyptian goods and imports.

Prices at public retail stores are, in general, lower than prices at private stores. The price differential is created by government subsidies, price controls, and tariffs on imported goods.

Public sector non-electrical machinery is distributed by public sector centers: Household refrigerators are distributed by public sector department stores, for example. Public sector manufacturers of pumps, material handling cranes, and so on, often sell directly to the user, employing a sales engineering group. Private sector distributors of chiefly imported equipment call themselves engineering companies and, similarly, sell directly to the user. These private outlets often distribute

several varieties of equipment. Indeed, during the preparation of this survey, it was noted that pumps, air compressors, tractors, hoists, and other machinery were available from a single source.

Pricing and Tariffs

In 1979, following the institution of the "Open Door" policy, the government acted to remove some subsidies and lower others. Several days of urban unrest resulted in government promises to rescind these actions. Since then, after the Egyptian government instituted a program of more gradual economic reform, significant industrial progress has been made in areas without high political impact. In Appendix 3, it can be noted that the price of a household refrigerator manufactured in Egypt was stable in 1976 and 1977 and increased in 1978. This price increase may be a reflection of the economic reforms instituted by the government.

According to industry officials, especially those of the private sector, the amount of tariff imposed on imported goods changes frequently. This survey did not

obtain an authoritative Egyptian policy on tariffs.*

Appendix 15 lists the tariff rates on the selected non-electrical machinery of this survey as of October 1981. Table 2-4 indicates the extent to which Egyptian industry fulfills the demand for the same NEM products.

From an examination of these figures, it would appear that the government imposes high tariffs on those imported goods competing with Egyptian goods that most closely meet demand. Egyptian-produced household refrigerators account for 80 percent of demand and have a tariff of 150 percent. On the other hand, woodworking machine tools, which are not produced in Egypt, have a tariff of only 2 percent, thus implying a highly protectionist tariff policy.

Tariffs on manufactured components imported for use in Egyptian assembly operations have lower tariffs

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* Specific assurances should be obtained from the Investment Authority regarding tariffs on raw materials and competitive products. The following statement, quoted from the Federation of Egyptian Industries Yearbook, 1978, gives some insight into the private sector's view of tariff rate policy: "Anyway, it is worthwhile to mention that the engineering private sector never asked for prohibiting the import of any rival commodity but rather sought lower tariffs on the raw material it requires. This is contrary to the demands raised by the public sector, which is attempting to cope with the situation through a ban on imports."

than finished assemblies. Appendix 15 indicates that imported refrigeration parts and components incur a 25 percent tariff, while domestic refrigerators, for example, incur a 150 percent rate. As noted in this survey, high-precision or technology components for refrigerators, such as compressors and evaporators, are not manufactured in Egypt. Thus, a lower tariff is imposed.

Export Potential

Egypt's negative trade balance has been a natural source of concern. One of the government's industrial goals has been to attain self-sufficiency by increasing domestic production and thereby reducing imports. A future goal is to become a net exporter of manufactured and processed goods.

To date, the NEM industries have not become self-sufficient (see Table 2-3), and the export potential for Egyptian NEM products is, therefore, not well defined. However, it would be reasonable to conclude that, if Egypt reached self-sufficiency in any or all of the NEM items reported in this survey, there would be markets for additional product. The Middle East and North Africa in general have little industrial capacity. At the same time, many of these countries

have great need for agricultural equipment, refrigeration, machine tools, and so on.

3. SMALL FARM TRACTORS

Infrastructure

Supplying its ever-increasing population with sufficient quantities of food continues to have the highest priority in Egypt's development plans. Domestic agriculture employs 45 percent of the country's labor force and represents 25 percent of its gross domestic product, but it has been unable to keep pace with the country's constantly expanding needs. As a result, progressively larger volumes of imported foods are widening Egypt's balance-of-trade deficit. In 1980, food imports amounted to $3.4 billion, exceeding the total foreign-exchange revenues from oil exports and Suez Canal services. In 1981, food imports were expected to range from $4-5 billion, and they are likely to exceed $7 billion by the mid-1980s at current prices.

Egypt has a total of six million feddans* of agricultural land under cultivation, almost all of which is located in the Nile Valley and Delta. Thanks to its irrigation system and favorable climate, this land is highly productive: three crops a year can

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* Feddan: approximately 1.03 acres.

be harvested in some areas. However, Egyptian agriculture is beset with problems in packaging, processing, and distribution.

Because Egypt's production of food fails to meet demand, the Egyptian government is placing considerable emphasis on the mechanization of agriculture, not only to increase the production of food but to reduce dependence upon livestock for draft purposes. In addition to being a principal mode of transport, cattle and water buffalo are used to prepare land, pump irrigation water, and harvest and thresh crops. Such work lowers milk production and renders the animals susceptible to disease. The government is therefore in the process of substituting draft animals with mechanized pumping and agricultural equipment.

According to the Ministry of Agriculture, special attention is being given to mechanizing the following agricultural procedures:

(1) Seed bed preparation (through the use of tractors and agricultural implements)

(2) Irrigation (through the use of electrical or mechanical pumping equipment)

(3) Threshing (through the use of low capacity, 600 kilograms/hour threshing equipment)

(4) Pest control (through the use of 600-pound sprayers)

The objective is to completely mechanize seed bed preparation and irrigation by 1985. In 1979, 51 percent of seed bed preparation and plowing was mechanized; today, 66 percent is mechanized. This objective should be considered in relation to the land-holding pattern in Egypt. The country's arable land is divided among 3.5 million owners, 95 percent of whom are small farmers holding less than 5 feddans each and accounting for 52 percent of the arable land.

Egypt is not now self-sufficient in farm labor. In 1961, when there were 5.1 million farm workers, the country was self-sufficient. Currently, the farm-worker population is 7.2 million. However, this is effectively reduced to about 3.5-3.9 million in that about 25 percent of the labor force is composed of children between the ages of 6 and 12 years, most of whom attend school during the winter months; and, in the roughly 20 percent of the farm-worker population over 50 years of age, there is a great deal of absenteeism because of ill health.

Firm statistics regarding the number of tractors in Egypt are unavailable. Estimates range from

15,000 to 20,000 and above. Tractors are used for agricultural purposes only 30 percent of the time. Their chief use is as a low-cost substitute for trucks in the transportation of goods. Accordingly, as reported by the Ministry of Agriculture, a Rumanian tractor of 65 horsepower is most commonly used, whereas a 45-horsepower tractor would be the optimum size for farming operations.

Although, in the early stages of this survey, the assembly or manufacture of the manually controlled, non-riding, powered, small farm tractors now used chiefly in fruit orchards were identified as an area of possible joint-venture interest, it became apparent during interviews with government and industry officials that there are several disadvantages in using these machines in traditional Egyptian farming:

- The Egyptian soil is heavy to work because it is plowed while still moist from irrigation.
- The operators tire easily.
- The machine can prepare only about one feddan per day.
- The cost of imported machines is high in relation to the traditional 65-horsepower riding tractor.

In contrast, the lightweight riding tractor of about 16 horsepower can prepare up to three feddans per day without worker fatigue. In general, there seems to be a much stronger preference for a lightweight riding tractor of about 16 to 30 horsepower.

Appendix 6 presents, by country of origin, 1979 figures for imports of agricultural tractors. Table 3-1, below, presents data on imports for the years 1976 to 1980. These figures were provided by the Nasr Automotive Manufacturing Company, the only company in Egypt to assemble tractors. According to Nasr officials, the 1980 figure understates the total number of tractors imported inasmuch as import duties were suspended during 1980, and agents accordingly imported more tractors than were reported. In 1980, it is believed that 8,000 units were imported.

Table 3-1

TRACTOR IMPORTS, 1976-1980

(units)

Year	Total	Less than 50 hp
1976	1,800	238
1977	3,400	69
1978	5,800	335
1979	2,600	N/A
1980	2,700*	N/A

* Import duties suspended during 1980.

According to the Nasr Company, the total annual demand for tractors should remain at between 5,000-6,000 units per year until 1984-1985. The Nasr Company has produced about 2,800 tractors annually over the past four years.

Nasr estimates that imports of lightweight tractors of less than 50 horsepower will average 180 units per year over the 1981-84/85 period.

Tariffs, as indicated in Appendix 15, amount to 45 percent for tractors of 45-70 horsepower and

2 percent for other horsepower ratings.

All tractor assembly in Egypt is carried out by the Nasr Automotive Manufacturing Company, a public company. Official government statistics as to number, value, and unit price are presented in Appendix 3. The most recent Nasr production figures are shown in Table 3-2.

Table 3-2

ANNUAL OUTPUT OF TRACTORS, 1976-1980

Year	Number Assembled
1976	1,700
1977	2,800
1978	3,000
1979	2,800
1980	2,500

Source: Nasr Automotive Manufacturing Company.

The company assembles three types of 65-horsepower tractors, namely:

Type	Country of Origin
IMR Model R60	Yugoslavia
UTB, 65 hp	Rumania
MF265	Canada

The only local items included in the assembled tractor are tires, batteries, and similar items.

Opportunities for Joint Ventures

Several possible joint-venture opportunities were identified:

- With Nasr Automotive Manufacturing Company, to manufacture standard tractors with up to 60 percent local content
- With private/public sector companies, to assemble/manufacture lightweight riding tractors
- With private/public sector companies, to manufacture small non-riding farm tractors

According to various public sector companies and government authorities, joint-venture partners should

procure components and motive power units from the Military Factories in order to make use of underutilized government-owned facilities.

Standard Tractors

Nasr Company has made detailed feasibility and project studies for the joint-venture manufacture of Rumanian or Massey-Ferguson standard tractors with a local content of up to 60 percent. These studies, which initially contemplated an annual output of 6,000 tractors, have been resubmitted, at the Ministry of Industry's request, for an output of 12,000 units per year. The higher figure is intended to enable Egypt to become self-sufficient in the production of standard tractors. Although this project has been under consideration for some time, it is still open for other potential joint-venture partners.

Lightweight Tractors, Riding Variety

Japanese and Italian manufacturers have entered this market. In 1979, imports of lightweight tractors represented only 25 percent of all tractors sold.

The standard 65-horsepower tractor is used mainly for hauling. Farmers with tractors also carry out contract operations, such as plowing, for farmers who do not own tractors.

Because there are many irrigation channels and canals, the heavy, large tractor is not the most suitable for use on the average (that is, very small) Delta plot. According to the Ministry of Agriculture, the optimum power for a farm tractor is 45 horsepower.

It is likely that, apart from seed-bed preparation or heavy plowing, the lightweight riding tractor of 15-25 horsepower, with cultivation, mowing, spraying, and other attachments, would be suitable--and therefore highly utilized--for agricultural use.

Small Non-Riding Farm Tractors

It is generally felt that the cultivator-type unit is not the best machine for general use on the average Egyptian farm. These units have been used chiefly in orchards or market-garden operations. Operator fatigue, vibration, pliability, low output, and high price were given as reasons for low sales to date.

The Ministry of Agriculture believes that a need exists for the small non-riding farm tractor and that if the price were competitive, the market could be 1,000 units in the first year, rising to 5,000 after five years. Eventually, the Ministry envisions a total of 100,000 units in use.

Profile 1

TRACTORS

Description:	A new venture to manufacture and assemble standard tractors (65 hp) with up to 60 percent local content.
Egyptian Interest:	Nasr Automotive Manufacturing Company.
Location:	Helwan or Cairo.
Role of Foreign Firm:	To provide technology, management, and training on a joint-venture basis. Potential joint-venture partners: a Rumanian manufacturer and Massey-Ferguson.
Project Status:	Awaiting Ministerial approval.
Output:	12,000 units per year.
Investment:	Not known.
Markets:	The Egyptian market is 6,000 tractors per annum. This figure may increase because of land reclamation and the growing shortage of farm labor. The 12,000 figure for full-scale production implies that some of this production will be exported, probably to nearby countries such as the Sudan and the Gulf States.
Pricing:	To be determined by feasibility studies.
Competition:	If the joint-venture company can satisfy the total Egyptian market for tractors of this horsepower, according to Nasr officials, the government would grant monopoly status to the company and apply

large tariffs on imports. Currently, the demand for low-cost tractors that is not being met by Nasr is being filled by imports, mainly from Eastern Europe. John Deere and other large horsepower tractors are imported for work on large agricultural projects.

Components and Assemblies: The Military Factories have the capacity to manufacture castings, engines, gearboxes, and other components which require machining to close tolerances. In principle, there should be no difficulty in providing the locally manufactured content, although additional plants may be required and machinery may need to be installed.

Profile 2

LIGHTWEIGHT TRACTORS

Description:	A new venture to establish a factory to assemble lightweight agricultural tractors.
Egyptian Interest:	The Centech Company, a private organization which has two divisions: Agriculture and Engineering. The company is the agent for various foreign firms active in agricultural chemicals, machinery, and irrigation systems.
Location:	Headquarters, Cairo. The company has land available for manufacturing.
Role of Foreign Firm:	To provide a percentage of capital, technology, management, and training on a joint-venture Public Law 43 arrangement or through a licensing agreement.
Project Status:	Preliminary discussions have been undertaken with an American manufacturer for the import of fully assembled machines.
Output:	To be determined.
Investment:	L.E. 1-1.5 million (for assembly only).
Markets:	Locally assembled tractors of around 65 horsepower dominate the Egyptian market together with imports from Eastern Europe. Approximately 6,000 are sold in Egypt each year. Because of the current world overcapacity in tractor manufacture, there are few export opportunities. It will be

difficult to enter this market unless the price of Egyptian-built tractors is competitive. Exporting also will require the training and development of export marketing and sales personnel.

As long as there is tax and tariff discrimination in favor of tractors, it is likely that 65-horsepower tractors will not only continue to find favor as effective substitutes for trucks in Egypt, but will continue to enjoy the lion's share of the market.

The market for a specialized lightweight tractor of between 15-35 horsepower will depend upon:

- o Effective field trials
- o The availability of extension services and training in product use
- o The widespread availability of service and maintenance
- o A wide variety of special tools and implements specifically suited to Egyptian conditions (e.g., plows, graders, cultivators, mowers, sprayer units, etc.)

With good marketing over a period of years, it is probable that sales in Egypt of a locally assembled lightweight tractor would increase from a small number to several thousand per year.

Pricing, Price Controls, and Tariffs:

The key determinant in pricing is the competition from locally assembled tractors and tractors imported from Eastern Europe. Tariffs of 2 percent are levied on tractors of less than 45 horsepower. The Egyptian government has customarily imposed

protective tariffs as an industry emerges.

Competition: It is believed, but not confirmed, that the Egyptian and French governments are negotiating to construct or assemble the Bouyer tractor in Egypt.

Profile 3

SMALL NON-RIDING FARM TRACTORS

Description:	A new venture to produce small non-riding farm tractors.
Egyptian Interest:	Unidentified, possibly Behera Company of Alexandria.
Location:	Unidentified.
Role of Foreign Firm:	To provide a percentage of equity, technology, management, and sales know-how.
Project Status:	A feasibility study is required.
Output:	To be determined by feasibility study.
Investment:	Unknown.
Markets:	The Egyptian market for mechanized agricultural equipment is growing because of increasing shortages of farm labor and the addition of newly reclaimed lands, which, in many cases, will be farmed by recent university graduates on 10-feddan plots.

A key deteminant is price, which must be competitive with the price of foreign imports. The purchase of these machines also depends upon:

- Adequate trials
- Good maintenance service
- The ready availability of spare parts
- The provision of extension services and training in product use

Depending upon price, design,

	quality, and the reliability of the product, markets could include other Middle Eastern countries and Mediterranean Europe.
Pricing:	To be determined by feasibility study.
Competition:	Italian and Japanese machines provide the chief competition. Sizes range upward from six horsepower. Unit sales figures for 1979 and 1980, though not available, are not believed to be large.
Components and Assemblies:	Major items such as engines, gear boxes, and attachments could be produced by the Military Factories.

4. MATERIAL HANDLING EQUIPMENT

The material handling equipment studied for this survey consists of hoists, cranes, and conveyors for industrial uses. The survey does not include fork lift, excavating, or other material handling vehicles.

Infrastructure

Prior to the Open Door policy, while Egyptian industry was nationalized, there was little incentive to introduce labor-saving devices, such as industrial material handling equipment, because one of the objectives of nationalized industry was to provide maximum employment. A further deterrent to adoption of modern material handling techniques was the very low prevailing wage. The minimum daily wage in 1978 was L.E. 0.5, which, at the 1978 rate of exchange, amounted to $1.28 per day.

In recent years, the lure of higher wages elsewhere in the Middle East has reduced the availability of Egyptian labor as has the establishment of new industries, many involving foreign capital and/or in the private sector. These factors have led to labor shortages and increased wages, which, in turn, have created an interest in material handling techniques.

Recent Egyptian economic policy also has had a significant impact upon the wider acceptance of material handling techniques. With few exportable natural resources, Egypt has determined to industrialize in order, first, to become self-sufficient and, ultimately, to become a net exporter of industrial goods. In order to be competitive in these areas, Egyptian industry has recognized the need to improve its manufacturing efficiency.

The following statistics should be noted:

- In 1977, Gross Fixed Capital formation in Egypt was 24 percent of Gross Domestic Product. In the same year, comparable ratios in other countries were 17 percent, United States; 21 percent, West Germany; 19 percent, India; and 30 percent, Saudi Arabia.*
- Egyptian industrial activity as a percentage of Gross Domestic Product was 23 percent in 1977. Comparable ratios in other countries were 29 percent, United States; 41 percent, West Germany; 18 percent, India; and 61 percent, Saudi Arabia.*

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* Statistical Abstract of the United States, 1980, Bureau of the Census, U.S. Department of Commerce.

- Egyptian exports as a percentage of Gross Domestic Product were 20 percent in 1977. Comparable ratios in other countries were 8 percent, United States; 26 percent, West Germany; and 30 percent, Saudi Arabia.*
- The average per annum wage for Egyptian workers increased from L.E. 279 in 1972 to L.E. 491 in 1977, an increase of 76 percent.**
- The value of industrial output increased from L.E. 201 million in 1974 to L.E. 646 million in 1978, an increase of 221 percent.**

The Adel Wissa Company, which imports the kinds of industrial material handling equipment studied in this survey, enjoys 15-20 percent of the Egyptian market. The Wissa Company serves as agent for Mannesmann-Demag of Germany. Wissa imports hoists and lesser quantities of other components. Its current volume for hoists is estimated at 1,300,000 Deutsche Marks annually ($585,000 at $.45 per DM).*** Given Wissa's share of

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* Statistical Abstract of the United States, 1980, Bureau of the Census, U.S. Department of Commerce.

** Statistical Yearbook, 1979, Central Agency for Public Mobilization and Statistics.

*** Wall Street Journal, November 2, 1981.

the market and the annual volume, the entire Egyptian market for hoists is $3-4 million per year. Table 4-1 gives 1981 estimates of the demand for hoists and the corresponding dollar value. See also Appendix 4 for a similar estimate.

Table 4-1

ESTIMATED DEMAND FOR HOISTS IN EGYPT, 1981

Hoist Capacity	Percent of Market	Value $ (000)
5 - 10 tons	50	1,500 - 2,000
11 - 15 tons	25	750 - 1,000
16 - 35 tons	25	750 - 1,000
TOTAL	100	3,000 - 4,000

Source: The Adel Wissa Company, 1981.

If Wissa is correct in estimating that the demand for material handling equipment will grow by 10-15 percent per year, the market for hoists will range between $4.4-$8.3 million by 1985.

As of October 1981, tariffs on industrial lifting and handling equipment were minimal at 5 percent. In contrast, to protect the growing Egyptian elevator

assembly industry, personnel elevators have a tariff of 100 percent. According to Schindler-Egypt, this German concern assembles some 50 percent of all the popular 4- to 8-person elevators purchased in Egypt. In addition to imposing tariffs, in some cases the Egyptian government also grants monopoly status to industries that are capable of meeting the country's needs and possibly exporting its products in time.

Opportunities for Joint Ventures

The field of industrial material handling equipment appears to be awaiting manufacturers. The item most wanted is the hoist, with demand about equal for mechanically and electrically operated hoists.

Bridges, monorails, trolleys, and controls associated with hoists also appear to be viable prospects, and conveying systems, including structures, drives, rollers, and controls, should emerge as items in high demand. All of this equipment will replace manual labor in transporting work from one production stage to another in manufacturing, chemical processing, construction, and food processing as well as in the transportation industry.

Profile 4

MATERIAL HANDLING EQUIPMENT

Description:	New venture to establish a plant to manufacture industrial material handling equipment such as lifting, handling, loading, and unloading machinery and conveyors.
Egyptian Interest:	Adel Wissa Company, a distributor of material handling equipment in Egypt, representing Mannesmann-Demag of West Germany. Wissa, a private sector company with an engineering staff, enjoys 15-20 percent of the market.
Location:	Cairo, Egypt.
Role of Foreign Firm:	To provide a percentage of capital, technology, management, and training in a joint venture under Public Law 43.
Project Status:	The Wissa Company has held very preliminary discussions with Mannesmann-Demag and Steelco, an Egyptian public sector steel fabricator. No decisions, plans, or studies have been made.
Output:	Products and volume to be determined.
Investment:	Unknown.
Markets:	Currently, $3-4 million per year of hoists are imported. This figure is expected to rise to $4.5-8.5 million by 1985. Other material handling components are also imported. Because of labor shortages, wage increases, and Egypt's industrialization policy, the market for material handling equipment is growing at an

estimated rate of 15-20 percent per year.

Pricing, Price Controls, and Tariffs: Pricing of Egyptian-produced material handling equipment must be competitive with foreign imports. Tariffs are at a minimal 5 percent.

Competition: At present, imports are the chief competition. Two public sector companies fabricate structural steel for use in rails, bridges, and booms of cranes. The Military Factories have considered manufacturing cranes and hoists at a 200-unit-per-year volume, but have not yet done so.

Other: A joint venture with the Adel Wisa Company could be expanded to include either Ferrometalco or Steelco for fabrication of structural elements, and the Military Factories for mechanical elements, gear boxes, trolleys, forgings, and so on.

5. MACHINE TOOLS

Infrastructure

It is estimated that, in recent years, the demand for metalworking machine tools in Egypt has increased by 25 percent annually, with most growth occurring in imported machines. In 1981, it is estimated that total demand reached a value of $22.5 million. As shown in Table 2-3, domestic production filled 22 percent of demand and imports 78 percent. With imports amounting to $17.6 million, the Egyptian government is naturally interested in developing a stronger domestic manufacturing base.

Domestic production of machine tools is concentrated at the Helwan Machine Tool Company, which is affiliated with the Ministry of Military Production. The Helwan Company produces a range of machine tools, the value of which in 1981 was estimated at $4.9 million. Machine types produced include floor and bench drills, wheel grinders, center lathes, horizontal milling machines, small eccentric presses, and shapers. In recent years, production has concentrated on drills (punches), grinding, lathes, and milling machines (see Appendix 2).

The designs of these machines appear to date from

the 1940s and 1950s. Compared with current designs, the machines, though functional, are over-built and costly to manufacture. As a result, business is lost in some cases to lower-cost imports, shown by country of origin in Appendix 12.

It should be noted that many of the imported machines are not types produced in Egypt. For example, machines imported from Switzerland are most likely electric discharge types for mold-making or Swiss automatic screw machines. Similarly, imports from West Germany are most likely pantograph engravers or die-sinkers. The large number of inexpensive machines from Taiwan are probably bench drills or grinders, which, in the United States, are usually purchased for home workshops. The Helwan Company cannot compete against the pricing of these items with its present machine designs.

Judging from observations made during visits to Egyptian metalworking plants, market demand for manual machine tools will continue to increase. It is likely that, in the majority of smaller shops, there will be a demand pattern similar to that seen in U.S. plants during the 1950s--namely, a demand for simple vertical milling machines such as those produced by Bridgeport,

and for simple production lathes, such as those manufactured by South Bend.

A somewhat updated Bridgeport design capable of accepting plug-in digital readout devices should be pursued for the Helwan factory, and a more cost-effective center lathe design also should be secured. Such tools should be able to compete with low-cost imports and furnish a base for continued production by the Helwan factories.

In order to ascertain the validity of these suggestions, a detailed feasibility analysis should be made, including the following:

- Value-analyze bench drill press design for manufacturing cost-savings opportunities
- Analyze demand for Bridgeport vertical mill with retrofit digital readout possibilities
- Analyze demand for a more simplified center lathe design that may eliminate many features on the current Helwan lathe
- Value-analyze double wheel-grinding machine to reduce cost. A simple pedestal design rather than a formed base may be more cost-justified.

Similar analyses should be made with other types of machines.

Once more simplified machine designs are produced at lower cost, Egyptian market demand should approximate the figures in Table 5-1.

Table 5-1

ESTIMATED UNIT DEMAND OF SIMPLIFIED DOMESTIC MACHINE TOOLS, 1981, 1985

	Machine Units	
Machine Types	1981	1985
Vertical mill	300	600
Center lathe	250	500
Bench drill	400	700
Pedestal grinder	350	800
Floor drill	150	250
TOTAL	1,450	2,850

Opportunities for Joint Ventures

To eliminate the need for a sizable investment, the following profile considers the Helwan Machine Tool Company as the Egyptian joint-venture partner.

Profile 5

MACHINE TOOLS

Description:	A joint venture to produce simplified vertical milling machines to meet needs of medium and small Egyptian metalworking shops. Machine design should have retrofit capabilities for digital readout.
Egyptian Interest:	The Helwan Machine Tool Company.
Location:	Helwan.
Role of Foreign Firm:	To provide machine designs, component prints, tooling, and methods sheets, and to start up production for such a machine; to provide manufacturing and production engineering personnel in order to assure quality and salable machines; to contribute shared equity investment with Helwan and possibly other machine tool investors.
Project Status:	A detailed feasibility study is required. Any prior preliminary discussions with machine tool builders should be reviewed.
Output:	To be determined by market analysis.
Investment:	Not determined, but investment should be low if the Helwan Machine Tool Company is the joint-venture partner.
Markets:	Medium and small Egyptian metalworking shops. This study estimates an annual market demand of 300 units for 1981 and 600 by 1985.

Pricing:	To be determined by market analysis.
Competition:	Principally foreign imports.
Components and Assemblies:	Components and assemblies can be supplied by the Helwan plant or other current sources.

Joint-venture opportunities for other machine tools, such as center lathes, bench drills, pedestal grinders, and floor drills will be similar to that described in Profile 5.

6. POWER-DRIVEN HAND TOOLS

This study analyzed current usage and future demand for pneumatic and electric "industrial grade" hand tools only. Tools for home or personal use, such as those produced in the United States by companies such as Black & Decker, were not included.

Pneumatic and electric industrial grade tools are designed for heavy-duty use, continuous operation, and for extended life with low maintenance. For this reason, tool components and parts for industrial use are made of metal instead of plastic, which is used for workshop tools. Industrial tools are used as follows:

- In the processing industry (chemical, petroleum, primary metal plants), for maintenance and repair
- In industrial production, for assembly of machinery and equipment such as farm tractors, refrigerators, and diesel engines
- For building and utilities construction and repair
- For the maintenance and repair of mobile equipment such as trucks, aircraft, and construction equipment

The types of pneumatic tools most commonly used

are impact wrenches, paving breakers, chipping hammers, and nut-runners. Electric tools are most often screwdrivers, drills, saws, routers, and planers.

Pneumatic tools can be used only when compressed air is available. To prevent tool wear, the air must be dried, filtered, and lubricated with atomized oil.

Electric hand tools can be built to operate on any voltage or frequency. Electric voltage in Egypt is 230 volts.

Infrastructure

Pneumatic and electric power-driven hand tools are not manufactured in Egypt. The tools now in use have been imported, principally from Italy, the United Kingdom, the Netherlands, and Japan (see Appendix 7). Although there are no Egyptian import statistics for pneumatic tools, some pneumatic tools are currently in use.

According to data developed during the course of this study, in 1981 imports of power-driven hand tools had an estimated value (C.I.F.) of $2.3 million, 90 percent of which is for electric tools. The market for power-driven hand tools will continue to increase in Egypt as industrial capacity is developed and higher worker productivity is required.

As was noted earlier, industrial power hand tools are fabricated principally from metallic components. Pneumatic tools require die cast metal housings, rotors, and other metal components and fittings. Electric tools also require metal housings, shafts, and stamped laminates for armatures and stators. Electric tools require a source or facility to produce fractional horsepower motors. Egypt now produces large motors in a public sector factory.

Unit statistics for power hand tools are not recorded in Egyptian public records. However, estimates developed for this study indicate that market demand is largest for electric tools such as saws and drills, with total unit demand being in the range of 2,000-3,000 annually. The demand for electric saws and drills is expected to increase at an annual rate of 12 percent between 1981 and 1985. Saws are principally in the 7 1/2 inch blade size and drills up to one-half inch chuck capacity.

Opportunities for Joint Ventures

The following profile describes a conceptual joint venture with a public sector company that produces integral electric motors of one horsepower and up.

Profile 6

POWER HAND TOOLS

Description:	A joint venture to manufacture and assemble electric hand tools such as saws and drills. Manufacture would include a production line for electric fractional horsepower motors.
Egyptian Interest:	Not specifically identified. Most likely, a public sector company producing integral motors.
Location:	Helwan or Shobra.
Role of Foreign Firm:	To provide product design, production line design and tooling, management, and training on a joint-venture basis.
Project Status:	Needs Ministerial approval.
Output:	To be determined from market analysis.
Investment:	Estimated $2-3 million.
Markets:	The Egyptian market is estimated at 2,000-3,000 units annually. A demand analysis for other in-country applications for fraction horsepower motors is required. Additional demand can significantly influence economics of motor production.
Pricing:	To be determined by market analysis.
Competition:	Current demand is being met by imports from Italy, the United Kingdom, the Netherlands, and Japan.

Components and Assemblies:	Facilities for stamping motor laminations exist at public sector integral motor plant. A source for diecastings needs to be developed.

7. WOODWORKING MACHINE TOOLS

Infrastructure

Although Egypt has a significant woodworking industry, it produces practically no woodworking machine tools. Except for a few produced by the Jesco Company of Alexandria, all are imported, mainly from Italy and West Germany. As noted in Appendix 4, some 2,700 pieces of machinery, valued at about $7.5 million, were imported in 1979. Because little woodworking machinery is produced domestically, the tariff levied on imports is the minimum 2 percent (see Appendix 15).

The woodworking industry--that is, the market for woodworking machinery--is largely privately owned. The private sector of this industry, which produces about 98 percent of all wood products,* is comprised of about 250 "large companies" and 1,500 smaller shops. According to the Chamber of Woodworking Industries, large companies have more than 25 employees and a capitalization of more than L.E. 5,000 ($7,150 at the current exchange rate).

The products of the woodworking industry are

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* Source: 1978 Yearbook, Federation of Egyptian Industries.

manufactured from wood imported in the form of raw logs, largely from West Africa, and cut boards and plywood, largely from Finland and the Soviet Union.* In the last three to four years, the construction industry consumed approximately 85 percent of all imported wood. In 1978 and 1979, the remaining 15 percent was consumed as indicated in Table 7-1.

Table 7-2 indicates the value added for all non-construction woodworking industries in 1978-1979.

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* Source: 1978 Yearbook, Federation of Egyptian Industries.

Table 7-1

WOOD PRODUCT PRODUCTION, 1978-1979

Products	1978			1979		
	Quantity	Value		Quantity	Value	
		L.E. (000)	$ (000)		L.E. (000)	$ (000)
Wood furniture (number)	106,624	53,312	76,236	114,054	57,026	81,547
Building materials* (tons)	196,965	36,766	52,574	197,000	42,600	60,918
Wooden chairs (number)	309,721	1,548	2,214	322,500	1,980	2,831
Parquet flooring (square meters)	95,190	285	408	95,320	301	430
Reels and spools for textile industry	-	158	226	-	159	227

Table 7-1 (cont'd)

Products	1978			1979		
	Quantity	Value		Quantity	Value	
		L.E. (000)	$ (000)		L.E. (000)	$ (000)
Other wood products (e.g. shoe heels) (tons)	23,746	4,365	6,242	24,606	5,420	7,751
TOTAL PRODUCTION		96,587	138,119		107,639	153,924

* Principally doors and frames, minor quantities of cut boards and plywood.

Source: Central Agency for Public Mobilization and Statistics.

Table 7-2

VALUE ADDED FOR ALL NON-CONSTRUCTION WOODWORKING INDUSTRIES, 1978-1979

	1978 Value		1979 Value	
	L.E. (000)	$ (000)	L.E. (000)	$ (000)
Value of non-construction woodworking production	96,587	138,119	107,639	153,924
Value of imported wood	17,204	24,602	15,641	22,380
Value Added	79,383	103,517	91,998	131,544
Percent	561	561	688	688

Source: Central Agency for Public Mobilization and Statistics.

Exports of wood products, principally in the form of furniture to the Soviet Union, declined from L.E. 3.7 million in 1975 to L.E. 2.1 million in 1979, reflecting a worsening of relations between Egypt and the Soviet Union. Furniture exports are expected to increase, depending upon Egypt's relations with other countries in the Middle East.

With this in mind, the market for woodworking machine tools appears to lie in machinery to saw raw timber; manufacture plywood; shape wood for furniture, doors, and frames; and for on-site construction uses.

The small quantity of boards and plywood that is sawed in Egypt is produced by the public sector. The chairman of one public sector woodworking company noted that his company will probably discontinue sawing and laminating operations in the near future because of obsolete equipment and lack of government financial support for the public sector of woodworking.

Discussions with government officials indicate that Egypt is anxious to develop a wood building materials industry to supply the vast construction and resettlement programs. Complete cities, such as Heliopolis and Sadat City, are being planned or constructed near Cairo to relieve the country's acute

housing shortage.

Egyptian furniture does not compare favorably in quality and appearance with imported furniture, and according to a chairman of a furniture company, the Egyptian furniture industry would benefit from modernization and more efficient production methods. However, Egyptians purchase domestically produced furniture because it is cheaper than imported furniture. The Egyptian furniture industry produces largely for the middle class. Wealthy Egyptians purchase imported furniture, and less affluent Egyptians either purchase furniture from the many small, local shops or do without. Thus the demand for modern woodworking equipment appears potentially to lie in all three segments of the furniture market.

According to the Federation of Egyptian Industries, the Egyptian government strongly supports the private woodworking industry by levying low tariffs on equipment and wood and imposing few restrictive regulations. Provided efficient operations can be developed, Egypt's balance-of-payments deficit could be improved by importing raw wood at L.E. 73 ($104) per ton rather than importing sawed wood at L.E. 128 ($183) per ton.*

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* Figures quoted represent 1977 prices as indicated by 1970 Yearbook of Federation of Egyptian Industries.

Opportunity for Joint Venture

International Timber Industry Company (INTIMCO), a newly formed Egyptian company, plans to produce lumber, plywood, and other items from raw timber in an integrated woodworking center, probably in Giza, outside Cairo. The expected capital cost to produce wood products at an annual net profit of 29.9 percent is projected at L.E. 11.5 million ($16.5 million). The following excerpts from the feasibility study are instructive as to product and woodworking machinery requirements.

Annual Production Capacity

Description	Unit	Quantity
Exotic wood planks	m^3	21,000
Soft wood and local wood planks	m^3	7,000
Veneer	m^2	2,000,000
Plywood	m^3	3,000
Coreboard	m^3	7,200
Parquet	m^2	300,000
Wood boxes	pieces	2,100,000

Fixed Capital Requirements	L.E.
Land: 20 feddans @ L.E. 20,000	400,000
Construction: 17,000 mg. @ L.E. 80	1,360,000
4,000 mg. @ L.E. 50 (protecting roof)	200,000
Machinery	4,009,000
Assembling (erection)	213,000
Cars	145,000
Internal transport equipment	200,000
Furniture and social services equipment	160,000
Typewriters and calculators	154,000
Know-how, engineering, and royalties	390,000
Start-up expenses (social)	160,000
	7,391,000

MACHINERY

Sawmill

Complete sawing line with log vertical saw, resawing machine, and trimming machines

Conveyors

Driers

Crane and fork lift for log movement

Auxiliary services, technological installations, and workshop

Total value of sector: L.E. 838,650*

Veneer**

Horizontal log band saw

Crane

Line for veneer slicing, complete with clippers and drier

Auxiliary services and technological installations

Plywood

Preparation machines and evaporation basin

Crane

Peeling line

Veneer drier

Pressing line

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* Prices based on European Common Market sources.

** Value of sector included in the value of plywood sector cited directly below.

Auxiliary services, technological installations, and workshop

Total value of sector: L.E. 1,949,150*

Coreboard

Line for core preparation

Line for veneer preparation

Pressing line

Finishing of coreboards

Auxiliary services, technological installations, and workshop

Total value of sector: L.E. 393,000*

Parquet

Preparation line

Cutting line

Finishing line

Assembly and glueing line

Auxiliary services and technological installations

Total value of sector: L.E. 502,000*

Wirebound Wood Boxes

Line of preparation of solid wood, complete with vertical saw

Peeling line with clippers and drier for peeled veneer

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* Prices based on European Common Market sources.

Stitching and looping line

Auxiliary services, technological installations, and workshop

Total value of sector: L.E. 1,129,200*

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* Prices based on European Common Market sources.

INTIMCO has received approval from the General Organization for Industrialization (GOFI) for this project and is currently seeking a joint-venture partner to supply expertise and engineering.

Profile 7

WOODWORKING MACHINE TOOLS

Description:	A new venture to manufacture and assemble woodworking machine tools.
Egyptian Interest:	International Timber Industry Company (INTIMCO), Cairo. INTIMCO is disposed to manufacture woodworking machinery as well as to produce wood products from raw wood. The company assets at this point are from private sources, largely from the International Supplies Company, a trader in building materials and other goods. INTIMCO's President, Mr. Samir Sadek Moussa, also serves as President of International Supplies. INTIMCO's partners include international traders, engineers, accountants/financiers, a general contractor, and an attorney.
Location:	Giza or Alexandria. Land is owned by INTIMCO.
Role of Foreign Firm:	To supply technology and training; financial participation is negotiable.
Project Status:	A U.S. woodworking machinery firm is being sought to undertake a feasibility study to examine the possibilities of a joint venture.
Output:	To be determined by feasibility study.
Investment:	Foreign investment would be about L.E. 200,000 ($286,000).

Markets:	All segments of the Egyptian furniture market.
Pricing:	To be determined by feasibility study.
Competition:	Imports, mainly from Italy and West Germany.

8. AIR AND GAS COMPRESSORS

Infrastructure

The Egyptian demand for air compressors--whether for industrial machinery, hand tools, or paint-spraying operations--appears to have been limited until quite recently. However, small (less than five horsepower) compressors for inflating tires are often seen in small automobile repair shops.

The Egyptian air/gas compressor market is totally supplied by imports. As noted in Appendix 9, 20,260 air/gas compressors were imported in 1979. Of these, 20,200 were imported from Brazil at a unit price of about $28. The remaining 60 units were imported from Rumania at an average unit price of about $567.

A significant demand for air and gas compressors has developed since 1979. According to Ingersoll-Rand's distribution agent in Egypt, which supplies approximately one-third of the Egyptian market, estimates of the 1981 demand for compressors of over five horsepower are as shown in Table 8-1.

Table 8-1

ESTIMATED DEMAND FOR COMPRESSORS OF OVER 5 HP, 1981

Less than 250 cu. ft./min.	700 - 1,000
251 to 700 cu. ft./min.	350 - 500
701 cu. ft./min. and over	50 - 100

Source: Ingersoll-Rand.

Ingersoll-Rand also estimates that demand for air compressors of over five horsepower will grow at 10-20 percent annually. The market for compressors of over five horsepower is currently supplied by Ingersoll-Rand, Atlas-Copco, and Holman-Compair. Although statistics on the demand for compressors of less than five horsepower are unavailable, the Italian "DARI" compressor is thought to dominate the market.

Projecting from the Ingersoll-Rand estimates, the future demand for compressors of over five horsepower is indicated in Table 8-2.

Table 8-2

PROJECTED DEMAND FOR COMPRESSORS OF OVER 5 HP, 1981-1985

Year	Capacity (cu. ft./min.)		
	Less than 250 HP	251 - 700 HP	701 HP & Over
1981	700 - 1,000	350 - 500	50 - 100
1982	770 - 1,200	385 - 600	55 - 120
1983	850 - 1,440	410 - 720	60 - 145
1984	935 - 1,730	450 - 865	65 - 185
1985	1,030 - 1,395	495 - 1,040	70 - 220

Although, in 1974, a trial production of small air compressors resulted in high-quality goods, the project was cancelled because the pricing was unable to compete with foreign imports.

According to the Chairman of the Helwan Machine Tool Company, a Military Factory, air-compressor manufacturing is an important field for Egyptian industry to enter. Though there has been little foreign interest in joint ventures or licensing arrangements to date, Egyptian manufacturers believe that, given modern equipment and technology, the

Military Factories may be viable partners in producing components and parts for air compressors. In addition to producing engines, the Military Factories have capabilities to produce castings, forgings, pistons, and piston rings, and to heat-treat metals.

Opportunity for Joint Venture

Profile 8

MANUFACTURE OF AIR AND GAS COMPRESSORS

Description:	A new venture to manufacture air and gas compressors.
Egyptian Interest:	The Helwan Machine Tool Company, a Military Factory. This company has machine tooling facilities and a work force in place.
Location:	Helwan, an industrial area near Cairo.
Role of Foreign Firm:	To provide technology for the product, manufacturing efficiency, quality, and marketing. Financial participation negotiable.
Project Status:	A U.S. company is being sought to check the viability of the project and prepare a feasibility study.
Output:	Initially, the output would meet the demands of the Egyptian market. Eventual entry into the export market is planned.
Investment:	Not yet specified. However, any requirement will be reduced by the availability of Helwan's facilities.
Markets:	In 1979, the Egyptian market for compressors of less than five horsepower was 20,000 per year. By 1985, the demand for compressors in the range of over five horsepower is projected to be:

Less than 250 cfm:	1,030 - 1,395 units
251 - 700 cfm:	495 - 1,040 units
Over 700 cfm:	70 - 220 units

Export markets are as yet undefined.

Pricing, Price Controls, and Tariffs:

Pricing of air and gas compressors must be competitive with the import market. Because Egypt does not produce compressors, no price controls exist. As of October 1981, tariffs of 10 percent are levied.

The Egyptian government has customarily imposed protective tariffs and granted monopoly status to manufacturers capable of satisfying domestic needs.

9. BLOWERS AND SUCTION FANS

Infrastructure

The demand for blowers and suction fans in Egypt (referred to as "air and gas pumps" in official government records) is determined largely by the requirements of building construction and reconstruction. Buildings constructed in recent years and those now under construction generally feature air-conditioning and/or air-handling blowers. Because of high costs and the scarcity of land with access to water supplies, newly constructed hotels, offices, and residences tend to be high-rise. High-rise construction has tended to reduce the cost of air-conditioning and air-handling blowers as compared with what was required in the past for low-rise structures.

According to the Chairman of the Helwan Machine Tool Company, most large blower installations are custom-designed and supplied by foreign manufacturers. For example, Carlin Middle East, distributors in Egypt of Carrier air-conditioning/heating and air-handling equipment, maintains a staff of engineering personnel capable of designing systems using Carrier equipment. Egyptian companies, largely agents for foreign suppliers, provide on-site supervision for installation

and, in some cases, they also fabricate the ductwork.

Although a few small blowers are manufactured in Egypt, they are noisy and of inferior quality because of a lack of technological, design, and manufacturing expertise. No private sector companies manufacture blowers.

According to Appendix 9, about 94,663 "air and gas pumps" with an average value of about $100 were imported in 1979. These imports, supplied chiefly by Japan and Italy, were largely fans. Floor fans and desk models manufactured in both of these countries are frequently used in Egyptian offices.

Opportunities for Joint Ventures

Although no specific joint ventures in blowers and suction fans were identified during the course of this study, there are many conceptual joint-venture opportunities available in this area. The Egyptian government's commitment to house its ever-growing population, combined with the continuing construction of hotels, commercial centers, offices, and industrial plants, point to a large potential market. U.S. businessmen interested in these opportunities are encouraged to express their interest, seek guidance, and investigate opportunities. As described in A GUIDE

TO DOING BUSINESS IN EGYPT, which follows this report, Egypt's Authority for Investment and Free Zones, invites interested parties to request financial and investigatory assistance.

10. FLUID PUMPS

Infrastructure

As indicated in Table 2-3, fluid pump usage in Egypt reached a record demand level of $27.6 million in 1981. It is estimated that domestic production and assembly met 21 percent of demand, while imports accounted for 79 percent. With imports running over $21 million, the Egyptian government has a strong interest in expanding domestic production of such equipment.

Because fluid pump designs and applications are highly diversified, this study confines itself to the identification of pump types and sizes most suited to domestic manufacture.

Statistics on pump production and imports, as shown in Tables 2-1 through 2-3 and in the Appendixes, include all pump types. These range from diesel engine and automotive fuel pumps, with an import CIF unit value of six to seven dollars, to refinery process pumps valued at over $10,000 apiece.

Taking into consideration present and future market demands, design and manufacturing complexity, the availability of manufacturing skills, and the findings of interviews with knowledgeable individuals

in the private and public sector, single stage centrifugal pumps for agricultural irrigation hold the best prospects for domestic manufacture. Table 10-1 indicates unit estimates for single stage centrifugal irrigation pumps, for both domestic consumption and export.

Table 10-1

ANNUAL SALES ESTIMATES:
CENTRIFUGAL PUMPS FOR IRRIGATION
SINGLE STAGE - LOW LIFT, 1981-1985

(Units)

Year	Domestic Consumption	Export Opportunities	Total
1981	3,700	-	3,700
1982	4,000	-	4,000
1983	4,600	1,200	5,800
1984	5,300	1,800	7,100
1985	6,000	2,200	8,200

These unit estimates take into account Egyptian Ministry of Irrigation analyses and studies, which use a variety of estimating techniques. One study, which analyzed low-lift pump requirements for

one million feddans of farm land, estimated total pump demand for this area at 15,000-20,000 pump units. Because six million feddans of Egyptian farm land require irrigation, total low-lift pump requirements would range between 90,000-120,000 units. Assuming a ten-year pump life and a market penetration of 50 percent, an annual pump market of between 4,500-6,000 units is conservative.

Growth in pump usage will be directly affected by rural electrification and land reclamation. These two areas are receiving major investment support in the Egyptian government's current Five-Year Plan.

Table 10-1 also gives estimates of export opportunities for irrigation pumps. Egyptian pump manufacturers will soon find ready demand in several Middle Eastern countries. Sudan, for example, has friendly geophysical and economic ties with Egypt, with which it shares the waters of the Nile River and Lake Nasser. With over seven million feddans of farm land requiring irrigation, the Sudanese market for pumps could soon be as large as the Egyptian market.

U.S. pump manufacturers should view joint-venture manufacturing opportunities in Egypt in terms of both market demand and major component supply capabilities

in-country. Pump components, such as castings, are produced in public sector facilities near Cairo. Pump housings are currently produced at quality levels equal to those of many U.S. foundries. Machining operations on pump components require moderate skill levels, and these exist in Egyptian plants that produce machine tools and well-head valves for petroleum and natural gas wells. Other components, such as shaft bearings and seals, are readily imported.

Motor drivers for pump sets are also produced in Egypt. An electric motor plant in the military complex produces one to ten horsepower units. Similarly, a Helwan diesel engine plant produces two sizes of a water-cooled engine. Negotiations are underway to establish a turnkey license agreement for a modern, air-cooled diesel engine. Such diesel units can meet pump-set demand in non-electrified farm areas. It should be noted, however, that a full-scale engineering design project for a national electrical grid system is in progress. The advent of electric power is a major stimulus to replacing old irrigation methods, such as water wheels, shadoofs, and obsolete diesel-driven pumping units, which still exist in many farm communities.

It should be noted that the market estimates presented in Table 10-1 reflect the ability of a typical Egyptian farmer to finance pump units. Egyptian government statistics indicate that average farm income reported for tax purposes came to about L.E. 550 in 1980. This figure is misleading in that it fails to account for the uncovered wealth that exists at the farm level. In addition, both government and farm cooperative financing is available to small farmers for purchase of equipment as well as for seed, fertilizer, and insecticides.

Single stage centrifugal pumps can be used for many purposes other than crop irrigation. There are applications also in other domestic and commercial water systems, in industrial cooling and low-temperature heating, and in industrial processes requiring low abrasive, contaminant, or oxidizing fluid handling. Such applications account for an estimated annual market demand of 200-300 additional units. High temperature or highly corrosive applications are not included in this estimate.

Just as most U.S. pump manufacturers produce a range of pump models for various operating conditions and fluids, so Egypt's growing petroleum refining,

petrochemical, pharmaceutical, paper, and metal industries are developing demand for a full range of pumps. Similar industrial growth is occurring throughout the Middle East, where extensive demand is anticipated through the year 2000. In short, there are good opportunities to participate not only in the Egyptian pump market but also in other Middle Eastern markets of equal size. Producing centrifugal pumps for crop irrigation is a base operation that can lead to an expanded product line.

Opportunities for Joint Ventures

For the purposes of this study, discussions were held with a sampling of private sector Egyptian companies involved in importing and selling irrigation pumps, with sales agency companies representing foreign pump manufacturers, with pump manufacturers using foreign components for pump sets, and with the public sector production companies at Helwan. Each type of situation offers unique advantages to a joint venture.

Over the years, private sector companies with direct selling contact have developed a position of trust and credibility with farmers. This trust is extremely important at the small farm level, where financing may be necessary. These companies, however,

lack the administrative and production skills that are required in assembly and manufacturing operations.

Public sector joint-venture prospects are principally companies affiliated with the Ministry of Military Production. Such companies provide manufacturing facilities for metal castings, large and small machining bays for pump castings, impeller shafts, and assembly operations.

The following profiles describe investment possibilities in this area in greater detail.

Profile 9

IRRIGATION FLUID PUMPS

Description:	A new joint venture to produce low-lift centrifugal irrigation pumps for use on small farms, with electric motor or internal combustion engines as power source.
Egyptian Interest:	A private sector company with detailed knowledge of tertiary irrigation practices used by large and small farms and strong sales credibility with farmers.
Location:	Preferably Cairo, Helwan, Shubra, or Sadat City.
Role of Foreign Firm:	To provide current pump design and technology; layout for manufacturing facilities; methods, tooling, quality control, worker training and management; and percentage of equity on joint-venture basis.
Project Status:	A detailed feasibility study is required. Some prefeasibility analyses are available from GOFI and the Ministry of Irrigation.
Output:	To be determined by feasibility study.
Investment:	The cost of machinery, equipment, tooling, patterns, and fixtures is estimated at $2.2 million. It is assumed that manufacturing and office space can be leased, and that castings will be supplied from an outside source.
Markets:	Egyptian farms using tertiary low-lift irrigation methods. The 1981 market demand of 3,700 units is expected to increase

	to 6,000 domestic units and 2,200 export units by 1985.
Pricing:	To be determined by feasibility study.
Competition:	Domestic competition is minimal. Foreign imports come from Italy, Spain, India, and some East European companies. Spanish and Indian pumps are poor in quality but workable. There is strong domestic pressure to restrict low-quality imports.
Components and Assemblies:	Castings are available in-country; electric motors or diesel engines are available from public sector companies; bearings and shaft seals are imported; machining operations and assembly are available in-country.

Profile 10

IRRIGATION FLUID PUMPS

Description:	A joint venture to produce low-lift centrifugal irrigation pumps for use on small farms, with electric motor or diesel engines as power source.
Egyptian Interest:	A public sector joint-venture company using the concepts applied in McEvoy joint venture and Military Factory facilities. Casting supply from Helwan iron foundries; motors or engines from Helwan or Shubra; local machining and assembly.
Location:	Helwan.
Role of Foreign Firm:	To provide overall management, sales, and marketing strategy and develop in-country and export sales organization. To evaluate existing public sector pump designs as compared with foreign designs, and to establish manufacturing layout and methods. To provide equity investment on a joint-venture basis.
Project Status:	A detailed feasibility study is required. Some prefeasibility analyses are available from GOFI, and additional detailed proprietary studies may be available from the Ministry of Irrigation.
Output:	To be determined by feasibility study.
Investment:	Not fully determined. Investment may be lower than that required for joint venture with private sector company if existing pump designs can be used. Start-up costs for

	marketing organization will be significant.
Markets:	Egyptian farms using tertiary low-lift irigation techniques. The 1981 market demand of 3,700 units is expected to increase to 6,000 domestic units and 2,200 export units by 1985. The Sudan could be a prime export market.
Pricing:	To be determined by feasibility study.
Competition:	Principally foreign imports from Italy, Spain, India, and Eastern Europe.
Components and Assemblies:	Castings, motors, and engines can be sourced in-country from public sector companies; bearings and shaft seals will be imported; machining and assembly operations can be handled on-site or subcontracted to Military Factories.

11. REFRIGERATION AND FREEZING EQUIPMENT

This survey of Egypt's refrigeration and freezing equipment industry deals with household and industrial equipment that is used to preserve foods and other perishable items.

HOUSEHOLD REFRIGERATORS

Infrastructure

A household refrigerator is a luxury item for most Egyptian families. The cost of an eight-cubic-foot Egyptian-produced refrigerator (L.E. 120) compared with the average annual wage of the Egyptian industrial worker (L.E. 651; see Appendix 1) discourages most buyers.

For centuries, the Egyptian people have purchased food from local open-air markets on a day-to-day basis. Meats are butchered and fruits and vegetables are purchased in this manner today. Fowl is often purchased alive. Only a very few small supermarkets offer refrigerated and frozen foods.

The standard of living of the average Egyptian family has been rising rapidly in recent years, and Egyptian tastes and lifestyles have become Westernized. Still, the demand for household refrigerators well exceeds the ability of Egyptian industry to provide

them.

Household refrigeration units were first produced in Egypt in 1962 by Delta International, a public sector company which has since become a government-sanctioned monopoly. Until early 1980, Delta produced "Ideal"-brand refrigerators under license to Westinghouse-Koldair. Initially, Ideal refrigerators of 170 cubic liters (8 and 10 cubic feet) were produced, and these models continue to be produced today. A model with 13 cubic feet is now also being produced.

Delta's manufacturing operations consist of forming sheet metal cases and doors; manufacturing various other metal, plastic, and electrical parts; and painting. Manufactured components are assembled with imported electrical and mechanical components such as thermostats, condensers, evaporators, and compressors. Until licensing arrangements were terminated, Koldair components were imported. These components are now purchased by competitive bid.

Although the Military Factories also manufacture household refrigerators for civilian use, they produce less than five percent of Egypt's total output.

Production figures, total value, and average unit

prices for the years 1976 through 1978 are presented in Appendix 2. Estimates for 1979 are given in Table 11-1.

Table 11-1

ESTIMATED PRODUCTION OF
HOUSEHOLD REFRIGERATORS, 1979

Size	Quantity	Value	
		L.E. (000)	$ (000)
13 cu. ft.	5,600	1,710	2,390
10 cu. ft.	66,000	11,480	16,420
8 cu. ft.	118,000	17,700	25,311
170 liters	660	90	128
TOTAL	190,260	30,980	44,248

The Vice President of Delta International estimated 1981 production of 8- and 10-cubic-foot models at 250,000 units. According to Ideal's marketing research, 1981 demand for the 8- and 10-cubic-foot models came to approximately 350,000 units. The differential explains why consumers wait as long as a year to take delivery on a

refrigerator.

Because Delta is a monopoly, its only competition comes from imports, for which 1979 figures are shown in Appendix 6. Only 2,155 household refrigerators were imported in 1979. The demand is low because of the relatively very high pricing. Egyptian-produced refrigerators are price-controlled and may be artificially low in price. In addition to the high cost of imported refrigerators, a 150-percent tariff is imposed. A 25-percent tariff is imposed upon refrigerator parts, such as condensers and thermostats, which are used to produce Ideal products.

Delta International marketing research has indicated that, if available, refrigerators larger than the 8- and 10-cubic-foot models would be in high demand. Delta's manufacturing complex, which also produces 250,000 washing machines, about $17 million in metal furniture, and other items, is not tooled to produce larger refrigerators. In early 1981, Delta entered into agreements with the Thomson Company of France to produce 12-to-20-cubic-foot refrigerators. According to Delta's Vice President, a 350,000-square-meter plant was built, and $25 million plus L.E. 25 million was placed on deposit for such a

project. The agreements with the Thomson Company were terminated, however, and Delta is now actively seeking arrangements with other potential foreign partners to implement the production of 12-to-20-cubic-foot refrigerators and to modernize production of the 8- and 10-cubic-foot sizes. So far, the project has been discussed with Electrolux, Phillips, and Bosche.

Eventually, Delta hopes to produce one million refrigerators annually to meet an expanding domestic market for first-time purchases and replacements and to satisfy government expectations for expanding Middle East exports. To meet this goal, the company hopes to obtain the technology for manufacturing components which are now imported.

Profile 11

HOUSEHOLD REFRIGERATOR PLANT

Description: A joint venture to provide the technology and training to establish a household refrigerator plant and/or to improve the operating efficiency of a plant now in operation.

Egyptian Interest: The Delta International Company, manufacturers of "Ideal" brand 8-, 10-, and 13-cubic-foot refrigerators as well as washing machines and steel furniture.

Delta has constructed a 350,000-square-meter factory building, which is awaiting implementation of manufacturing plans and technology. The sum of $25 million, plus L.E. 25 million, are on deposit for equipment and implementation costs. The company owns 200,000 square meters of unused land.

Location: The new plant is located in Nasr City, in the outskirts of Cairo.

Role of Foreign Firm: To provide the technology and training for a high-volume component (compressors, condensers, etc.) and an assembly plant for 12- to 20-cubic foot refrigerators.

To improve the efficiency and increase the production of an existing 8- and 10-cubic-foot refrigerator plant now producing 250,000 units annually.

Project Status: This project was to have been a joint venture between Delta

International and the Thomson Company of France. Final agreements were not completed, and Delta has since had discussions with Electrolux, Phillips, and Bosche. Delta is anxious to proceed with the project, would welcome a U.S. partner, and would like to come to preliminary agreements in the near future.

Output: Current production of 250,000 units per annum of 8- and 10-cubic-foot refrigerators is expected to increase to production of one million refrigerators of up to 20 cubic feet.

Investment: The Delta International Company estimates the foreign partner's participation at $10 million.

Market: Delta enjoys a government-sanctioned monopoly for household refrigerators and a 150-percent protective tariff on imported refrigerators. It now can produce only an estimated 70 percent of the current market demand for 350,000 units per year. Demand is expected to soar as new housing construction for an annual population increase of one million persons is completed and the standard of living steadily improves. The Middle East export market is expected to make high demands as well.

Pricing, Price Controls and Tariffs: The Egyptian government imposes price controls on Delta refrigerators in order to make them obtainable by the average Egyptian. Price increases are allowed, however.

According to Delta, controlled prices do provide for a good

return. The Vice President cited a return of L.E. 15 million on L.E. 65 million sales in 1980.

INDUSTRIAL REFRIGERATION EQUIPMENT

Infrastructure

Coupled with the growing inability of Egyptian agriculture to produce the food requirements of a population increasing at about one million persons per year is the fact that some of the food produced on Egyptian farms spoils even before reaching the market. According to an article in the Egyptian Gazette (September 1981), as much as half of all farm produce is lost due to spoilage. Though some spoilage is attributable to poor harvest timing and inadequate packaging methods, much of it results from the lack of sufficient refrigerated storage, freezing facilities, and refrigerated transportation.

Imported frozen foods also are lost because of insufficient refrigerated storage and transportation, and there is additional spoilage from the lack of refrigeration at retail outlets.

Until recently, Egypt's refrigerated storage, freezing, and ice production capabilities have been government-controlled. The Egyptian Ministry of Supply controls the refrigerated storage of all imported fish, meat, poultry, and dairy products. Jurisdiction over other public sector refrigeration and

ice-making facilicies lies with the individual governorates.

Public sector refrigeration and ice-making facilities are owned and managed by two public sector companies. The General Company for Refrigeration (GERCO) has refrigeration and ice-making facilities in Cairo, Port Said, Suez, and in all provinces. GERCO's facilities comprise about 70 percent of all public and private enterprises combined. The other public sector firm, the Alexandria Ice and Refrigeration Company, controls about 25 percent of the country's refrigeration capacity.

At present, there is keen private sector interest in owning and operating cold storage and in processing frozen food. The Arab Investment Company, for example, recently erected a 1,600-ton cold-storage facility and a Swiss food-freezing system with a freezing capacity of one ton per hour. The storage, which is designed to maintain -30° C, uses Sapro chillers from Holland. The Managing Director of the Arab Investment Company, notes that food can be processed within two hours of harvesting. In September 1981, the company's storage facility was leased largely to importers of food products.

Overall, there are very few refrigerated trucks and railcars, and, according to the General Manager of the Chamber of Food Industries, refrigerated transportation of fish in particular--from abundant supplies in Lake Nasser at the Aswan High Dam as well as from imported sources--is desperately needed. It is expected that, in 1982, 30 refrigerated railcars will start operation from Aswan to Cairo, mainly for the purpose of transporting fish.

Because of the lack of refrigerated transportation, the use of frozen foods in Egypt--and, therefore, the use of refrigerated storage and display cases--is not common. This is expected to change, however, as adequate transportation facilities become available.

Indeed, at least two companies are already involved in producing refrigerated vans. SAKRCO Enterprises is now assembling vans from purchased components at a rate of about two per week, and it plans to consult the Budd Company, manufacturers in Pennsylvania of over-the-road transportation equipment, regarding possible joint ventures. The Arab Investment Company, mentioned earlier, is actively seeking joint-venture opportunities to produce insulated

paneling and to assemble refrigerated vans.

No industrial refrigeration equipment was produced in Egypt in the years 1976 through 1979. Most equipment of this sort is still imported, mainly from Germany, England, Italy, and recently Denmark. Items 2, 3, and 4 of Appendix 6 indicate that imports of industrial refrigeration in 1979 were valued at L.E. 6.14 million ($8.78 million) at the October 1981 exchange rate. GERCO's chairman estimates that Egypt requires 20,000 tons of refrigerated storage immediately and an additional 40,000 tons in the next two to three years, and, to this end, the company would welcome inquiries regarding possible joint ventures.

Profile 12

INDUSTRIAL REFRIGERATION AND REFRIGERATED STORAGE

Description:	The establishment of a facility to manufacture/assemble industrial refrigeration and freezing equipment and refrigerated storage.
Egyptian Interest:	The General Company for Refrigeration (GERCO), a public sector company which operates 70 percent of Egypt's cold storage capacity: all publicly owned cold storage facilities except those in Alexandria. GERCO is a joint-venture partner in several cold storage facilities, generally with foreign refrigeration manufacturers.
Location:	Probably near Cairo.
Role of Foreign Firm:	To provide technology, training, and manufacturing know-how.
Project Status:	GERCO is ready to undertake preliminary discussions and feasibility studies.
Output:	To be determined.
Investment:	Unknown.
Markets:	The Egyptian agricultural, food processing, and food importing industries offer significant and growing markets.
Pricing, Price Controls and Tariffs:	Pricing must be competitive with foreign imports. There are no price controls. Tariffs for industrial equipment are set at 10 percent. Egyptian policy has been to increase tariffs as

Egyptian manufactured goods become available.

Profile 13

ASSEMBLY OF REFRIGERATED VANS AND TRUCKS

Description:	The establishment of a facility to assemble refrigerated vans and trucks.
Egyptian Interest:	SAKRCO Enterprises, a private sector company, assembles refrigerated vans from imported components and manufactures refrigerated panels.
Location:	Cairo.
Role of Foreign Firm:	To provide a portion of the capital, technology, training, and possibly truck or refrigeration components under a Public Law 43 arrangement.
Project Status:	SAKRCO has been seeking joint ventures with foreign firms. A feasibility study has yet to be completed.
Output:	To be determined.
Investment:	SAKRCO would provide significant financial interest.
Markets:	A large market exists for refrigerated transport of locally produced and imported food.
Pricing, Price Controls and Tariffs:	Information on pricing unavailable. No price controls; light tariffs.

Profile 14

ASSEMBLY OF COMPONENTS FOR REFRIGERATED VANS AND TRUCKS

Description:	The establishment of a facility to assemble truck bodies/chassis, insulated paneling, and refrigeration equipment for refrigerated vans and trucks.
Egyptian Interest:	The Arab Investment Company, a private company of Egyptian venture capital investors, which has recently constructed a highly successful food freezing and storage facility near Alexandria and is interested in refrigerated transportation.
Location:	Probably near Alexandria, but negotiable.
Role of Foreign Firm:	To provide components, technology, training, and initial management in a joint-venture Public Law 43 arrangement or licensing agreement.
Project Status:	Joint-venture inquiries and feasibility studies are being sought.
Output:	To be determined.
Investment:	The Arab Investment Company would provide the majority of the capital investment.
Markets:	There is a large market for refrigerated transport of locally produced and imported food.
Pricing, Price Controls and Tariffs:	Information on pricing is unavailable. No price controls; light tariffs.

AIR-CONDITIONING EQUIPMENT

Infrastructure

Until recently, typical Egyptian buildings used unglazed windows with shutters to keep out the elements. Window air-conditioning units would not fit into the average-sized window, and central air-conditioning was a more expensive construction item than the traditional concrete and bricks. Central air-conditioning is difficult to retrofit into traditional concrete and brick buildings.

Migration to urban centers and a population increase of about one million persons per year have created a shortage of both land and housing. This, in turn, has caused construction and land costs to increase to the point where air conditioning is relatively inexpensive.

In recent years, Western and European influences and a general and steady rise in the Egyptian standard of living have created demands for air-conditioned residences, offices, stores, and hotels. These demands are being satisfied in several ways. Older buildings are being fitted with window air-conditioning units installed through brick walls, and many of the residences, offices, hotels, and commercial centers in

the new cities that are being developed to house as many as 250,000 people are designed to accommodate air conditioning.

Appendix 2 indicates the production of air-conditioning equipment between 1976 and 1978. In 1978, the relatively few window units (11,640) and tons of central air conditioning (3,150) were produced by two public sector companies having joint ventures with Koldair and Fedders of the U.S.

Carlin International, a private sector company representing the Carrier Corporation in Egypt, has been negotiating with Carrier and the Egyptian General Organization for Industrialization regarding a joint venture to manufacture window air-conditioning units, an undertaking that is highly motivated by the 150-percent tariff that is imposed on imported units. The tariff on imported components and parts for use in assembly is only 25 percent (see Appendix 15).

Institutional air-conditioning machinery for hotels and new office and residential buildings is imported, and Carlin International and other representatives of foreign air-conditioning suppliers are at present meeting Egypt's needs for large air-conditioning units. In addition to offering

supervisory services at construction sites, Carlin maintains an engineering staff to specify Carrier equipment and design the ductwork and control systems. Carlin's President, who puts his company's yearly volume in industrial size air-conditioning at about 15,000 tons, in units ranging from 1 to 1,000 tons each, estimates the overall growth in the air-conditioning market at about 15 percent per year for the foreseeable future.

Opportunities for Joint Ventures

Apparently because government authorities consider the current output by the Koldair and Fedders joint-venture public sector companies sufficient for present needs, Carlin International has received little encouragement in its negotiations with the Egyptian General Organization for Industrialization to form a joint venture with Carrier. Therefore, the demand for industrial size air conditioning as well as its complexity in manufacture may preclude additional manufacturing enterprises in Egypt for the present.

12. A REVIEW OF POTENTIAL INVESTMENT OPPORTUNITIES

During the preparation of this report, a survey of the major Egyptian manufacturers and importers of non-electrical machinery was made to determine the degree of interest in joint ventures. Although many individuals and organizations were contacted, it obviously has been impossible to contact all potential Egyptian investors. However, the additional contacts that will be made with the Egyptian business community during the course of this project will undoubtedly reveal other possible projects in non-electrical machinery.

Accordingly, interested U.S. investors are encouraged to remain in touch with the Investment and Free Zones Authority, Chase Trade Information Corporation, U.S. AID, the Egypt-U.S. Business Council, the special office of the U.S. Trade Representative, the U.S. Department of Commerce, and others involved in the continuing review of opportunities for U.S. investment in Egypt. If, as is hoped, this report has stimulated interest in any aspect of the non-electrical machinery sector, this should be made known to any of the organizations listed above.

This report on non-electrical machinery has identified a variety of potential joint-venture

opportunities. These are summarized in the Profiles included in the various chapters of the report and listed in Table 12-1, which follows.

Table 12-1

JOINT-VENTURE OPPORTUNITIES
DISCUSSED IN REPORT ON NON-ELECTRICAL MACHINERY

	Type of Project	Page Reference
Profile 1	Tractors	45
Profile 2	Lightweight Tractors	47
Profile 3	Small Non-Riding Farm Tractors	50
Profile 4	Material Handling Equipment	58
Profile 5	Machine Tools	65
Profile 6	Power Hand Tools	70
Profile 7	Woodworking Machine Tools	85
Profile 8	Manufacture of Air and Gas Compressors	91
Profile 9	Irrigation Fluid Pumps	104
Profile 10	Irrigation Fluid Pumps	106
Profile 11	Household Refrigerator Plant	114
Profile 12	Industrial Refrigeration and Refrigerated Storage	121

Table 12-1 (cont'd)

	Type of Project	Page Reference
Profile 13	Assembly of Refrigerated Vans and Trucks	123
Profile 14	Assembly of Components for Refrigerated Vans and Trucks	124

APPENDIXES

Appendix 1

GENERAL DATA, INFRASTRUCTURE OF EGYPTIAN NON-ELECTRICAL MACHINERY INDUSTRY, 1973-1978, 1980 (Projected)

Item	Description	1973	1974	1975	1976	1977	1978	Average+ Annual Growth	1980 (Projected)
1	Index of Industrial Production	100	123	142	142	160	—	12.3	197
2	Value of Industrial Output (million LE/$)								
	a. All Industries (petroleum, mining, chemicals, food, engineering and electrical, building material, and textiles)	LE 1,725 $ 2,467	2,038 2,914	2,547 3,642	2,952 4,221	3,433 4,909	4,014 5,740	494 706	5,002 7,152
	b. Engineering and Electrical Industry# (Traditional Manufacturing)	LE 246 $ 351	201 287	393 561	447 639	554 792	646 923	111 158	868 1,239
	c. Engineering and Electrical Industry# Output as a Percentage of Total (%)	14	10	15	15	16	16	—	17
3	Growth of Industrial Output over Previous Year (%)								
	a. All Industries	—	18.1	25.0	15.9	16.3	16.9	—	17
	b. Engineering and Electrical Industry	—	-18.3	45.5	13.7	23.9	16.6	—	18
4	Gross Fixed Capital Formation (million LE/$)								
	a. All Egypt, production and services	LE 462 $ 660	640 915	1,228 1,756	1,385 1,981	1,769 2,530	— —	367	2,670
	b. Industrial (manufacturing)#	LE 153 $ 219	190 272	689 985	352 503	512 732	— —	107	833
	c. Industry as a Percentage of All Egypt#	33.1	29.7	56.1	25.4	28.9	—	—	29.0
5	Employment (1000's of persons)								
	a. All Egypt, production and services	8,860	9,030	9,433	9,505	9,719	—	230	10,410
	b. Industrial (manufacturing)#	1,112	1,133	1,159	1,181	1,226	—	31	1,320
	c. Industrial as a Percentage of All Egypt#	12.6	12.5	12.3	12.4	12.6	—	—	12.7

Note: Dollar figures based on October 1981 exchange rate: $1.43 per L.E.

+ Average of years 1974 through 1977/1978.
# Does not include agriculture, petroleum, electricity generation, construction, services.

Source: Central Agency for Public Mobilization and Statistics for 1973 through 1978.

Appendix 1 (cont'd)

Item	Description	1973	1974	1975	1976	1977	1978	Average + Annual Growth	1980 (Projected)
6	Total Wages Paid (million LE/$)								
	a. All Egypt, production and services	LE 1,592	1,769	2,181	2,464	2,683	—	305	3,597
		$ 2,277	2,530	3,119	3,524	3,937	—	436	5,144
	b. Industry (manufacturing)#	LE 319	331	338	428	491	—	53	651
		$ 456	473	483	612	702	—	76	930
	c. Industry as a Percentage of All Egypt#	20.0	20.8	15.5	17.4	18.3	—	—	18.0
7	Average Annual Wages (LE/$)								
	a. All Egypt, production and services	LE 180	196	231	259	276	—	27	356
		$ 257	280	330	370	394	—	39	509
	b. Industry (manufacturing)#	LE 287	292	291	362	400	—	38	508
		$ 410	418	416	518	572	—	54	726
	c. Other Sectors								
	1) Agriculture	LE 61	71	107	110	110	—	13	149
		$ 87	102	153	157	157	—	18	213
	2) Petroleum	LE —	645	743	1,016	1,332	—	229	2,019
		$ —	922	1,062	1,453	1,905	—	327	2,887
	3) Construction	LE 223	233	302	313	325	—	31	417
		$ 319	333	432	448	465	—	44	596
	4) Services	LE 290	314	346	377	400	—	29	486
		$ 415	449	495	539	572	—	41	695

Note: Dollar figures based on October 1981 exchange rate: $1.43 per L.E.

+ Average of years 1974 through 1977/1978.
# Does not include agriculture, petroleum, electricity generation, construction, services.

Source: Central Agency for Public Mobilization and Statistics for 1973 through 1978.

Appendix 2

PRODUCTION AND PRICING OF NON-ELECTRICAL MACHINERY IN EGYPT, 1976-1978

BTN+	Description	1976 Quantity (U=Units/T=Tons)	1976 Value LE(000)	1976 Value# $(000)	1977 Quantity (U=Units/T=Tons)	1977 Value LE(000)	1977 Value# $(000)	1978 Quantity (U=Units/T=Tons)	1978 Value LE(000)	1978 Value# $(000)
84.10	Pumps for Liquids, Liquid Elevators									
	a. Private Sector	0 U	0	0	0 U	0	0	0 U	0	0
	b. Public Sector	152§U	140	200	326§U	294	420	411 U	360	515
	c. Military Factory Civilian Production	743 U	681	974	1,043 U	940	1,344	2,016 U	1,764	2,522
	Total:	895 U	821	1,174	1,369 U	1,234	1,764	2,427 U	2,124	3,037
	Average Unit Price:		LE 916	$ 1,312		LE 901	$ 1,289		LE 879	$ 1,251
	§ Quantity information unavailable. Figure presented assumes that the average value of one military-produced unit is that of a public sector-produced pump. (1976 - 917 LE/pump; 1977 - 901 LE/pump; 1978 - 875 LE/pump)									
	Note: Pumps produced were all reported to be rotary in various horsepower ratings, having one to four stages and being both fixed and portable.									
84.11	Air and Gas Pumps and Compressors									
	a. Private Sector	0 U	0	0	0 U	0	0	0 U	0	0
	b. Public Sector	0 U	0	0	0 U	0	0	0 U	0	0
	c. Military Factory Civilian Production	26 U	124	177	46 U	219	313	0 U	0	0
	Total:	26 U	124	177	46 U	219	313	0 U	0	0
	Average Unit Price:		LE 4,770	$ 6,808		LE 4,761	$ 6,804		—	—

+ BTN: Brussels Tariff Notation.
# Based on October 1981 exchange rate: $1.43 per L.E.

Source: 1979 Yearbook, Federation of Egyptian Industries.

Appendix 2 (cont'd)

BTN*	Description	1976 Quantity (U=Units/T=Tons)	1976 Value LE(000)	1976 Value# $(000)	1977 Quantity (U=Units/T=Tons)	1977 Value LE(000)	1977 Value# $(000)	1978 Quantity (U=Units/T=Tons)	1978 Value LE(000)	1978 Value# $(000)
84.12	Air Conditioning Machines and Elements									
	Window Air Conditioning Sets									
	a. Private Sector	0	0	0	0	0	0	0	0	0
	b. Public Sector	6,779 U	1,647	2,355	8,436 U	2,442	3,492	11,640 U	3,744	5,354
	c. Military Factory Civilian Production	0	0	0	0	0	0	0	0	0
	Subtotal:	6,774 U	1,647	2,355	8,436 U	2,442	3,492	11,640 U	3,744	5,354
	Average Unit Price:		LE 243	$ 343		LE 289	$ 414		LE 321	$ 460
	Central Air Conditioning									
	a. Private Sector	0	0	0	0	0	0	0	0	0
	b. Public Sector	1,850 T	752	1,075	1,920 T	596	852	3,150	1,260	1,801
	c. Military Factory Civilian Production	0	0	0	0	0	0	0	0	0
	Subtotal:	1,850 T	752	1,075	1,920 T	596	852	3,150 T	1,260	1,801
	Average Unit Price:		LE 466	$ 581		LE 310	$ 444		LE 400	$ 571
	Air Conditioning Parts and Maintenance									
	a. Private Sector	0	0	0	0	0	0	0	0	0
	b. Public Sector	N/A	2,777	3,971	N/A	2,552	3,649	N/A	2,744	3,923
	c. Military Factory Civilian Production	0	0	0	0	0	0	0	0	0
	Subtotal:	N/A	2,777	3,971	N/A	2,552	3,649	N/A	2,744	3,923
	Grand Total:	—	5,176	7,144	—	5,590	7,993	—	7,748	11,078

+ BTN: Brussels Tariff Notation.
# Based on October 1981 exchange rate: $1.41 per L.E.

Source: 1979 Yearbook, Federation of Egyptian Industries.

BTN +	Description	1976 Quantity (U=Units/T=Tons)	1976 Value LE(000)	1976 Value# $(000)	1977 Quantity (U=Units/T=Tons)	1977 Value LE(000)	1977 Value# $(000)	1978 Quantity (U=Units/T=Tons)	1978 Value LE(000)	1978 Value# $(000)
84.15	Refrigerators and Refrigeration Equipment									
	a. Private Sector	0	0	0	0	0	0	0	0	0
	b. Public Sector	112,000 U	14,223	20,339	—	—	—	—	—	—
	13 Cu. Ft.	—	—	—	3,350 U	771	1,103	2,650 U	808	1,155
	10 Cu. Ft.	—	—	—	35,000 U	5,075	7,257	29,950 U	5,241	7,495
	8 Cu. Ft.	—	—	—	70,800 U	8,416	12,035	98,700 U	14,805	21,171
	170 Liter	—	—	—	20,050 U	2,105	3,010	7,000 U	945	1,351
	c. Military Factory Civilian Production	4,775 U	837	1,197	6,132 U	1,073	1,534	6,800 U	1,254	1,793
	Total:	116,775 U	15,060	21,536	135,332 U	17,440	24,939	145,100 U	23,053	32,965
	Average Unit Price:		129	$ 184		129	$ 184		158	$ 225
	Note: A. No figures available as to refrigerator parts production and maintenance. B. No industrial size refrigeration units were reported as produced.									
84.22	Lifting and Handling Equipment excluding Excavating Equipment									
	a. Private Sector	0	0	0	0	0	0	0	0	0
	b. Public Sector	230 T	399	485	210 T	252	360	213 T	277	396
	c. Military Factory Civilian Production	167 U	135	193	0	0	0	0	0	0
	Total:	—	534	678	210 T	252	360	213 T	277	396
	Average Unit Price: (Public Sector)		1,698	$ 2,428		1,200	$ 1,716		1,300	$ 1,859
	Note: A. Public Sector Production consists largely of fabricating crane structures and using imported hoists. B. Military Production in 1976 was manufacturing hoists.									

+ BTN: Brussels Tariff Notation.
# Based on October 1981 exchange rate: $1.43 per L.E.

Source: 1979 Yearbook, Federation of Egyptian Industries.

Appendix 2 (cont'd)

BTN*	Description	1976 Quantity (U=Units/T=Tons)	1976 Value LE(000)	1976 Value# $(000)	1977 Quantity (U=Units/T=Tons)	1977 Value LE(000)	1977 Value# $(000)	1978 Quantity (U=Units/T=Tons)	1978 Value LE(000)	1978 Value# $(000)
84.24	Agricultural and Horticultural Machinery for Soil Preparation									
	a. Private Sector	0	0	0	0	0	0	0	0	0
	b. Public Sector	N/A	346	495	N/A	346	495	N/A	359	513
	c. Military Factory Civilian Production	0	0	0	0	0	0	0	0	0
	Total:	N/A	346	495	N/A	346	495	N/A	359	513
	Average Unit Price:		N/A	N/A		N/A	N/A		N/A	N/A
	Note: The figures given do not include agricultural tractors.									
87.01	Agricultural Tractors									
	a. Private Sector	0	0	0	0	0	0	0	0	0
	b. Public Sector	1,664 U	5,219	7,463	2,761 U	10,826	15,481	2,925 U	14,213	20,324
	c. Military Factory Civilian Production	0	0	0	0	0	0	0	0	0
	Total:	1,664 U	5,219	7,463	2,761 U	10,826	15,481	2,925 U	14,213	20,324
	Average Unit Price:		LE 3,136	$ 4,484		LE 3,921	$ 5,607		LE 4,859	$ 6,948
	Note: The majority of tractors produced are of the 45 to 70 horsepower range.									

* BTN: Brussels Tariff Notation.
# Based on October 1981 exchange rate: $1.41 per L.E.

Source: 1979 Yearbook, Federation of Egyptian Industries.

BTN +	Description	1976 Quantity (U=Units/T=Tons)	1976 Value LE(000)	1976 Value# $(000)	1977 Quantity (U=Units/T=Tons)	1977 Value LE(000)	1977 Value# $(000)	1978 Quantity (U=Units/T=Tons)	1978 Value LE(000)	1978 Value# $(000)
84.45	Machine Tools for Metalworking									
	a. Private Sector	0	0	0	0	0	0	0	0	0
	b. Public Sector	N/A	200	286	N/A	435	622	N/A	522	746
	c. Military Factory Civilian Production									
	Punches	470 U	1,978	2,828	525 U	1,889	2,710	N/A	N/A	N/A
	Grinding Machines	80 U	32	46	210 U	86	123	N/A	N/A	N/A
	Lathes	79 U	493	705	35 U	272	389	4 U	63	90
	Milling Machines	0	0	0	78 U	454	649	140 U	547	782
	Polishing Machines	20 U	9	13	0	0	0	0	0	0
	Total (Military Production):	649 U	2,512	3,592	848 U	2,701	3,862	N/A	N/A	N/A
	Average Unit Price: (Military Production)		LE 3,871	$ 5,536		LE 3,185	$ 4,555	N/A	N/A	N/A
	Note: Machine tools produced were all of the manually operated variety.									
84.47	Machine Tools for Woodworking									
	a. Private Sector	0	0	0	0	0	0	0	0	0
	b. Public Sector	0	0	0	0	0	0	0	0	0
	c. Military Factory Civilian Production									
	Carpentry Saws	0	0	0	1	1	1	N/A	N/A	N/A
	Total:	0	0	0	1	1	1	N/A	N/A	N/A
	Average Unit Price:	-	-	-	-	-	-	-	-	-
84.49	Pneumatic Hand Tools									
	a. Private Sector	0	0	0	0	0	0	0	0	0
	b. Public Sector	0	0	0	0	0	0	0	0	0
	c. Military Factory Civilian Production	0	0	0	0	0	0	0	0	0
	Total:	0	0	0	0	0	0	0	0	0
	Average Unit Price:	-	-	-	-	-	-	-	-	-
84.50	Electric Hand Tools									
	a. Private Sector	0	0	0	0	0	0	0	0	0
	b. Public Sector	0	0	0	0	0	0	0	0	0
	c. Military Factory Civilian Production	0	0	0	0	0	0	0	0	0
	Total:	N/A	908	1,298	N/A	556	795	N/A	1,119	
	Average Unit Price:		N/A	N/A		N/A	N/A		N/A	N/A

+ BTN: Brussels Tariff Notation.
# Based on October 1981 exchange rate: $1.43 per L.E.

Source: 1979 Yearbook, Federation of Egyptian Industries.

Appendix 3

PRODUCTION AND PRICING OF NON-ELECTRICAL MACHINERY IN EGYPT: 1978, 1981 (Projected)

BTN +	Description	1978 Actual Production			1976-78 Average Annual Growth			1981 Projected Production			1981 Unit Projected Price#	
		Quantity (U=Units/T=Tons)	Value L.E(000)	Value# $(000)	Quantity (U=Units/T=Tons)	Value L.E(000)	Value# $(000)	Quantity (U=Units/T Tons)	Value L.E(000)	Value# $(000)	L.E	$
84.10	Pumps for Liquids	2,427 U	2,124	3,037	766 U	651	931	4,725 U	4,077	5,830	862	1,232
84.11	Air Pumps/Compressors	0	0	0	0	0	0	0	0	0	-	-
84.12	Air Conditioning											
	a. Window Units	11,640 U	3,744	5,354	2,433 U	1,049	1,500	18,934 U	6,891	9,854	364	520
	b. Central	3,150 T	1,260	1,801	650 T	254	363	5,100 T	2,022	2,891	396	566
	c. Parts/Maintenance	N/A	2,744	3,923	N/A	-17	-25	N/A	3,000	4,290	N/A	N/A
84.15	Refrigeration	145,100 U	23,053	32,965	14,162 U	3,997	5,716	187,586 U	35,044	50,113	187	267
84.22	Lift/Handling Equipment	213 T	277	396	21 T	-61	-37	200 T	260	372	1,300	1,859
84.24	Agricultural Machinery	N/A	359	513	N/A	7	9	N/A	360	515	N/A	N/A
87.01	Agricultural Tractors	2,925 U	4,859	6,948	630 U	4,497	6,431	4,815 U	18,350	26,240	3,811	5,450
84.45	Metalworking Machine Tools (Military Production)	848 U§	2,701§	3,862§	199 U	189	270	1,644 U	3,457	4,944	2,102	3,006
84.47	Woodworking Machine Tools	0	0	0	0	0	0	0	0	0	-	-
84.49	Pneumatic Hand Tools	0	0	0	0	0	0	0	0	0	-	-
84.50	Electric Hand Tools	N/A	1,119	1,600	N/A	106	152	N/A	1,437	2,055	N/A	N/A

+ BTN: Brussels Tariff Notation.
# Based on October'1981 exchange rate: $1.43 per L.E.
§ Figures shown are 1977 (1978 not available).

Source: 1979 Yearbook, Federation of Egyptian Industries.

Appendix 4

IMPORTS OF NON-ELECTRICAL MACHINERY: 1979, 1981 (Projected)

BTN +	Description	1979 Imports Quantity (U=Units/T=Tons)	1979 Imports Value LE(000)	1979 Imports Value # $(000)	Est. Annual Growth (%)	Basis for Est. Annual Growth	1981 Projected Quantity (U=Units/T=Tons)	1981 Projected Value LE(000)	1981 Projected Value # $(000)
84.10	Pumps for Liquid	147,503 U	9,613	13,746	18.5	(1)	174,800 U	11,390	16,290
	Parts	434 T	3,272	4,679	18.5	(1)	520 T	3,880	5,550
84.11	Air & Gas Pumps/Compressors	114,723 U	7,100	10,561	1.3	(2)	116,200 U	7,190	10,700
	Parts	285 T	2,012	2,877	1.3	(2)	290 T	3,040	2,910
84.12	Air Conditioning	1,525 U	1,581	2,261	21.0	(3)	1,850 U	1,910	2,740
	Parts	215 T	1,242	1,776	21.0	(3)	260 T	1,500	2,150
84.15	Domestic Refrigerators	2,155 U	331	473	10.0	(4)	2,370 U	360	520
	Industrial Refrigerators	527 U	1,297	1,854	4.4	(5)	550 U	1,350	1,940
	Other Refrigerator Equipment	8,059 U	4,844	6,927	4.4	(5)	8,410 U	5,060	7,230
	Parts	892 T	1,703	2,435	10.0	(4)	981 T	1,870	2,673
84.22	Lifting/Handling Equipment	2,971 T	2,695	3,853	1.3	(2)	3,010 T	2,730	3,900
	Portable Lifting Equipment	8,607 U	93	133	1.3	(2)	8,720 U	95	135
	Parts	201 T	491	702	1.3	(2)	200 T	500	710
84.24	Cultivating Appliances	519 U	681	974	18.5	(1)	615 U	805	1,154
87.01	Agricultural Tractors	2,504 U	9,293	13,289	18.5	(1)	2,970 U	11,010	15,750
	Parts	209 T	2,322	3,320	18.5	(1)	250 T	2,750	3,930
85.45	Metalworking Machine Tools	4,651 U	9,246	13,222	25.0	(6)	5,825 U	11,560	16,530
	Parts	167 T	613	876	25.0	(6)	210 T	765	1,095
85.47	Woodworking Machine Tools	2,703 U	5,189	7,463	25.0	(7)	3,380 U	6,485	9,330
84.49 / 85.05	Power Hand Tools	223 T	1,560	2,232	1.3	(2)	225 T	1,580	2,260

(1) Average annual increase in the Agricultural Production Index, 1972-77.
(2) Assumed growth rate equivalent to imports of machinery and mechanical appliances.
(3) Assumed growth rate equivalent to growth rate of domestically produced air conditioning.
(4) Assumed growth rate equivalent to growth rate of domestically produced refrigerators.
(5) Assumed growth rate equivalent to the combined growth rate of domestic production and imports of vegetables and meats, 1972-77.
(6) Judgment of needs to replace obsolete equipment and demand for machined goods.
(7) Equivalent to the woodworking industry growth in output of wood products in 1977.

+ Brussels Tariff Notation.
# Based on October 1981 exchange rate: $1.43 per L.E.

Source: Central Agency for Public Mobilization and Statistics, Monthly Bulletin of Foreign Trade, January-December 1979

Appendix 5

EGYPTIAN IMPORTS/EXPORTS OF NON-ELECTRICAL MACHINERY, 1979

BTN+ Item	Description	Imports		Exports	
		Quantity (tons)	Value $(000)	Quantity (tons)	Value $(000)
84.10	Pumps for liquids, liquid elevators	4,748	14,837	—	—
84.11	Air pumps, vacuum pumps and air or gas compressors	3,160	10,064	—	—
84.12	Air conditioning machines, elements for changing the temperature and humidity of air	664	3,024	—	—
84.15	Refrigerators and refrigerating equipment (electrical and other)	4,473	11,017	—	—
84.22	Lifting, handling, loading or unloading machinery, telphers, and conveyers except excavating equipment	8,429	24,660	—	—
84.24	Agricultural and horticultural machinery for soil preparation or cultivation, lawn and sports ground rollers	299	922	—	—
84.45	Machine tools for working metal or metallic carbides	4,936	9,562	—	—
84.47	Machine tools for working wood, cork, bone, ebonite, other hard carving materials	4,865	2,171	—	—
84.49	Tools for working in the hand, pneumatic, or with self-contained non-electric motor	178	671	—	—
85.05	Tools for working in the hand with self-contained electric motor	299	2,119	—	—
87.01	Tractors, whether or not fitted with power take-offs, winches or pulleys	2,850	12,534	—	—

+ BTN: Brussels Tariff Notation.

Source: Central Agency for Public Mobilization and Statistics, Monthly Bulletin of Foreign Trade, January-December 1979.

Appendix 6

EGYPTIAN IMPORTS OF NON-ELECTRICAL MACHINERY, 1979

BTN† 84.15

Item	Description
1.	Domestic Refrigerators - Household, Hospital, Store
2.	Industrial Refrigerators
3.	Refrigerating Equipment
4.	Other Refrigerating Equipment
5.	Refrigeration Parts

Exporting Country	Item	Quantity (U=units/T=tons)	Value L.E. (000)	Value# $(000)
Jordan	1	420 U	92	132
	4	53 U	27	39
Algeria	1	128 U	18	26
Saudi Arabia	1	706 U	96	137
Libya	4	634 U	148	212
Kuwait	1	368 U	42	60
	1	79 U	16	23
	4	330 U	77	110
Arab Emirates	1	112 U	14	20
	4	83 U	21	30
Finland	3	8 T	22	31
Spain	5	9 T	35	50
Denmark	2	15 U	106	152
	5	17 T	44	63
Sweden	3	10 U	76	109
United Kingdom	2	28 U	378	541
	3	699 U	274	392
	4	34 U	55	79
	5	9 T	86	123
Italy	1	266 U	33	47
	3	1,973 U	461	659
	4	208 U	509	727
	5	378 T	277	396
West Germany	2	19 U	190	272
	3	560 U	275	393
	4	161 U	65	93
	5	43 T	66	94
Switzerland	2	2 U	13	19
	3	15 U	45	64
	5	3 T	13	19
France	2	363 U	151	215
	3	1,400 U	381	545
	4	77 U	28	40
	5	116 T	432	618
Taiwan	4	45 U	141	202
United States	1	76 U	20	29
	2	100 U	459	656
	3	1,443 U	2,221	3,176
	4	321 T	118	169
	5	317 T	1,027	1,469
Total:	1	2,155 U	331	473
	2§	527 U	1,297	1,854
	3§	6,116 U	3,655	5,227
	4§	1,943 U	1,189	1,700
	5	892 T	1,703	2,435

+ BTN: Brussels Tariff Notation.
# Based on October 1981 exchange rate: $1.43 per L.E.
§ Items designated industrial refrigeration.

Source: Central Agency for Public Mobilization and Statistics, Monthly Bulletin of Foreign Trade, January-December 1979.

Appendix 7

EGYPTIAN IMPORTS OF NON-ELECTRICAL MACHINERY, 1979

Item	Description	
1.	BTN[+] 84.49	Electric Driven Hand Tools
2.	BTN[+] 85.05	Pneumatic Driven Hand Tools

Exporting Country	Item	Quantity (tons)	Value L.E. (000)	Value[#] $(000)
Czechoslovakia	1	5	28	40
Spain	1	12	69	99
Sweden	1	4	39	56
United Kingdom	1	45	602	861
Italy	1	59	191	273
France	1	4	25	36
Netherlands	1	44	377	539
Taiwan	1	7	20	29
Japan	1	43	209	299
Total:	1	223	1,560	2,232
	2	0	0	0

[+] BTN: Brussels Tariff Notation.
[#] Based on October 1981 exchange rate: $1.43 per L.E.

Source: Central Agency for Public Mobilization and Statistics, Monthly Bulletin of Foreign Trade, January-December 1979.

Appendix 8

EGYPTIAN IMPORTS OF NON-ELECTRICAL MACHINERY, 1979

BTN[+] 84.10

Item	Description
1.	Pumps for liquid and liquid elevators
2.	Parts for liquid pumps and elevators

Exporting Country	Item	Quantity (U=units/T=tons)	Value L.E. (000)	Value[♦] $(000)
East Germany	1	54 U	100	143
Czechoslovakia	1	134 U	49	70
	2	35 T	133	190
Yugoslavia	1	241 U	12	17
	2	5 T	51	73
Spain	1	688 U	52	74
Denmark	1	96 U	54	77
Sweden	2	9 T	73	104
Austria	1	2 U	47	67
United Kingdom	1	4,736 U	1,269	1,815
	2	26 T	243	347
Italy	1	113,932 U	2,446	2,498
	2	02 T	1,106	1,581
West Germany	1	13,762 U	3,016	4,313
	2	122 T	1,035	1,480
Switzerland	1	18 U	33	47
France	1	6,431 U	483	691
	2	91 T	124	177
Netherlands	1	11 U	80	114
	2	3 T	46	66
Japan	1	2,360 U	791	1,131
	2	7 T	39	56
United States	1	5,038 U	1,181	1,689
	2	74 T	422	603
Total:	1	147,503 U	9,613	13,746
	2	434 T	3,272	4,679

[+] BTN: Brussels Tariff Notation.
[♦] Based on October 1981 exchange rate: $1.43 per L.E.

Source: Central Agency for Public Mobilization and Statistics, Monthly Bulletin of Foreign Trade, January-December 1979.

Appendix 9

EGYPTIAN IMPORTS OF NON-ELECTRICAL MACHINERY, 1979

BTN[+] 84.11

Item	Description
1.	Air and gas pumps
2.	Air and gas compressors
3.	Parts for air and gas pumps/compressors

Exporting Country	Item	Quantity (U=units/T=tons)	Value L.E.(000)	Value[#] $(000)
Czechoslovakia	1	17 U	13	19
Rumania	2	60 U	24	34
Yugoslavia	1	153 U	20	29
Spain	1	5,141 U	87	124
	3	19 T	42	60
Denmark	1	9,267 U	270	386
Sweden	1	53 U	323	462
United Kingdom	1	3,261 U	1,546	2,210
	3	21 T	214	306
Italy	1	14,259 U	1,106	1,582
Belgium	1	29 U	182	260
West Germany	1	6,945 U	777	1,111
	3	151 T	1,133	1,620
Switzerland	1	6 U	63	90
	3	4 T	23	33
Netherlands	1	15 U	104	148
	3	6 T	155	222
Taiwan	1	2,363 U	29	41
India	1	534 U	20	29
Japan	1	47,532 U	965	1,380
	3	11 T	23	33
United States	1	5,038 U	1,181	1,689
	3	74 T	422	603
Brazil	2	20,200 U	390	558
Total:	1	94,663 U	6,686	9,561
	2	20,260 U	414	592
	3	286 T	2,012	2,877

[+] BTN: Brussels Tariff Notation.
[#] Based on October 1981 exchange rate: $1.43 per L.E.

Source: Central Agency for Public Mobilization and Statistics, Monthly Bulletin of Foreign Trade, January-December 1979.

Appendix 10

EGYPTIAN IMPORTS OF NON-ELECTRICAL MACHINERY, 1979

BTN[+] 84.22

Item	Description
1.	Lifting, Handling, Loading, Unloading Machinery excluding Excavating Equipment
2.	Portable Lifting Equipment
3.	Parts for Lifting Equipment

Exporting Country	Item	Quantity (U=units/T=tons)	Value L.E.(000)	Value[#] $(000)
Saudi Arabia	1	11 T	72	103
Libya	1	39 T	20	29
Kuwait	1	81 T	184	263
Arab Emirates	1	25 T	32	46
USSR	1	113 T	67	96
East Germany	1	32 T	113	162
Finland	1	12 T	60	86
Spain	2	2,555 U	37	53
Denmark	1	83 T	161	230
Sweden	1	74 T	291	416
Italy	1	498 T	892	1,276
	3	183 T	356	509
France	1	1,168 T	3,313	4,738
Taiwan	2	5,250 U	28	40
Japan	1	150 T	318	454
	2	802 U	28	40
	3	5 T	46	66
United States	1	693 T	2,172	3,106
	3	13 T	89	127
Total:	1	2,971 T	2,695	11,004
	2	8,607 U	93	133
	3	201 T	491	702

[+] BTN: Brussels Tariff Notation.
[#] Based on October 1981 exchange rate: $1.43 per L.E.

Source: Central Agency for Public Mobilization and Statistics, Monthly Bulletin of Foreign Trade, January-December 1979.

Appendix 11

EGYPTIAN IMPORTS OF NON-ELECTRICAL MACHINERY, 1979

Item	Description	
1.	BTN[+] 84.24	Cultivating Appliances
2.	BTN[+] 87.01	Cultivating Tractors
3.	BTN[+] 87.01	Parts for Cultivating Tractors

Exporting Country	Item	Quantity (U=units/T=tons)	Value L.E. (000)	Value[$] $(000)
Czechoslovakia	2	404 U	1,259	1,800
	3	13 T	85	122
Rumania	2	701 U	2,876	4,112
	3	39 T	168	240
Yugoslavia	2	729 U	2,840	4,061
	3	45 T	311	445
Denmark	1	16 U	57	82
Austria	2	9 U	128	183
	3	11 T	34	47
United Kingdom	1	86 U	191	273
	2	79 U	473	676
Italy	1	405 U	241	345
	2	513 U	800	1,144
West Germany	2	38 U	539	770
	3	19 T	78	112
France	2	11 U	168	240
Netherlands	2	4 U	44	63
Japan	2	16 U	166	237
United States	1	12 U	192	274
	3	82 T	1,646	2,353
Total:	1	519 U	681	974
	2	2,504 U	9,293	13,289
	3	209 T	2,322	3,320

[+] BTN: Brussels Tariff Notation.
[$] Based on October 1981 exchange rate: $1.43 per L.E.

Source: Central Agency for Public Mobilization and Statistics, Monthly Bulletin of Foreign Trade, January-December 1979.

Appendix 12

EGYPTIAN IMPORTS OF NON-ELECTRICAL MACHINERY, 1979

BTN[+] 84.45

Item	Description
1.	Machine tools for working metal or metallic carbides
2.	Parts for metalworking machine tools

Exporting Country	Item	Quantity (U=units/T=tons)	Value L.E. (000)	Value[#] $(000)
East Germany	1	69 U	193	276
Hungary	1	5 U	47	67
Bulgaria	1	50 U	229	327
	2	96 T	103	147
Poland	1	73 U	336	552
	2	14 T	22	31
Czechoslovakia	1	129 U	345	493
	2	22 T	93	133
Rumania	1	223 U	278	398
Spain	1	65 U	409	584
Denmark	1	77 U	247	353
Sweden	1	12 U	125	179
Austria	1	12 U	90	129
United Kingdom	1	125 U	1,307	1,869
	2	2 T	13	19
Italy	1	1,155 U	1,672	3,391
	2	12 T	79	113
West Germany	1	185 U	2,556	3,655
	2	21 T	303	433
Switzerland	1	14 U	606	867
France	1	42 U	333	476
Taiwan	1	2,208 U	95	136
Japan	1	152 U	101	149
United States	1	65 U	227	325
Total:	1	4,661 U	9,246	I3,222
	2	167 T	613	876

[+] BTN: Brussels Tariff Notation.
[#] Based on October 1981 exchange rate: $1.43 per L.E.

Source: Central Agency for Public Mobilization and Statistics, Monthly Bulletin of Foreign Trade, January-December 1979.

Appendix 13

EGYPTIAN IMPORTS OF NON-ELECTRICAL MACHINERY, 1979

BTN[+] 84.47

Item	Description
1.	Machine tools for woodworking

Exporting Country	Item	Quantity (U=units/T=tons)	Value L.E. (000)	Value[♦] $(000)
Hungary	1	30 U	28	40
Czechoslovakia	1	5 U	20	29
Austria	1	108 U	77	110
Italy	1	1,288 U	2,369	3,388
Belgium	1	4 U	30	43
West Germany	1	869 U	1,302	1,862
Switzerland	1	1 U	60	86
France	1	198 U	149	213
Japan	1	175 U	30	43
Hong Kong	1	23 U	38	54
United States	1	2 U	1,116	1,596
Total:	1	2,703 U	5,189	7,463

[+] BTN: Brussels Tariff Notation.
[♦] Based on October 1981 exchange rate: $1.43 per L.E.

Source: Central Agency for Public Mobilization and Statistics, Monthly Bulletin of Foreign Trade, January-December 1979.

Appendix 14

EGYPTIAN IMPORTS OF NON-ELECTRICAL MACHINERY, 1979

BTN[+] 84.12

Item	Description
1.	Air conditioning elements and machines for changing the temperature and humidity of the air
2.	Parts for air conditioning

Exporting Country	Item	Quantity (U=units/T=tons)	Value L.E. (000)	Value[♦] $(000)
Saudi Arabia	1	115 U	23	33
Kuwait	1	79 U	16	23
East Germany	2	10 T	100	143
Spain	2	6 T	33	47
United Kingdom	1	47 U	175	250
	2	36 T	159	227
Italy	1	67 U	349	499
Switzerland	2	66 T	446	633
France	1	75 U	240	343
	2	4 T	45	64
Netherlands	2	2 T	43	61
Japan	1	85 U	37	53
United States	1	1,057 U	741	1,060
	2	91 T	416	594
Total:	1	1,525 U	1,581	2,261
	2	215 T	1,242	1,776

[+] BTN: Brussels Tariff Notation.
[♦] Based on October 1981 exchange rate: $1.43 per L.E.

Source: Central Agency for Public Mobilization and Statistics, Monthly Bulletin of Foreign Trade, January-December 1979.

Appendix 15

EGYPTIAN TARIFFS ON IMPORTS OF NON-ELECTRICAL MACHINERY
(as of October 20, 1981)

BTN+ Item	Description	Tariff (% of CIF#)
84.10	Pumps for liquids, liquid elevators	15%
84.11	Air pumps, vacuum pumps and air or gas compressors	10%
84.12	Air-conditioning machines, elements for changing the temperature and humidity of air	Cold Storage 10% Domestic 150% Components/Parts 25%
84.15	Refrigerators and refrigerating equipment (electrical and other)	Industrial 10% Domestic 150% Components/Parts 25%
84.22	Lifting, handling, loading or unloading machinery, telphers, and conveyors except excavating equipment	5%
84.24	Agricultural and horticultural machinery for soil preparation or cultivation, lawn and sports ground rollers	0
84.45	Machine tools for working metal or metallic carbides	2%
84.47	Machine tools for working wood, cork, bone, ebonite, other hard carving materials	2%
84.49	Tools for working in the hand, pneumatic, or with self-contained non-electric motor	2%
85.05	Tools for working in the hand with self-contained electric motor	2%

BTN+ Item	Description	Tariff (% of CIF#)
87.01	Tractors, whether or not fitted with power take-off, winches, or pulleys	45-70 hp 45% Other hp 2%

In addition to the tariffs listed above, import duties are also levied on all imported goods as follows:

Development Duty	-	10% of CIF
Pavement Duty	-	3% of sum of tariff and development duty
Statistic Duty	-	1% of CIF
Marine Duty	-	0.5% of value of goods

+ BTN: Brussels Tariff Notation.
# CIF: Cost, Insurance, and Freight.

Source: U.S. Commerce Department, Action Group for the Near East, Sheryl McQueen, Egypt desk, Washington, D.C.