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REPORT + DOCUMENT

THE BUILDING MATERIALS INDUSTRY

IN THE ESCWA REGION

AN OVERVIEW

## I. INTRODUCTION

The building materials industry, in general, has a low value added content and worker productivity. Nevertheless, the sector played a vital role during the expansion of construction activities experienced in the ESCWA region during the late 1970s and early 1980s. Thus, with a few exceptions, the development of building materials industrial projects is a recent phenomenon in the region.

Before the construction boom, building materials had a small share in the manufacturing sector. Builders relied mainly on local production and the use of materials produced in-situ was widespread. The pace of construction activities was slower which allowed the use of traditional technologies and materials. By the end of the 1970s, a radical change had taken place in the area. Major construction projects were being implemented throughout the region. Roads, bridges, dams, airports, hospitals, schools, and housing developments were built at a very fast pace. Demand for building materials increased sharply for a number of years, and governments tried to reduce expenditure on imported materials by stimulating, through investment, the expansion of the local industry. Thus, simultaneously with construction projects, industrial projects began to be implemented. There were even cases where building materials factories were established with one single construction project in mind.

The building materials industry in existence at the moment in the countries of the ESCWA region is, to a great extent, the result of those years of intensive construction activity. Planning and co-ordination of the industry seemed to have played a small role in its expansion and, therefore, a

closer look at the structure and organization of this sector is now of vital importance.

## II. MINERAL RESOURCES

The ESCWA region has a wealth of metallic and non-metallic minerals that can be used as inputs in the building materials industry. Most of the largest deposits of building-related minerals are concentrated in the western part of the region. Nevertheless, as shown in table 1, deposits of this type of minerals are known to exist in almost all the countries of the region. However, detailed information on the extent and quality of the reserves is available only for a few of the deposits. Also, industrial exploitation occurs in very few areas and is usually concentrated on those minerals used in the production of cement or iron and steel products.

The single most important metallic mineral for the building materials industry in the region is iron. Although there are about three billion tonnes of iron ore in the region today, and further large quantities are known to exist, no substantial exploitation takes place yet. The iron and steel industry in the ESCWA region relies mainly on imported raw material. The largest deposits of iron ore are located in Saudi Arabia and in Egypt. Estimated reserves in Saudi Arabia are in the order of two billion tonnes while Egypt has more than 500 million tonnes. Other important deposits have been found in the Syrian Arab Republic (145 million tonnes), Democratic Yemen (100 million tonnes), Lebanon (34 million tonnes), and Iraq (30 million tonnes).

Total known reserves of gypsum in the region amount to about 146 million tonnes with Egypt and Iraq each accounting for about 35 per cent of the total. Other important deposits exist in Jordan, the Yemen Arab Republic, and the Syrian Arab Republic. Gypsum is also known to exist in Democratic Yemen, Bahrain, Oman, and Saudi Arabia.

Clay/kaolin has been found in almost all the countries of the ESCWA region and known reserves total nearly 700 million tonnes. The largest deposits are located in Jordan which has reserves estimated at about 450 million tonnes while Egypt has approximately 200 million tonnes.

With the exception of Bahrain, all the countries of the region have substantial limestone reserves that amount to three billion tonnes. Iraq alone has more than 1.6 billion tonnes. Democratic Yemen and Egypt also have large reserves -700 and 600 million tonnes, respectively.

The ESCWA region has exceptional reserves of good quality sandstone and sand. Egypt, with nearly 30 million tonnes, has the largest known reserves of white and quartz sand although vast quantities of unmeasured deposits are known to exist. Democratic Yemen has a small reserve of 3.3 million tonnes. Jordan has abundant but unestimated reserves of high-quality sand. Deposits in the Syrian Arab Republic contain large quantities of quartz sand and sandstone. Both Iraq and Saudi Arabia also have large deposits of sand, especially glass sand.

A great variety of structural, ornamental, and monumental building stones exists in the ESCWA region. In Saudi Arabia alone, more than 100 marble deposits have been identified. Jordan also has large reserves of different

types of marble and other building stones, while Egypt has considerable deposits of marble, Egyptian alabaster and granite.

Table 1. Mineral deposits for the building materials industry

Country	Gypsum	Clay/ kaolin	Lime- stone	Sand/ sandstone	Building stone	Marble	Iron ore
Bahrain	X	X	-	X	X	X	-
Democratic Yemen	X	X	X	X	X	-	X
Egypt	X	X	X	X	X	X	X
Iraq	X	X	X	X	X	X	X
Jordan	X	X	X	X	X	X	X
Kuwait	-	X	X	X	-	-	-
Lebanon	-	X	X	-	-	-	X
Oman	X	X	X	X	X	X	-
Qatar	-	-	X	X	X	-	-
Saudi Arabia	X	X	X	X	X	X	X
Syrian Arab Republic	X	X	X	X	X	X	X
United Arab Emirates	X	-	X	X	X	X	-
Yemen Arab Republic	X	X	X	X	X	X	-

Source: United Nations Economic and Social Commission for Western Asia. Status of the building materials and construction industries in the ESCWA region (E/ESCWA/HS/85/6) (Baghdad, 1985).

### III. MANUFACTURED BUILDING MATERIALS

The structure and organization of the building materials industry vary greatly among the countries of the ESCWA region. Some countries like Kuwait and Bahrain rely almost completely on imports to satisfy the local demand for construction materials, while other countries such as Egypt and the Syrian Arab Republic have an abundance of natural resources and, in one sense, a more or less diversified building materials industry. A common characteristic, however, is the dominance of cement and iron and steel products.

Since the late 1970s, when demand for cement from the rapidly expanding construction sector had to be satisfied mainly through imports due to the low level of local production, major emphasis has been placed by the countries of the region on the expansion of their production capacity. Between 1975 and 1985, the total cement production capacity of the region increased from 12.5 to 62.9 million tonnes per year, that is, there was a fivefold increase in ten years. By 1985, installed capacity in the ESCWA region was more than 99 per cent of the apparent cement consumption for the area, while several countries had capacities that far surpassed their consumption. In fact, it has been estimated that by 1990 the majority of the ESCWA countries will be have the capacity to be not only self-sufficient but also exporters of cement. Actual production also increased over the same period, though at a slower pace (see table 2). Production in 1985 was estimated at 44.5 million tonnes while in 1975 it was 11 million tonnes.

This difference in growth rates indicates one of the major problems facing the cement industry in the region, that is, oversupply. Up to the mid-1980s the main emphasis within the construction sector was on large infrastructural projects that obviously required enormous amounts of cement. Thus, the expansion of production capacity came as a response to the requirements of these type of projects. However, with the completion of most of these projects and the decline in oil revenues that has hindered the planning of large new works, housing is bound to become the major concern of the construction sector and, therefore, demand for cement is expected to decrease.

A clear example of this decrease in demand for cement can be seen in Saudi Arabia, the main cement consumer in the region that accounts for more than 30 per cent of the total regional consumption. Projections made at the beginning

of 1980s indicated that in 1985 cement consumption in Saudi Arabia would reach 27 million tonnes while actual consumption for that year was a little over 15 million tonnes.

Table 2. Cement consumption in ESCWA countries (1985)  
(Thousands of tonnes)

Country	Installed capacity	Actual production	Consumption	Production as a percentage of consumption
Bahrain	450	220	781	28.2
Democratic Yemen	350 <sup>a/</sup>	-	400	-
Egypt	11,950	7,600	16,000	47.5
Iraq	17,800	11,500	11,250 <sup>b/</sup>	102.2
Jordan	4,200	2,067	1,716	120.5
Kuwait	2,100 <sup>c/</sup>	1,070	2,565	41.7
Lebanon	3,000	1,250	1,300	96.2
Oman	850	657	1,746	37.6
Qatar	330	335	371	90.3
Saudi Arabia	9,160	10,167	15,166	67.0
Syrian Arab Republic	7,330	5,000	4,990	100.2
United Arab Emirates <sup>d/</sup>	9,300	4,800	1,800	222.2
Yemen	1,050	650	1,300	50.0
TOTAL	62,770	44,500	59,385	74.9

Source: Data compiled by ESCWA from national and international sources.

<sup>a/</sup> In the projection state.

<sup>b/</sup> 1984.

<sup>c/</sup> Grinding capacity only.

<sup>d/</sup> 1986.

Cement producers, specially in the Gulf countries, have tried to counteract the decrease in local demand by making efforts to increase exports. However, to a certain extent these efforts have been discouraged by the move towards self-sufficiency in potential regional markets as well as by tariff barriers and unfavourable dollar exchange rates in markets outside the region. Two consequences of the cement glut affecting the region have been

the decrease in productivity, as factories cannot work at full capacity and the shelving of new projects, like the expansion of the cement factory in Qatar.

Ten of the ESCWA countries had an iron and steel production capability in 1985. Production in the region started in 1949 in Egypt. It was followed by an expansion of capacity again in Egypt and continued with the recent construction of plants in Qatar, Iraq, Saudi Arabia, Kuwait, and the remaining countries in the region, with the exception of the two Yemens and Oman. The overall designed production capacity of the region stands at about five billion tonnes per year, with Egypt accounting for 40 per cent of this figure. Other countries with large production capacities are Saudi Arabia (950 thousand tonnes per year) and Iraq (455 thousand tonnes per year). The actual production of construction-related iron and steel products, i.e. reinforcing bars and wires, sections and flat products was 2.2 million tonnes in 1983, the last year for which actual output data is available. Reinforcing bars represented more than 60 per cent of the total figure.

Some countries in the region, specially Qatar, the United Arab Emirates, Saudi Arabia, and Kuwait are among the world's greatest per capita consumers of iron and steel products owing to the high levels of construction compared with their small populations. More than 50 per cent of the iron and steel products consumed in the ESCWA region is imported and even those which are locally produced require imported raw materials for their production. In the Gulf countries local production satisfies only 10 per cent of total consumption. The need to import steel products springs not only from the high level of demand, but also from the lack of diversity of the steel

industry: cold and flat products are produced only in Egypt, no country produces seamless tubes, while reinforcing bars and sections are produced in all countries.

Table 3. Consumption of iron and steel products in selected countries of the ESCWA region, (1985)  
(Thousands of tonnes)

Country	Capacity	Production	Imports	Exports	Consumption
Egypt	1,910	592	3	-	595
Jordan	396	136 <sup>a/</sup>	170	3.4	303
Kuwait	160	76 <sup>b/</sup>	544 <sup>c/</sup>	59.9	560
Qatar	330	504 <sup>a/</sup>	63	503.7	63
Saudi Arabia	940	1,162 <sup>a/</sup>	2,844	-	4,006
Syrian Arab Republic	140	89 <sup>a/</sup>	438	-	527

Source: Data compiled by ESCWA from national and international sources.

<sup>a/</sup> Reinforcing bars only.

<sup>b/</sup> Metal pipes.

<sup>c/</sup> 1984.

As was indicated before, a large portion of the demand for building materials in the ESCWA region is satisfied through imports. The importance of imports in local consumption varies from country to country according to the level of local production for each material. However, the fact remains that, at the regional level, expenditure on imported construction materials is very high. Table 4 shows the value of building materials imported by selected countries of the region in 1985. For those countries included in the table, the value of imported building materials reached more than \$US 9.5 billion with Saudi Arabia and Egypt alone accounting for more than 50 per cent of this figure. Data on the value of total imports is not available for all countries but it is estimated that the share of building materials in total imports varies between 5 and 20 per cent. For example, in 1985 construction materials respectively accounted for 18.7 and 17.0 per cent of the value of total

imports in Bahrain and the Syrian Arab Republic. On the other hand, while imports of this type of materials in Saudi Arabia amounted to almost \$US 3 billion in the same year, in fact it represented less than 12 per cent of the total value of imports; in Egypt, it represented 4.7 per cent of the total.

It is also interesting to observe in table 4 that, as with local production, imports of building materials in 1985 were dominated by cement and iron and steel products. The latter alone accounted for more than 44 per cent of total imports while cement, in spite of being a relatively cheap material, represented more than 8 per cent. In other words, cement and iron and steel products accounted for more than 50 per cent of total regional expenditure on imported building materials, despite the fact that most of the countries of the region made large investments in an attempt to expand their production capacities in one or both types of material. However, it is important to note that not all of these imports originated outside the region. Intra-regional trade has played an increasingly important role in the region, especially since several countries have production capacities far greater than their local consumption requirements, as is the case in cement production in the United Arab Emirates, or steel bars and rods in Qatar.

Table 4. Value of imports of building materials in selected countries of the ESCWA region (1985)  
(thousands of US dollars)

	Bahrain	Egypt	Iraq	Jordan	Kuwait	Lebanon	Oman	Qatar	Saudi Arabia	Syrian Arab Republic	United Arab Emirates	Total
Wood simply worked	1,886	454,607	52,666	10,818	8,430	1,930	24,700	6,342	111,981	3,643	15,436	692,439
Stone, sand and gravel	1,723	7,339	1,713	1,088	3,827	3,827	3,846	2,103	23,980	1,246	4,425	52,648
Paints, lacquers, etc.	13,758	28,797	21,966	3,146	11,017	6,160	12,754	6,646	87,867	5,591	18,567	216,269
Builder's carpentry <sup>a/</sup>	3,282	1,066	26,295	2,791	3,476	1,858	-	1,272	53,896	702	3,873	98,511
Veneers, plywood, panels, etc.	17,359	86,510	21,570	8,734	11,939	2,907	24,980	6,585	92,404	4,562	8,460	286,010
Cement	43,266	469,451	8,342	805	44,541	3,813	72,329	1,373	147,286	6,053	8,833	807,092
Building and monumental stones	8,090	2,061	4,746	473	34,647	5,652	7,321	4,222	155,321	5,195	17,045	244,773
Clay and refractory materials	8,940	40,461	23,469	11,186	13,759	11,020	24,826	8,143	99,478	22,282	17,578	281,142
Articles of cement <sup>b/</sup>	3,988	240	1,855	220	6,719	528	-	535	67,384	3,077	2,219 <sup>c/</sup>	86,765
Iron and steel bars and rods	23,277	517,981	145,362	6,809	34,483	38,607	55,090	5,343	218,952	130,751	33,297	1,209,952
Iron and steel angles and shapes	-	16,809	95,709	2,638	7,285	3,319	d/	2,782	48,028	10,800	12,548	199,918
Iron and steel plates and sheets	7,843	138,240	97,522	16,552	34,588	-	15,717	4,400	140,575	58,428	34,246 <sup>c/</sup>	548,111
Iron and steel tubes and pipes	29,644	80,084	190,810	31,533	113,408	-	128,734	14,286	527,236	69,479	165,879	1,351,084
Iron and steel structures	71,176	186,183	152,182	34,147	74,195	-	60,098	7,594	340,768	13,737	45,832	985,912
Aluminium products <sup>e/</sup>	2,624	12,030	44,655	11,926	17,879	9,842	3,365	6,047	93,123	33,459	16,903	251,853
Aluminium structures	10,446	2,717	21,044	679	15,907	758	21,340	3,343	60,255	3,672	15,080	155,241
Civil engineering equipment <sup>f/</sup>	7,299	155,046	171,077	30,586	33,346	-	250,397	3,445	156,667	82,444	185,902	1,076,209
Processing machinery <sup>g/</sup>	6,021	59,205	74,896	11,311	7,647	-	16,431	2,475	39,930	19,548	10,268	247,732
Air-conditioning equipment	24,448	11,763	39,237	5,562	40,943	3,101	44,736	12,136	200,227	10,699	42,948	435,800
Sanitary fittings & fixtures <sup>h/</sup>	23,393	12,693	24,749	19,970	30,920	11,878	36,669	8,574	179,479	8,521	37,948	394,794
Total	308,463	2,283,283	1,219,865	210,794	550,307	105,200	803,833	107,646	2,844,837	493,880	698,287	9,626,075

Source: Data compiled by ESCWA from national and international sources

a/ Including wooden joinery, doors, and windows.

b/ Including articles of concrete and artificial stone.

c/ Dubai only.

d/ Figure included in iron and steel bars & rods.

e/ Including bars, rods, angles, and shapes.

f/ Including quarrying, earth removing and construction equipment.

g/ Machinery for processing raw building materials, cement, and concrete.

h/ Including plumbing, lighting, and heating fittings and fixtures.

The preceding analysis of the situation at the regional level needs to be complemented by a brief description of the main features of the building materials industry in the countries of the ESCWA region. It should be mention, however, that because of the lack of detailed information Lebanon and Palestine have not been included in this part of the study.

#### Bahrain

Natural resources for the manufacture of building materials are very limited in Bahrain. Deposits of commercially exploitable minerals are known to exist, but the extent of the reserves is not. Lime and dolomite are currently being exploited, while other raw materials are imported. About 20 factories produce building materials in the country. The main materials produced are cement, bricks, limestone tiles, concrete blocks, paints and aluminium products. Technical problems have affected the cement and iron and steel industries in Bahrain: the output/installed capacity of cement is only about 55 per cent, while operations have not yet started in the 25,000 tonnes/year iron and steel plant. All the iron and steel consumed in the country is imported.

#### Democratic Yemen

Mineral resources in Democratic Yemen consist mainly of gypsum, limestone and sandstone. Other minerals known to exist are marble, granite and a variety of building stones. Manufactured materials include cement blocks and tiles, pre-cast panels, clay bricks, and doors and windows made from imported aluminium. Prefabricated housing units are also produced, though the cement and steel used in these factories is all imported. In many parts of the

country traditional methods of construction that are based on the use of sun-baked mud bricks and stone walling still prevail.

The building materials industry in Democratic Yemen is hard pressed to satisfy the needs of the country. Significant progress has been made during the last few years but the major portion of certain basic materials such as cement still have to be imported. The country has a variety of natural resources that could be useful in the development of a strong local industry, once the location and extent of deposits are analysed in detail in order to determine their commercial potential. It is also necessary to create stronger links between industrial expansion and the actual needs of the country.

#### Egypt

Egypt has large deposits of the kind of minerals used in the building materials industry, although not all of them are being exploited. The most abundant are gypsum, clay/kaolin, limestone, sand and a variety of decorative stones such as marble, Egyptian alabaster, and granite. In addition, known reserves of iron ore amount to about 550 million tonnes, but the extent of further deposits is still unknown. Aluminium has also been found although in smaller quantities. Apart from mining and quarrying, the industrial sector also produces a range of building materials such as reinforcing steel bars, steel sheets and sections, metal structures, different types of cement, bricks, glass products, tiles, sanitary appliances and pipes made of asbestos, clay and concrete.

Egypt would appear to be far from a state of self-sufficiency in the production of most modern building materials although one of the aims of the

1981/1982-1986/1987 Five-Year Plan is to achieve self-sufficiency in products such as bricks, tiles wood products and building minerals. The Plan diagnoses the main ills of the industry as being the inappropriate linkage with the construction sector and the very low output/capacity ratios of most of the factories manufacturing building materials. Egypt's expenditure on imported construction materials ranks second in the ESCWA region after Saudi Arabia.

### Iraq

Iraq is a rich country in terms of resources it possesses for the production of building materials. Many deposits are easily accessible and extraction requires only simple technology. Minerals found in the country include clay, limestone, gypsum, marble, sand and gravel and several building stones. Reserves of iron ore have been estimated at about 30 million tonnes. Some of the materials manufactured locally are cement, red bricks, sand lime bricks, lime plastering, gypsum plaster, cement blocks, marble, glass, asbestos-cement products, concrete products and prefabricated elements such as walls and roofs .

Local production of building materials has expanded rapidly since the end of the 1970s taking advantage of the abundance of commercially exploitable natural resources. Nevertheless these efforts have been concentrated in few materials and self-sufficiency has been achieved only in bricks and cement. The construction materials industry in Iraq lacks diversification and, as a consequence the country still imports large quantities of building materials.

### Jordan

A variety of raw building materials abounds in Jordan. The country has huge quantities of clay, gypsum, limestone, building stones, high-quality sand and gravel, marble, etc. although its reserves of metallic minerals are much smaller. The manufacturing sector is highly diversified and Jordan is able to export cement, some iron and steel products, clay and glass products. Nevertheless, imports are still necessary in order to meet the local demand for certain materials such as steel reinforcing bars and primary forms and wood and aluminium products. Further expansion of the local industrial sector depends on being able to gain access to foreign markets. There is also scope for improvement in the development and further popularization of some local building technologies that are already being practiced, especially those related to the rich variety of monumental and decorative stones.

### Kuwait

The development of the a building materials industry in Kuwait is severely limited by the lack of adequate natural resources. There are no good quality rocks or minerals and the geological formations contain mainly gravel, sand and sandstone. Local factories produce cement, sand lime bricks, concrete products, and asbestos and metal pipes.

Kuwait's dependence on imports is bound to continue owing to the lack of natural resources. This does not mean, however, that development cannot occur in this industrial sector. Local industry should aim at processing of imported raw materials or at the production of finished goods from imported semi-processed materials. In fact, this shift towards the middle range of the

production process has already started. The grinding of imported clinker to produce cement and the production of prefabricated buildings from imported steel are only two examples of the changes that are occurring in the industrial structure of Kuwait. On the other hand, the dependence on imports implies that the industry is affected by factors that are totally out of national control and, therefore, that planning for industrial development has to be flexible enough to allow for fluctuations in the world market.

#### Oman

According to a study carried out on raw building materials in 1981, Oman possesses several deposits of commercial value. The main minerals are limestone, asbestos, gypsum, dolomite, clay, marble and decorative stones, sand, gravel and aggregates. Local manufactures include cement and cement products, aluminium doors and windows, wooden elements and paints. There is also limited production of bricks.

Despite the expansion of local production, Oman still depends heavily on imports. The two cement factories meet less than half of local consumption, and the production of other materials is far from sufficient to satisfy the local demand. The Government has taken several measures to encourage the expansion of local production and to protect it from external competition. These measures include special facilities and loans for the establishment of factories, exemption from customs duties on imported raw materials and a 25 per cent tax on imported manufactured materials, including cement from the Gulf Cooperation Council countries.

## Qatar

The lack of adequate natural resources has hindered the development of the building materials industry in Qatar. Sand, clay, gypsum and certain types of stones are exploited by the Government through the plants established by the Ministry of Public Works, which then sells the products to the private sector at advantageous prices. Most of the factories, however, have to rely on imported raw materials. The two major industries are the Qatar National Cement Company and the Qatar Steel Company. Initially intended as an export-oriented project, the cement plant only met about 35 per cent of total local consumption in 1981. However, by 1985 cement consumption in the country had dropped by 55 per cent, which meant that 73 per cent of the local demand could be satisfied locally. The steel factory mainly produces steel reinforcing bars. Since its opening in 1978 it has produced at well above its design capacity of 330,000 tonnes per year. Most production is for export, especially since local consumption has decreased drastically during the last few years.

Almost all the raw building materials and a large percentage of the manufactured building materials used in Qatar are imported. The light industries located in the Salwa Industrial Estate south-west of Doha are capable of producing a variety of materials, but demand far outstrips production. More than \$US 100 million were spent in 1985 to import raw and manufactured building materials such as wooden elements, marble, building stones, clay and clay products, iron ore, specialized cements, bricks and blocks and sanitary and air-conditioning equipment.

### Saudi Arabia

Saudi Arabia has a large and varied building materials sector ranging from stone quarrying to iron and steel products. In 1984, there were an estimated 460 factories producing non-metallic construction materials in the country and further 60 factories were at the implementation stage. Each major town is surrounded by quarries that produce the majority of its requirements. A steady expansion of this sector has resulted in an impressive increase in production, especially in cement and iron and steel products. However, this expansion and the slow-down in demand caused by the completion of major projects have brought the risk of over-capacity. In an attempt to reduce this risk, the Government has tried to encourage exports and the country now exports a variety of materials. Another much more effective measure was to decrease the number of loans given to the building materials sector by the Saudi Industrial Development Fund (SIDF). Thus, since 1980 the share of this sector in SIDF loans has decreased by more than 20 per cent. In spite of the conditions in the local industry, Saudi Arabia is the largest importer of building materials in the ESCWA region.

### Syrian Arab Republic

The Syrian Arab Republic has a wide range of construction raw materials. Limestone, gypsum, clay, sandstone, and sand are extensively exploited. Other materials such as building stones, aggregates, marble and decorative stones are also exploited for construction purposes. Manufactured building materials include cement (some of which is exported), iron bars, aluminium profiles, asbestos sheets and pipes, porcelain tiles, sanitary equipment, paints and glass.

The building materials sector, like other industrial sectors in the Syrian Arab Republic, has been affected by under-utilization of installed capacity, maintenance difficulties and the irregular supply of imported raw materials and spare parts for machinery. Actual production rarely meets more than 70 per cent of local consumption, although installed capacities seem to be sufficient to satisfy local demand. Thus, the Government's main concern is to increase productivity in existing factories in order to reduce expenditure in the import of building materials, which in 1985 was almost 500 million dollars.

#### United Arab Emirates

The country does not have a wealth of construction minerals. Reserves are quite small and, in general, of poor quality. Thus, the building materials industry in the United Arab Emirates is dominated by cement production. In fact, the total installed capacity of existing the cement plants in the country is approximately nine times actual consumption. There are also five iron and steel rolling mills, one major aluminium smelting plant and some fifty other building materials factories.

Since the beginning of the 1980s a shift away from construction materials has been taking place in the structure of the manufacturing sector. Between 1980 and 1984, the share of building materials in the total value added of manufacturing industries decreased by 50 per cent while employment was down by 25 per cent.

#### Yemen

The Yemen Arab Republic has an abundance of non-metallic minerals for construction purposes, though there is little information on the extent and

quality of the deposits. Minerals found in large quantities include gypsum, clay, marble, limestone and silica sand. Apart from quarrying products, the industrial sector also produces cement, bricks, cement blocks and tiles, clay bricks, paints, metallic doors and windows.

The building materials industry in Yemen, at the moment, has very good short-term prospects. The priority given to this industrial sector in the development plans together with the decrease observed in construction activities indicates that self-sufficiency in basic building materials is a real possibility within the next few years. However, at present, the future of the local manufacturing industry, including the building materials sector, largely depends on the prospects of expansion of the oil industry.

#### IV. CONCLUDING REMARKS

At the end of the 1970s, when the rapid expansion of the construction sector in the region began, the building materials industry was not prepared to provide for the needs of this expansion. Consequently, investment in manufacturing industries was concentrated in this sub-sector. The same situation developed in mining and quarrying, where the extraction of raw building materials expanded rapidly. Nevertheless, imports continued to meet a large portion of the local consumption of some basic materials such as cement.

By the mid-1980s, the production capacity of some major materials had greatly increased, to the extent that capacity was either equal or very close to demand. This expansion, however, was concentrated on cement and cement products, bricks and, in a few cases, iron and steel. Thus, as was indicated,

imports still play a major role in the provision of a great variety of materials. There have been isolated efforts to develop a diversified building materials industry in some countries of the region. For example, Jordan is capable not only of producing locally most of the materials required by its construction sector, but also of exporting cement, iron and steel products, clay and refractory products, paints, glass, and sanitary appliances. Other countries like Egypt, Iraq, and the Syrian Arab Republic have also developed a level of diversification in their local industries but they have either a large local demand or they encountered difficulties in the running of their factories. Thus, at the regional level the building materials industry has been affected by several factors, some of which are becoming evident only now that, to a certain extent, the construction boom has come to an end.

The first problem to affect the building materials industry arises from the lack of planning. In the late 1970s, the fact that this industrial sub-sector was caught unprepared for the expansion in demand meant that projects were developed at a very fast pace almost without any attempt at co-ordinating at the national level, and with very little consideration being given to the regional situation. Building materials accounted for about 50 per cent of the loans given by financial institutions to the manufacturing sector. This often led to a duplication of efforts and to over-capacity. At the same time, due to the large volume of demand for cement, a main emphasis was placed on the production of cement and cement products, while little attention was paid to other types of materials. Also, it has often been the case that technology employed in the new factories required skilled personnel that was not locally available which meant, therefore, that productivity has been much lower than expected.

Another significant difficulty is the assumptions under which building materials projects were first started. The main consideration was the level of demand at the moment the project was approved and an attempt to satisfy that demand through local production. Thus, most of the projects were based on short-term objectives. At the same time it was assumed that the level of demand would remain the same or, in the case of a drop in local demand, that exports would counterbalance the drop in local consumption. In fact, projections made at the beginning of the 1980s greatly over-estimated the future demand for construction materials. For example, cement demand in Saudi Arabia, which accounts for a major portion of total consumption in the region, was projected to reach 27 million tonnes in 1985, while actual consumption for that year was just over 15 million tonnes.

It is clear, then, that by the end of 1987, the situation will have changed radically in the entire region. Major works of infrastructure which required large amounts of materials have been completed while the recession that particularly affects the oil producing countries has delayed, sometimes indefinitely, the implementation of new projects. Construction is expected to slow down considerably during the next few years and, therefore, demand for building materials should also decrease.

Thus, the building materials industry at the moment faces major difficulties that originate, on the one hand, in technical problems related to productivity and to the supply of certain raw materials and, on the other hand, in the slow-down in construction. In addition, access to foreign markets has not been as successful as was expected, mainly because the material which most of the countries are or will be able to export is cement and, therefore, each country is facing very strong competition in marketing its own product.

Since the mid-1980s, and in the face of these difficulties, a few countries such as Saudi Arabia and Bahrain have tried to transform their industrial structure by reducing emphasis on building materials. At the same time, the countries of the Gulf Cooperation Council are trying to implement planning policies that will co-ordinate and integrate industrial projects at the regional level. Finally, more importance is being given to research on alternative construction technologies and building materials that, while helping to diversify the industry, could also make optimum use of the physical and human resources already available in the region. For example, through a joint project with the Agence Francaise pour la Maitrise de L'Energie, ESCWA has been instrumental in investigating the suitability of local clay for production of cold-stabilized (unbaked) bricks which could be used for low-cost building.

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