Industrialization in the UAE

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Introduction

Commercial quantities of oil were first discovered in Abu Dhabi emirate in 1958 and oil exports commenced in 1962, nearly four decades ago. Oil was subsequently found in Dubai and exports began in 1969. The federation of the United Arab Emirates was formed on 2 December 1971, about 13 years after that initial discovery in Abu Dhabi. Undoubtedly, oil and the federation were the two most important factors in the transformation of the seven emirates politically, economically, socially and culturally, from a collection of subsistence desert sheikhdoms into a federated group of modern city-states.

In the pre-oil era the vast majority of the population worked in pearling, fishing, trading and dhow building. According to Al Otaiba (1970), pearling began to flourish in Abu Dhabi about two and a half centuries ago, and just before the Second World War approximately 85 per cent of the population of Abu Dhabi (which was about 55,000 at the time) worked directly or indirectly in pearling, the industry accounting for 95 per cent of the total national income. It was those living on the coast who were the main beneficiaries of this sea-based industry. The oases' inhabitants engaged in subsistence agriculture (animal husbandry, the care of date palms,) and rural handicrafts (the fashioning of silver ornaments, daggers, the weaving of *bishts* from camel hair and pottery), although some of the population shifted between pearling and agriculture according to the season.

After the discovery of oil, it became the mainstay of the economy, and development in the 1960s and 1970s, and to a lesser degree after that, focused on physical infrastructure such as roads, ports, airports, water and electricity supplies and on social infrastructure such as schools and hospitals. The rapid growth of the construction industry required to meet the development in infrastructure attracted large numbers of skilled, semi-skilled and unskilled expatriate workers from a variety of countries, but mainly from the subcontinent and some Arab and European countries. The expansion in population resulted in growth of the building sector, trading, banking and insurance services, while privately owned import-substitution industries producing locally needed materials such as concrete blocks, aluminium windows, furniture and carbonated beverages began to flourish.

The governments of the emirates then decided to enhance the role of the public sector in the development process by investment in manufacturing associated with oil and gas, such

as refineries, fertilizer plants and aluminium smelters, as well as other industries requiring large investments, such as cement factories. In Abu Dhabi, the largest and richest emirate, public sector industrial projects are shared between two main bodies: Abu Dhabi National Oil Company (ADNOC), which is the main organ for implementing Abu Dhabi policy regarding oil exploration, production, marketing and processing, and the General Industries Corporation (GIC), which undertakes non-petroleum related projects.

This chapter outlines the growth of the industrial sector since the discovery of oil and examines the constraints faced. Possible strategies are suggested for the early decades of the new century.

Manufacturing Outside the Oil Sector

Industrial development outside the oil sector was strongly linked to the construction boom, directly via the demands for cement, cement blocks, polyvinylchloride pipes, aluminium windows and furniture, and indirectly through the expansion of the food industry to cope with the large increase in population.

Table 1. Total number of industrial establishments
in the Industrial Register of Ministry of Finance & Industry that employ 10 or more persons

Year	Total Number of Establishments
1990	705
1991	740
1992	857
1993	949
1994	1076
1995	1241
1996	1388
1997	1525
1998	1693
1999	1859

Source: Ministry of Finance and Industry

Table 1 shows the increase in the number of industrial establishments employing ten or more people over the past decade, while Table 2 indicates the number of such establishments by activity and emirate at the close of the century. Table 2 indicates that industrial activity is concentrated in Dubai, Sharjah, Ajman and Abu Dhabi. Dubai has 678 out of the 1859 total number of industrial establishments while Sharjah has 581. However, Abu Dhabi hosts many of the larger industries in the country. Some of the different categories of industry in the UAE are examined below.

Construction-related industries

From the late 1960s industrial establishments related to the requirements of building and construction started to increase rapidly in number. At first small factories manufacturing building blocks, tiles, plastic pipes, water tanks, GRP swimming pools, marble tiles and

Table 2. Number of industrial establishments
registered at Ministry of Finance and Industry employing 10 or more persons as at 31/12/1999

Industrial Activity	Abu Dhabi	Dubai	Sharjah	Ajman	Ra's al-Khaimah	Umm al-Qaiwain	Fujairah	Total
Food & beverages	18	82	42	20	9	6	5	182
Tobacco				1				1
Textiles	1	7	19	11	1	1		40
Garments	9	13	53	65	2		1	143
Leather goods	1	3	6	5			1	16
Wood & wooden products	1	13	14	3		1		32
Paper & paper products	8	23	14	11	2	1	1	60
Publishing	7	33	19	3	2		1	65
Petroleum products	5	4	5	7	1			22
Chemicals	22	47	52	14	4	3	1	143
Rubber and plastic products	21	42	56	23	2	4	3	151
Non-petroleum non-metallic minerals	45	99	64	22	22	9	11	272
Basic metal industries	4	21	12	2	3	1		43
Metal products	41	146	78	28	9	6	4	312
Machinery & equipment	5	16	19	1	1			42
Office equipment and computers				1				1
Electrical equipment & parts	6	25	16	1		1	2	51
Vehicles & trailers	5	12	4	4	1			26
Other transport equipment	3	12	6	10	3	1		35
Furniture & other manufacturing	2	64	85	18	3	1	1	174
Recycling						1		1
Handicraft industries		16	17	7	7			47
Total	**204**	**678**	**581**	**257**	**72**	**36**	**31**	**1859**

Source: Ministry of Finance and Industry, Department of Industrial Development

similar items, made their appearance. By 1973 a large asbestos-cement pipe factory had been built in Dubai, followed within a few years by another one in Umm al-Qaiwain. When the oil prices jumped in 1973, there were still no cement factories in the country. Cement was imported from Belgium, Germany, Kenya, etc. As requirements increased sharply in 1974, other countries, including Egypt, Greece, Pakistan, the Philippines, the Republic of Korea, Romania and Lebanon, began to export cement to the UAE. The first cement factory in the UAE started production in Ra's al-Khaimah in 1975 with an annual capacity of 550,000 tons. More cement factories were built in various emirates until the number reached eleven with an annual capacity exceeding 8 million tons. During the economic slump of the mid-eighties these were working at just over half capacity with nearly half of that production being exported. During that period, a white cement factory was also built in Ra's al-Khaimah which still exports a substantial part of its production to neighbouring Gulf countries.

Most of the cement factories have been built or partly financed by local government, but the private sector contributed heavily in some cases, such as in Dubai. Except for gypsum and some additives, the raw materials for cement are locally available. Local cement is

generally preferred to imported cement because of freshness. The big increase in demand for cement in the 1990s has resulted in the flourishing of the industry. Some production is exported.

The cement industry has helped the development of a downstream building materials industry such as asbestos-cement pipes and sheets, concrete building blocks and tiles. It is natural to consider manufacturing pipes both because of the need for them in the infrastructure as water supply lines but also because the import of pipes incurs heavy transport costs due to their large volume, when most of the volume in fact is empty space. (The same could be said about transporting tanks.) In addition transporting pipes exposes them to shock and, therefore, cracks. Moreover, in the case of cement pipes most of the raw materials are available locally.

There are two asbestos-cement factories in the UAE. A pipe factory opened in Dubai in 1973, even before the development of the first cement factory, and a pipe and sheet factory was installed in Umm al-Qaiwain during the late 1970s. However, because of the environmental problems connected with asbestos (even though the more dangerous blue asbestos has been phased out), a large number of GRP, PE and PVC pipe factories have appeared in the various emirates over the years and have taken some of the market share of the asbestos-cement pipes. The many medium and small concrete block, interlock and tile factories which were established now not only cover most of the country's needs but also export a substantial portion of their production.

A total of nine factories for making reinforced steel bars from scrap iron have been built in the UAE but four of these have closed down and the remaining five produce a total of 100 thousand tons annually, which is less than one tenth of local demand. A large factory is planned for Abu Dhabi and once this is in operation it will reduce imports substantially.

The first paint factory was opened in 1975. By 1996 there were 21 paint factories producing about 100 thousand tons annually with about one fourth of the production exported. Although most of the basic materials for manufacturing paints are imported, the high water content in most paints for use in building makes it economical to manufacture the paints locally in order to reduce transport costs. However, many special paints, such as marine paints and motor vehicle paints, are imported.

Many carpentry shops have been established to supply the construction industry with such items as doors, windows, partitions, pre-fabricated buildings, with the number of larger units employing more than ten persons reaching 33 in 1996. As for furniture-making factories, those employing more than ten persons reached 64 in the same year.

Food processing and beverages

Factories for making beverages commenced operation in the late 1960s. The number of factories for food processing and beverages with a labour force of more than ten reached 80 in 1985. By 1996 there were 130 factories, and by the end of 1999 there were 182. These include a large sugar factory and a few flour mills. The remaining units are for meat or fish processing, milk and dairy products, vegetable oil and animal fat processing, canning of fruits, vegetables and legumes, soft drink factories, mineral water bottling factories and three factories for animal feed.

Textiles, wearing apparel and leather goods

Ready-made garment factories mushroomed during the second half of the 1980s, reaching about 150 in number. The attraction was the benefits to be gained from access to the UAE

quota for export to the West, in particular the United States. There was no appreciable increase in the 1990s. In fact some factories closed down because the quota had been exhausted, with 143 remaining at the end of the century. Most of these factories are located in Sharjah and Ajman, with some in Jebel Ali Free Zone.

Except for four of these establishments where the investment exceeds 10 million, most of the others are small with a capital investment of less than half a million dirhams for each factory. It is a labour-intensive industry, using an average of over 140 people per factory, 80 per cent of whom are generally young females aged 17 to 25 years, most from Sri Lanka.

The bulk of production is shipped to the USA and the EU with most of the seconds exported to Eastern Europe. By the time the quota system is abolished in 2005, this industry will be too well established to be seriously affected. It is considered the second largest manufacturing industry in the UAE after aluminium and constitutes about 15 per cent of the non-oil industrial exports. The banks are usually happy to provide the industry with finance. Some of the more factories are more sophisticated, using a higher level of technology and these are mostly located in Jebel Ali. There are also a few factories in the UAE for leather products.

Paper, paper products and publishing

Publishing establishments have developed over the years to meet local demand, with the number reaching 65 by the end of 1999, half of which are in Dubai. As for units manufacturing paper or paper products, 60 were in operation at the end of 1999. A few of these are paper mills using recycled paper as raw material with one factory in Jebel Ali using pulp to make tissue paper.

Metal products, machinery and equipment

By the end of 1999 there were 312 factories dealing in such metal products as aluminium windows, metal furniture, cooking utensils, etc. There were also 42 factories connected with machinery and equipment such as air-conditioners and electric distribution panels.

The Dubai government built a large cable factory in Dubai in collaboration with a UK manufacturer, and Abu Dhabi has recently taken a share in the factory.

A large number of mechanical workshops exist in the UAE, including an extensive workshop in Dubai Drydock, probably the largest drydock in the world and capable of handling tankers with a capacity of up to 1 million tons.

Basic metal industries

The most important factory producing a basic metal is DUBAL, the Dubai Aluminium Company. Its smelter, which started production in 1979, was set up to benefit from the available associated gas. DUBAL imports alumina via the adjacent Jebel Ali Port and exports the metal ingots produced in containers through the same port. The aluminium produced is of 99.86 per cent purity, one of the highest in the world. Production was 170,000 tons in 1990, increasing to 245,000 tons in 1994. The factory has since undergone expansion, and, with current yearly production running at more than half a million tons, it is now one of the largest aluminium smelters in the world. Aluminium metal, which is mainly exported to Japan, is considered the second most important export item in the UAE after oil. This sophisticated industry has played an important role in the training of UAE nationals in technology.

Oil-Related Industries

Table 3 indicates the production and export of oil from the UAE between 1976 and 1995. The UAE's proven reserves are estimated at about 98 billion barrels, almost 10 per cent of the world's reserves.

Table 3. Production and export of crude from UAE		10,000 BPD
Year	**Production**	**Export**
1976	1936	1928
1980	1702	1605
1985	950	832
1990	2062	1785
1991	2320	2117
1992	2240	2011
1993	2190	1902
1994	2160	1930
1995	2160	1936

Source: *Development Indicators in the UAE – Achievements and Expectations*
The Department of Research and Studies
The Diwan of HH Crown Prince, Abu Dhabi, 1996.

Abu Dhabi National Oil Company (ADNOC), which was established in 1971 to oversee the oil and gas industry in Abu Dhabi, has become one of the world's leading oil companies, with substantial business interests in upstream exploration, development, production and marketing of oil and gas, and downstream refining, distribution and marketing of petroleum products, as well as liquefied natural gas (LNG) production and marketing. It owns and operates two refineries at Umm al-Nar and Ruwais, a gas treatment plant at Habshan, a gas pipeline distribution network and chlorine industries at Umm al-Nar.

The ADNOC group of companies operates in all sectors of the oil and gas industry, including drilling, construction, marine services, fertilizers, shipping and distribution. The group consists of three main oil operating companies, five support companies providing services to the oil and gas industry, three joint ventures to utilize fully the produced gas, two maritime transport companies for crude oil, refined product and LNG and one refined product distribution company. The three main oil and gas operating companies are: Abu Dhabi Company for Onshore Oil Operations (ADCO), Abu Dhabi Marine Operating Company (ADMA-OPCO) and Zakum Development Company (ZADCO).

ADCO, the largest crude oil producer in the southern Arabian Gulf, undertakes exploration, drilling, production and export activities in Abu Dhabi's onshore areas and the shallow coastal waters.

ADMA-OPCO operates the exploration, development and production activities of oil and gas in Abu Dhabi's offshore concession area. Oil and gas production comes from two fields: Umm Shaif and Zakum. The output of oil and gas from these fields is transported to the company's centre of operations on Das Island for processing, storage and export via the island's terminal.

ZADCO was established in 1977 to develop and operate the Upper Zakum field, one of the largest fields in the world, on behalf of ADNOC and Japan Oil Development Company (JODCO). Besides Upper Zakum, the company currently operates the Umm al-Dalkh and Satah fields.

In Dubai, oil in commercial quantities was first discovered on 6 June 1966 at the Fateh field by Dubai Petroleum Company (DPC) and was first exported on 22 September 1969. DPC later developed the offshore fields of south-west Fateh, Falah and Rashid. Currently production is about 170,000 barrels per day (b/d).

Arco International Oil & Gas Company (ARCO) made a gas/condensate discovery onshore at the Margham field and production started in 1982. Current production is about 6000 b/d of condensate.

In Sharjah the BP Amoco Sharjah Oil Company is producing 40,000 to 45,000 b/d and about 700 mn cu ft/day (cfd) of gas from the Sajaa, Moveyeid and Kahaif onshore fields. Crescent Petroleum markets nearly 5000 b/d of condensate from the Mubarak off-shore field.

Oil refineries

The first oil refinery in the UAE was opened in 1976 on the island of Umm al-Nar in Abu Dhabi with a capacity of 15,000 barrels per day to cater for local requirements. This factory was expanded in 1983 to produce 75,000 b/d of naptha, gasoline, kerosene, diesel and fuel.

In 1981 a larger refinery, with a capacity of 120,000 b/d, was opened at Ruwais in the emirate of Abu Dhabi. Its capacity was upgraded to 132,000 b/d in 1995. Ruwais produces similar products to Umm al-Nar plus ship fuel and sulphur. Liquefied gas is also produced which is sent to GASCO for treatment. The two refineries at Ruwais and Umm al-Nar refine about 10 per cent of Abu Dhabi's oil, the rest being exported as 'crude'. They are amongst the highest performing refineries in the world in terms of return on investment.

In 1999, the Dubai government-owned Emirates National Oil Company (ENOC) opened its condensate processing plant EPCL at Jebel Ali to produce up to 120,000 b/d of aviation fuel, diesel, naphtha and fuel.

In Sharjah, the Sharjah Oil Refining Company Ltd (SOR), the latest addition to the Fal Group, is currently constructing a refinery at al-Hamriyah with a capacity of 35,000 b/d. This will run mostly crude oil and plans to expand to 60,000 b/d.

In Fujairah the 35,000 b/d Greek-owned Metro Oil Corporation refinery went into service in 1996 but was then closed due to financial problems. It re-opened in 2000 as the Fujairah Refinery Company with Fujairah government support. The total capacity will be expanded to 90,000 b/d and the refinery will now produce kerosene and jet fuel as well as fuel oil and gasoline. It is worth remembering that Fujairah is the third bunkering port in the world after Rotterdam and Singapore, supplying 600,000 to 800,000 mn tons of fuel oil per month. Shareholders in the bunkering tank farm include Van Ommeren, ENOC and the Fujairah government.

The UAE has thus been able to rely on itself almost entirely for its requirements of refined products. Moreover it has been able to provide inputs for downstream industries. The Gulf Cooperation Council together refines about 15 per cent of its total crude and this percentage is expected to rise to 21 per cent in 2007 (*EIB Journal*, September 1997).

Liquefied gas

In the early years of oil extraction in the UAE associated gas was flared, but when prices of oil jumped in 1973 interest in gas rose sharply. In 1974 the UAE produced 500 bn cu ft of gas of which 1.5 per cent was used by the oil companies, 1.5 per cent by Abu Dhabi to produce electricity and desalinated water and over 93 per cent flared. By 1980, nearly half of the gas was utilized either through liquefaction for export or for use locally, and by 1983 Abu Dhabi was utilizing 92 per cent of its gas.

World gas reserves are estimated at 150 trillion cu m of which 6trillion cu m (4 per cent) are in the UAE. Abu Dhabi has 92 per cent of the UAE reserves while Sharjah and Dubai have 5 per cent and 2 per cent respectively.

The UAE also has large reserves of non-associated gas. About 55 per cent of UAE gas is used locally whilst the rest is exported. ADNOC owns the gas related projects in Abu Dhabi, Abu Dhabi Gas Liquefaction Company (ADGAS) and Abu Dhabi Gas Industries Ltd (GASCO).

ADGAS is a liquefied natural gas project which was established in 1973 and set up on Das Island in 1977. It produces 2.3 mn tons of LNG and 1.4 mn tons of LPG from the offshore fields crude oil.

GASCO, one of the largest gas processing companies in the world, was set up in 1981 to treat associated gas from three onshore fields as well as non-associated gas from another field. It supplies Ruwais and Abu Dhabi with gas as fuel for the generation of electricity and also supplies the petrochemical industries with feed-stock. The majority of gas produced is, however, exported.

Dubai Gas Company (DUGAS) was built at Jebel Ali in Dubai in 1980. It treats associated gas and collects condensate, butane and propane for export while methane and ethane are sent to the Dubai Electricity and Water Authority for the production of electricity and desalinated water and to DUBAL for aluminium smelting.

SHALCO was set up in Sharjah in 1986 for liquefaction and export of gas from the onshore fields. It also supplies Sharjah's gas requirements for electricity generation and water desalination. Moreover, it supplies DUGAS in Dubai with about 95 mn cu ft of gas per day.

The establishment of Ruwais Fertilizer (FERTIL) in 1980 to produce fertilizers for both domestic use and export was a joint venture between ADNOC and Total.

One of the most important developments in the UAE gas industry is the Dolphin Project which aims to develop links between the gas infrastructure of Qatar, the UAE and Oman, with a possible future link to Pakistan. This will allow the export of non-associated gas from the massive offshore North Dome field of Qatar. A statement of principles for the project was signed in March 1999 between the Qatar General Petroleum Corporation and the UAE Offsets Group (UOG). The project is estimated to cost $8 to $10 billion over six to seven years. In the first phase, to be completed by the end of 2002, the subsea pipeline will transport 1200 mn cfd of natural gas. This will be raised to 3000 mn cfd in the second phase. Dolphin is the largest programme of its kind in the world and will account for nearly 10 per cent of total world gas supply. In the initial phase the supply will be almost exclusively for supplying gas-fired power plants.

A pipeline is currently under construction to supply Dubai with about 800 mn cfd from Abu Dhabi's offshore field of al-Bukhoosh via Jebel Ali for electricity generation and water desalination. In time, this is expected to be integrated into the Dolphin project.

Industrialization in the UAE and its Resources

The rationale for industrialization in the UAE is the diversification of an economy which is heavily reliant on oil. A Ministry of Planning publication (1983: p 58) states:

> *Industrialization is a main aim of the state for the correction of the structure of production in which the crude oil sector accounts for about two thirds of the GDP. The industrial sector, according to economic criteria, is the sector on which economic efforts should be concentrated.*

The above statement dates back to 1983. Table 4 shows that the non-oil sector's contribution to GDP rose from 36.73 per cent in 1980 to 77.64 per cent in 1998, while the contribution of manufacturing has increased from 3.76 per cent in 1980 to 12.40 per cent in 1998. Even so, reliance on the oil sector is still high.

Exporting refined rather than crude oil enables the UAE to benefit from the value-added component. Moreover, the availability of associated gas which necessarily accompanies oil extraction provides feedstock for petrochemical industries and fuel for energy. In addition

Table 4. Gross domestic product at factor cost by economic sector 1975–1998

(Dh. million at constant prices)

Sector	1975	1980	1985	1990	1995	1998
Agricult., livestock & fishing	367	827	1,440	2,056	3,550	5,509
Mining & quarrying:						
Crude oil	35,820	70,532	44,707	57,632	49,200	34,002
Others	118	235	309	307	450	572
Manufacturing	472	4,191	9,255	9,701	12,500	18,855
Electricity & water	287	1,297	2,143	2,461	3,210	2,750
Construction	4,770	9,834	8,882	9,687	13,300	14,278
Wholesale, retail trade,						
Restaurants & hotels	4,940	9,094	8,715	11,237	17,800	20,813
Transp./storage, comm.	1,608	3,731	4,224	6,211	8,500	10,663
Financing, insurance, real estate:						
Financing & insurance	825	2,123	5,154	5,126	7,150	10,112
Real estate	1,326	4,006	5,176	6,864	11,700	15,935
Other services	516	814	1,645	2,467	1,640	3,008
Less imputed bank charges	(600)	(1,403)	(1,025)	1,950)	(2,550)	(3,774)
Government services*	2,551	5,989	11,001	12,968	16,320	18,005
Domestic services	54	200	364	499	1,200	1,302
Total	**53,054**	**111,470**	**101,990**	**125,266**	**143,970**	**152,030**
Non-oil sectors	17,234	40,938	57,283	67,634	94,770	118,028
Non-oil sectors %	32.48	36.73	56.17	53.99	65.83	77.64

Source: *Economic & Social Development in the UAE*
1975-80, 1980-85, 1985-90, 1990-95, Ministry of Planning, UAE
The Annual Economic Report 1999, Ministry of Planning, UAE.

* Includes education, health services, and the various ministries and government departments

industrialization plays an important role in the development of technology and a well-trained national labour force.

Industrial development requires various factors and resources and some of these will be examined below.

Labour force

Table 5. Population and labour force (in 1000's)

	1975	1980	1985	1990	1995
Male population	386	720	895	1115	1580
Female population	172	322	484	729	797
Total population	558	1042	1379	1844	2377
Labour force	288	541	619	694	1290
Percentage of labour force to total population	51.6	51.9	44.9	37.6	54.2

Source: Development Indicators in the UAE – Achievements and Expectations
The Department of Research and Studies. The Diwan of H.H. The Crown Prince, Abu Dhabi, 1996

Table 5 indicates the growth of population and labour force in the UAE between 1975 and 1995. The population has increased from 558,000 in 1975 to 2.37 million in 1995. This increase has been mainly achieved by the influx of expatriate workers. The percentage of labour force to total population is over 50 per cent because a large portion of the population consists of expatriate workers. Females constitute about one third of the population because most expatriate workers are male.

Table 6. Labour force in manufacturing sector

	1975	1980	1985	1990	1995
Labour force in manufacturing (A)	17505	39200	95100	66530	99400
Total labour force (B)	288414	541033	619429	694201	955100
Percentage of A to B	6.0	7.2	9.5	9.6	10.4

Source: Development Indicators in the UAE – Achievements and Expectations
The Department of Research and Studies. The Diwan of H.H. The Crown Prince, Abu Dhabi, 1996

Table 6 shows that the labour force in manufacturing is about 10 per cent of the total labour force in the country. Surveys of industries conducted by Dubai's Chamber of Commerce and Industry (1984), the Federation of Chambers of Commerce in the UAE (1983) and by the author in 1987 (Ph.D. thesis 1989) indicated that industry did not suffer from a shortage of manpower, since there were no restrictions to the inflow of the necessary expatriate labour force, skilled and unskilled. There are very few nationals working in the industrial sector. However, with nationals graduating from universities and colleges of technology in thousands every year and with the government sector becoming saturated, nationals are increasingly seeking employment in both the public and private industrial sector.

Industrial areas and infrastructure

When industrial development commenced in the UAE there was no proper town planning and industries were allowed to locate in areas unsuitably close to town centres. Later, when industrial areas were designated, some industries were asked to relocate. For instance several large enterprises engaged in fabrication for the oil industry were requested to move to

Jebel Ali. In addition to Jebel Ali's heavy industry area, Dubai municipality has designated seven areas (as indicated in Table 7), zoned for light, medium, heavy and hazardous industrial activity.

Table 7. Industrial areas in Dubai

Name of area	Area in hectares	Percentage of area in use
Al-Khubaisi	102	93
Al-Qusais	312	60
Al-Rumool	391	98
Al-Aweer	661	65
Al-Quoz	1,552	22
Al-Safa	114	17
Total	3,132	47

Source: Dubai Structural Plan. Study Report by Parsons, Harland Bartholomew & Ass., (1994).

The other emirates have also designated areas for industry with Abu Dhabi, for instance, allocating 1400 hectares in Musafah and 400 hectares in Al Ain. The various emirates have also seen considerable development in infrastructure and utilities: roads, ports, airports, electricity, water supply, sewerage and telephone lines.

Free zones

Because of the success of Jebel Ali Free Zone, free zones have been developed in all the emirates. With a total of nine free zones, the UAE has more free zones than most other Arab countries.

Table 8 shows the sizes of the various free zones, the date of their establishment, the number of companies located in each of them and their activities. Jebel Ali is the oldest and largest one in the UAE and today has approximately 1600 companies, of which about 22 per cent are industrial, mainly light and medium industries. However, they occupy a greater area than this percentage might imply since industrial establishments generally require a great deal of space. According to a study dating 1995/96 the percentages of industrial projects to the total number of projects in the free zones were: Sharjah 17.7 per cent, Fujairah 39.8 per cent, Ajman 41.3 per cent and Umm al-Qaiwain 100 per cent, (Nawar 1998).

Jebel Ali's success is due to the fact that it was built around the largest man-made port in the world (70 berths). It has a developed infrastructure with a modern management system and strictly implemented environmental and health and safety regulations. Several free zones, mostly from the Arab world, have recently signed consultancy agreements or memorandums of understanding with Jebel Ali Free Zones Authority management to benefit from its experience. Another important advantage is that proximity to the sea permits large projects to use a convenient source of cooling water, though it should be noted that the construction of a huge inland canal to provide cooling water in Jubail Industrial Area in Saudi Arabia has facilitated the building of various large projects several kilometres from the sea.

The attraction of the free zones is that foreigners can have full ownership of their projects (except for the land which is usually leased) and there are no customs duties on imports unless they cross the fence into the UAE. There are also no restrictions on the movement of capital and repatriation of profits and, so far, there are no restrictions on bringing labour from overseas.

Table 8. Free Zones in the UAE

Location of Free Zone	Date of Establishment	Area in Hectares	No. of Companies at beg. of 1999	Activity
Jebel Ali (Dubai)	9/2/85	10,000	1343	74% Trading 22% Industrial 4% Services
Fujairah	Nov. 1987	140	80	Trading and Industrial
Ajman	1988	More than 100	375	Trading and Industrial
Umm al-Qaiwain	1/4/88	110	About 35	Trading and Industrial
Sharjah Airport	8/5/95	1,000	318	67% Trading 23% Services 10% Industrial
Hamriyah (Sharjah)	12/11/1995	Approx. 1,000	8	Clean Industries
Dubai Airport	1996	120	35	Mainly high-tech
Ra's al-Khaimah	Dec. 1996	150	0	Clean Industries (Only Free Zone in UAE operated by Private Sector)
Sadiyyat (Abu Dhabi)	July 1996	3500	0	Mainly for Commodities
Total		**Approx. 16120**		

Source: Prepared by Author

Raw materials

The most important raw materials for industry in the UAE are oil and gas. Apart from the creation of more refineries and liquefaction projects, there exists the possibility of developing the petrochemical industry in a way similar to that achieved by Sabic in Saudi Arabia. The UAE has been slow to diversify in that direction, with FERTIL, the fertilizer plant in Abu Dhabi, being one of a limited number of such developments.

In fact, the Arab region, particularly the Gulf, is ideally placed to develop an advanced petrochemical industry. This should be accomplished in such a way as to avoid duplication of projects, thus eliminating over-production and price falls in the region. Several Arab countries produce the basic products ethylene and methanol from gas, or, in the case of Libya, from naphtha. They also produce smaller quantities of propylene and butadiene and aromatics. Some Arab countries go one step further and produce middle products while a few countries, like Saudi Arabia, produce final downstream products like PE, PVC, polypropylene and polybutadiene.

Recently the UAE considered setting up a major industrial company, Sina'at, mainly to develop the petrochemical industry. The proposed capital of Dh 4 billion was to be raised in the form of issuing shares to the public, but the project seems to be on hold.

Surveys for minerals other than oil and gas have been limited in the UAE, but preliminary reports indicate the presence of mica, chromes, gypsum, copper and manganese. The only

minerals that have so far been exploited on a large scale are those needed for the cement industry.

The UAE has been keen to develop its agriculture despite the very limited arable land and water resources, and has achieved production of some vegetables in excess of local needs. Canning of such production could be expanded.

As would be expected, in view of its lengthy coastline, the UAE has a successful indigenous fishing industry, ranked fourth in the Arab world and second among AGCC states in the volume of its annual catch. With the fish catch rising, but the average catch per boat declining, the Ministry of Agriculture and Fisheries is keen to protect the fishing industry and has placed legal restraints on fishing to conserve fish stocks. Thus fish processing can expand only in a controlled way. An example is Ocean Fish Processing LLC which was allowed to be set up in 1999 as an offsets project with an initial investment of US $1.5 million.

Capital

The country has a well developed banking industry. However commercial banks are generally not geared for investment in industry. The UAE created the Emirates Industrial Bank (EIB) in 1982 to finance industrial projects set up within the UAE and in which participation of nationals is at least 51 per cent. The participation of the bank can be up to 60 per cent of the project capital or 20 per cent of the bank's total paid capital, whichever may be lower. The bank charges 4 per cent interest plus .5 per cent administrative charges. The bank gives priority to projects using modern technology and which are capital-intensive rather than labour-intensive. It also gives priority to projects that use local raw materials and produce import-substitution goods. By the end of 1997 the bank had approved 225 projects with total loans of Dh 1439 million.

The General Industries Corporation in Abu Dhabi also created a fund of Dh 100 million for the encouragement of industrial projects in the emirate. The fund can participate with up to 50 per cent of the capital of an industrial project. It employs the same criteria as the EIB when assessing projects for approval and projects are given priority on similar grounds.

As a further stimulus to diversification, Abu Dhabi operates an offsets programme which aims to encourage small, medium and large industrial projects. The UAE has made it a condition that foreign companies bidding for lucrative defence contracts should invest a portion of the value of the deal in joint venture projects with local partners. The programme is managed by the UAE Offsets Group (UOG). Under the programme, foreign defence firms are entitled to hold a stake of up to 49 per cent in the joint ventures. Projects must generate added value within seven years. Between 1992 and 1999 the project financed 31 projects, 17 of which were in operation with a total investment of about Dh 2 billion. The projects include The Oasis International Leasing Company for leasing aircraft, TABREED for developing innovative cooling systems, a plant for manufacturing fire-fighting materials and a fish processing company. In 1999 UOG also announced its participation in the Dolphin project.

Finally one must remember that the UAE now has a large number of experienced businessmen who in the past would have engaged mainly in trade and contracting. In recent years many of these have gained some industrial expertise, and have set up small and medium factories and even a few larger ones.

Policy

The development of industry in a country is affected considerably by legislation and policies of central and local governments. The UAE Government has promulgated laws for the organization of industry and labour. The main legislative instrument governing industrial affairs is Federal Law No. 1 of 1979. Local industrial production is defined in this law as one in which the local part of the manufacturing costs is not less than 25 per cent of the total. The law applies to all industrial projects other than federal government projects, oil and gas extraction and refining, mineral raw materials refining, and small projects with a fixed capital less than Dh 250,000 or employing not more than ten persons. The law appoints an industrial committee under the chairmanship of the Minister of Finance and Industry, the membership of which includes the under-secretaries of the ministries of Finance and Industry, Economy and Commerce, Planning, Labour and Social Affairs, Petroleum and Mineral Resources, and Electricity and Water, plus a citizen from each emirate, and two UAE industrialists. The committee studies applications for setting up industrial projects and exemptions and incentives requested, and decides by majority. The law requires at least 51 per cent of the capital to be local, and that the manager and the majority of the board of directors also be UAE citizens.

According to the law, projects are considered in the light of:

- Requirements of the economic and social plan, and the industrial development programmes in the country.
- Agreements with Arab countries.
- Local consumption requirements and import substitution.
- Extent of availability of local raw materials to be used in the manufacturing process.
- Possibility of carrying out the project in one of the areas chosen by the Government.

Because the UAE is a strong believer in laissez-faire economics, there has been a lack of protection for local industry despite strong pressure from these industries in the early days of industrialization. The lack of protection has, in fact, forced local industries to ensure that their products are of high quality in order to compete with imported goods.

Law No. 1 of 1979 stipulates that industrial projects should employ a minimum of 25 per cent of local employees. However, the Minister of Finance and Industry may decide to reduce or waive this ratio if sufficient citizens are not available and, in fact, UAE industries have still not been able to achieve this minimum.

In 1986, Ministerial Decision No. 51 was passed whereby local products equivalent in quality to foreign products but up to 10 per cent more in price were to be given preference in government purchases.

A federal labour law was issued in 1980 (Law No. 8 of 1980) which governs the rights, responsibilities and duties of employers and employees. It covers both indigenes and expatriates but it does not apply to government employees, small establishments employing not more than five people, or domestic servants. The law covers such matters as contracts, minimum wages, working hours, vacation, sickness benefits, training, disciplinary code and work disputes. Trade unions are not permitted in the UAE.

Other laws related to industry include Federal Law No. 14 for the year 1976 regarding the establishment of the Department of Standards and Specifications, and Federal Law No. 44

for the year 1992 for the regulation and protection of the industrial ownership of inventions and designs. There are also various laws related to industry such as environmental and health and safety laws and regulations issued by the local governments, the free zone authorities or by the Federal Environmental Agency. Industrial projects that wish to manufacture medicines have to obtain the prior approval of the Ministry of Health.

Conclusion

In this final section we suggest some general strategies that could be suitable for industrialization in the United Arab Emirates.

Because of the small population base and the availability of capital, industrialization should be capital-intensive. A sophisticated or high-tech industrial sector requires a highly trained and educated labour force. The spread of education, including tertiary education and, in particular, higher colleges of technology, should be able to produce nationals with the required skills. However, it is necessary to ensure that the education system is modern and fully related to the requirements of the work market. The education system has tended in the past to depend on learning by heart rather than on developing creativity and innovation.

The Government should think of establishing a higher authority for scientific research. The federal or local governments should seriously consider establishing science parks near the universities or industrial centres. These should include what are known as incubators for innovative young educated nationals to develop their technical ideas into commercially viable innovations. The Internet-City project recently started in Dubai is intended as one such science park. There is also a project in Abu Dhabi called CERT (Centre for Excellence in Research and Technology) built on the Higher College Technology Campus and this centre concentrates on high-tech training.

Industries depending on hydrocarbons should be the spearhead of industrial development in the UAE. However the UAE should coordinate its efforts in this field with GCC countries and other oil-producing Arab countries in order to avoid over-duplication of projects with subsequent negative effects on prices and sales. The UAE should also coordinate research activities in this field with the other GCC countries with a view to making the region one of the most advanced in the world for the development of new materials and processes in the petrochemical industry.

The UAE should develop certain industries whose products are particularly required by the region. Examples of the fields that could be investigated are desalination, solar energy and air-conditioning. The region imports desalination and air-conditioning plants at great cost. Research may lead to the development of more effective ways of desalination. The Gulf countries could focus on fields such as the ones mentioned above and work together on related R & D projects.

The creation of a federal body or association for the free zones in the UAE could be beneficial to all of them. Coordination of effort in fields such as those related to environment and customs would facilitate the achievement of more sustained industrial development.

Bibliography

Abduljabber, M. 'The Cement Industry in the Arab Gulf States', *The Arab Gulf Journal*, April (1984) pp 65–69.

Abdulla, Matar A. *The Defect in the Composition of the Population of the United Arab Emirates and Ways to Correct it*, Sharjah, Dar Al-Khaleej (1999) (in Arabic).

Ahmed, Adam Mahdi 'Encouragement of Industry in Abu Dhabi', paper presented (in Arabic) at a seminar in the Department of Planning, Abu Dhabi, November (1998).

Ali, Taleb Fadel, *A General Scope for the Establishment of Free Zones in G.C.C. Countries in the Light of the UAE Experience*, Arabia Gulf University, Bahrain, unpubl. MA thesis, (1998) (in Arabic).

Al-Otaiba, M.S. *The Economy of Abu Dhabi*, Beirut, Commercial and Industrial Press (1970).

The Arab Organization for Industrial Development, 'Review of the Present Situation of the Petrochemical Industry in the Arab Countries', paper presented at the *Integration of the Arab Petrochemical Industry Seminar*, Bahrain, January (1986) (in Arabic).

Birks, J.S. and Sinclair, C. *Arab Manpower*, London, Croom Helm (1980).

Chenery, H.B. 'Patterns of Industrial Growth', *American Economic Review*, vol. 50, (1960) pp 624–654.

Chenery, H.B., Robinson, S. and Syrquin, M. *Industrialization and Growth: A Comparative Study*, London, Oxford University Press (1986).

Currency Board (UAE), 'Industrialization and Import Substitution in the United Arab Emirates', *Bulletin*, vol. 6, no. 2, June (1980) pp 55–72.

Diwan of HH Crown Prince, Abu Dhabi, *Development Indicators in the UAE: Achievement and Expectations* (1996) (in Arabic).

Dubai Chamber of Commerce and Industry, 'Dubai Industrial Survey: Analysis and Conclusions' in *Trade and Industry*, vol. 9. no. 10, March (1984) pp 16–28.

Emirates Industrial Bank (EIB), 'An Appraisal of the United Arab Emirates Cement Industry', *Journal of the Emirates Industrial Bank*, vol. 1, no. 2, December (1986) pp 10–12 (in Arabic).

EIB, 'The Beverage Sector in the United Arab Emirates', *Journal of the Emirates Industrial Bank*, vol.2, no. 1, January (1987) pp 13–15.

EIB, 'Appraisal of Tile Manufacturing in the United Arab Emirates', *Journal of the Emirates Industrial Bank*, vol. 2, no. 5, May (1987) pp 40–42 (in Arabic).

EIB, 'Blocks Manufacturing in the United Arab Emirates', *Journal of the Emirates Industrial Bank*, vol. 2, no. 7, July (1987) pp 52–54 (in Arabic).

EIB, 'Production of Plastic Goods in the United Arab Emirates', *Journal of the Emirates Industrial Bank*, vol. 2, no. 9, September (1987) pp 64–66 (in Arabic).

EIB, 'Food Processing Industry in the United Arab Emirates', *Journal of the Emirates Industrial Bank*, vol. 2, no. 11, November (1987) pp 73–75.

EIB, 'United Arab Emirates Beverages Manufacturing Sector', *Journal of the Emirates Industrial Bank*, vol. 3, no. 1, January (1988) pp 85–87.

EIB, 'United Arab Emirates Dairy Processing Industry', *Journal of the Emirates Industrial Bank*, vol. 3, no. 3, March (1988) pp 97–99.

EIB, 'The UAE Paint Industry', *Journal of the Emirates Industrial Bank*, vol. 10, no. 3, March (1995) pp 636–638.

EIB, 'Steel Manufacture in the UAE', *Journal of the Emirates Industrial Bank*, vol. 10 no. 9, September (1995) pp 684–686.

EIB, 'Mild Steel Rods and Bars Manufacturing in the UAE', *Journal of the Emirates Industrial Bank*, vol. 11, no. 1 January (1996) pp 721–723 (in Arabic).

EIB, 'Development in Oil Refining Industry in the UAE', *Journal of the Emirates Industrial Bank*, vol. 11, no. 11 October (1996) pp 793–795 (in Arabic).

EIB, Annual Report (1997).

EIB, 'Oil Refining Industry in the GCC Countries', *Journal of the Emirates Industrial Bank*, vol. 12, no. 9 September (1997) pp 881–883 (in Arabic).

EIB, 'G.C.C. Economic Performance during the Oil Crisis in 1986 and 1998', *Journal of the Emirates Industrial Bank*, vol. 13, no. 1, December (1998) pp 913–915 (in Arabic).

Fagan, J. 'The Drought after the Flood', *Gulf Construction*, May (1983) pp 5-7.

Federation of UAE Chambers of Commerce & Industry, 'Main Problems Suffered by Industrial Establishments at Emirate and State Levels', (1983) (typed report in Arabic).

Ghanem, S.M. *Industrialization Problems in the UAE with Particular Reference to the Shortage of Indigenous Skilled Manpower*, University of Wales, unpubl. Ph.D. thesis (1989)

Ghanem, S.M. 'Economy of the UAE before Oil', *UAE Digest*, UAE, July (1990) pp 26–27.

Ghanem, S.M. 'The Learning Process', *UAE Digest*, November (1990) pp 26–27.

Ghanem, S.M. 'UAE Industrialization and Its Problems', *Economic Horizons*, UAE, July (1990) pp 103–143.

Ghanem, S.M. 'Industrialization in Dubai', *Arab Industry* vol. 11, no. 3/4 (1990) pp 5–6.

Ghanem, S.M. 'An Outline of the Economy of the UAE', *Economic Horizons*, UAE, January (1991) pp 73–94.

Ghanem, S.M. 'Population and Manpower in the UAE', *Economic Horizons*, UAE, July (1991).
Ghanem, S.M. 'The Development of Industrial Human Resources with particular reference to the UAE and the Gulf', *Economic Horizons*, UAE, April (1992) pp 133–175.
Ghanem, S.M. *Industrialization in the United Arab Emirates*. Avebury, Gowerhouse, UK, (1992).
Ghanem, S.M. 'Industrial Development in the UAE', *Industry and Development*, UNIDO, Vienna, July (1992) pp 67–101.
Ghanem, S.M. 'Jebel Ali Free Zone: Some Environmental and Social Aspects'. Paper presented at the *Twelfth Annual Meeting of the International Association for Impact Assessment* at World Bank, Washington DC, August (1992).
Ghanem, S.M. 'Jebel Ali Free Zone: Environmental and Social Aspects', *Economic Horizons*, UAE, January (1993) pp175–185.
Ghanem, S.M. 'The First 30 years of Industrial Schools in the UAE', *The Higher Colleges of Technology Journal*, vol. 3, issue 1, (1998) pp 101–115.
Ghanem, S.M. 'The Future of U.A.E. Industry', *Cultural and Scientific Association Al-Owais Prize Annual Book* (1999) pp 19–68.
Ghanem, S.M. 'The Development of the Industrial Sector in the United Arab Emirates after the Discovery of Oil', *Emirates Today*, no. 319, 18 March (2000) pp 70–73 (in Arabic).
Ghanem, S.M. 'The Development of Oil Refining in the Gas Industry in the United Arab Emirates', *Emirates Today*, no. 320, 25 March (2000) pp 74–75 (in Arabic).
Ghanem, S.M. 'Its Rationale, Resources and Industry in the United Arab Emirates', *Emirates Today*, no. 321, 1 April (2000) pp 70-73 (in Arabic).
Ghanem, S.M. 'Human and Technological Constraints Confronting Industrial Development in the United Arab Emirates', *Emirates Today*, no. 322, 8 April (2000) pp 70–73 (in Arabic).
Ghanem, S.M. 'A Futuristic View of the Strategy for Industrial Development in the United Arab Emirates', *Emirates Today*, no. 323, 15 April (2000) pp 72–74 (in Arabic).
Guedes, Manicio & Formica, Piero, *The Economics of Science Parks*, ANPROTEC, IASP, AURRP, Brazil (1996).
Gurdon, C. , 'Cement and Building Materials', *Arab Industry Review 1986–1987* (1987) pp 87–92.
Hamdan, S.A.L. 'Industrial Activity in the State', *Industrial Affairs*, no. 61, 16th Year, March (2000) (in Arabic).
Ibrahim, Mohammed, A. *The Place of the Free Zone in Economic Development: The Example of the United Arab Emirates*, Ph.D. thesis, University of Durham (1994).
Institute for Applied Economic Geography, *The Dubai Handbook* (1987).
Kay, J. 'Industry Review: United Arab Emirates', *Arab Industry Review* 1986–1987 (1987) pp 219–226.
Karam, A. *Arabs in Front of the Challenge of Technology*, Kuwait, The National Council for Culture, Arts and Literature (1982) (in Arabic).
McHale, T.R. 'The Hydrocarbon Processing Industry in the GCC – Its Economic and Political Future in a Changing World Market Place', *Journal of Energy and Development*, Autumn (1982) pp 99–108.
Ministry Finance and Industry (UAE), 'Economic Indicators Concerning Beverages and Mineral Water Industries in the United Arab Emirates', paper presented to the *Seminar on the Beverage and Mineral Water Industry in the Arab World*, Dubai, 16–18 February (1986).
Ministry Finance and Industry (UAE), 'The Industrial Directory' (1996) (in Arabic).
Ministry of Information and Culture, *United Arab Emirates Year Book*, (1999).
Ministry of Planning, UAE, *First Five Year Economic & Social Development Plan Project*, 1981–85 (1981) (in Arabic).
Ministry of Planning, UAE, *Annual Industrial Production Statistics–1981* (1983).
Nawar, Abdul Hamid, 'The Economic Role of Free Zones in the UAE', *Economic Affairs Journal*, Abu Dhabi, November (1998) (in Arabic).
Organization of Petroleum Exporting Countries, *Annual Statistical Bulletin* 1980 Vienna (1980).
Organization of Petroleum Exporting Countries, 'United Arab Emirates: Progress Through Partnership', *OPEC Bulletin*, vol. 15, no. 1 February (1984) pp 20–31 and p 78.
Parsons-Harland Bartholomew & Associates Inc, *Final Report – Special Study for Industrial Development Dubai Emirate Structural Plan*, July (1994).
Sakr, N. *The United Arab Emirates to the 1990s: One Market or Seven*? London, Economist Intelligence Unit (1986).
Sharafi, Abdullah, 'Industrial Development in the United Arab Emirates', (paper presented to the Dept. of Planning, Abu Dhabi, November (1998).
Shihab, M. 'Industrial Development in the United Arab Emirates', *Cultural & Scientific Association Al-Owais Prize Annual Book*, (1990) pp 53–108 (in Arabic).
Shihab, M. 'Social and Economic Changes in the United Arab Emirates' in: Ghareeb, E. and Al Abed I. (eds), *Perspectives on the United Arab Emirates*, (1st edition) London, Trident Press (1997) pp 290–300.
Smith, Michael et al., *Asia's New Industrial World*, UK, Methuen (1985).
United States Energy Information Administration, 'United Arab Emirates' in: Energy Information Administration, December (1999).
Zahlan, A. *The Technological Depth of Arab Unity*, Beirut, Arab Unity Studies Centre (1981) (in Arabic).