The U.S. International Construction Industry

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SUMMARY

Most of the construction work in a nation is typically performed by companies that are based in that nation. For a U.S. contractor to win an award in another country, it generally must offer highly specialized technological or managerial capabilities. In most cases, only highly skilled U.S. engineers and other professional employees participate in overseas projects.

U.S. construction contractors perform very well in international competition for large, technologically sophisticated projects such as petroleum and chemical plants and power generation plants. They fare less well in international competition for building construction and basic infrastructure construction such as roads and ports, areas in which U.S. firms have no strong technological or management advantage.

Rapid economic growth in Asia and South America is causing those regions to increase in importance in international construction. U.S. contractors' future success in these and other international markets will depend on a variety of considerations such as the extent to which foreign markets are open to international competition, the contractors' ability to offer financing at competitive rates, and technological capabilities. The competitive strengths of foreign affiliates will also be a major factor since such affiliates are often critical in winning foreign contracts.

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THE U.S. INTERNATIONAL CONSTRUCTION INDUSTRY

I. STRUCTURE OF THE INDUSTRY*

The international construction sector consists mainly of contractors that are based in the major industrialized countries but have operations in a number of countries. These multinational contractors compete with each other and with contractors that perform work only in the countries in which they are based. The multinational companies tend to concentrate on certain types of construction work, such as petroleum plant, power generation, or major public infrastructure projects.

Customers in international construction markets are generally large private corporations and governments. They are usually sophisticated buyers, who participate in the planning and execution of the projects.

The U.S. contractors that have been most successful in international construction work are large companies that are able to organize, manage, and obtain financing for massive projects. Of the 50 largest U.S. contractors in 1994, most gained substantial parts of their business from international work, and all but 17 had at least some international business. In contrast, of the 50 next largest U.S. contractors (ranked 51-100 in value of revenues), only 21 had international business; of the next 50 (ranked 101-150), only 9 had international business.[1]

The importance of large size and range of operations in competing for international construction business is reflected in a recent decision by Bechtel Enterprises Inc. and PG&E Enterprises (a subsidiary of Pacific Gas & Electric Co.) to form an international power company. This new company will finance, build, and operate gas- and coal-fired projects outside the United States. The company plans to have a 50 percent equity stake in most of its projects that it expects will be mainly in Asia and Latin America.[2]

Similarly, the Parsons Corp. is seeking to improve its international competitive position in the power market through the acquisition of Gilbert/Commonwealth, Inc. Observers suggest that the combined company may be better able "to take risks, assume equity positions in projects, and compete in a technology-driven international marketplace."[3]

II. PERFORMANCE OF U.S. CONTRACTORS

U.S. companies have generally dominated the list of the largest winners of international construction contracts. (See Table 1. Tables begin on page 23, below.) For example, in 1993, U.S. companies

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* The Office of Policy Development, Economics and Statistics Administration, prepared this study of the U.S. international construction industry at the request of the Commerce Department's Technology Administration (TA) in support of TA's industry benchmarking project.

[1]McGraw-Hill, ENR (May 22, 1995), pp. 46-50.

[2]McGraw-Hill, ENR (March 6, 1995), p. 11, and (March 13, 1995), p. 17.

[3]McGraw-Hill, ENR (March 13, 1995), p. 13.

accounted for 6 of the top 10 and 10 of the top 20 contract winners based on value of international contracts awarded. Similarly, in 1980 U.S. companies accounted for 7 of the top 10 and 11 of the top 20 winners, indicating little deterioration in the U.S.-based companies' dominance of the top spots.

In 1994, McGraw-Hill (a major source of data on U.S. international construction companies) began collecting data on the revenues contractors obtained from international projects. In contrast, McGraw-Hill data for the years prior to 1994 focus on the value of contract awards. As a consequence, the data for 1994 are not directly comparable to those for earlier years. However the 1994 data indicate that U.S. contractors did not rank as high that year (in terms of revenues) as they had in earlier years in (terms of value of contracts won). In 1994, the largest U.S. international contractor, Fluor Daniel, Inc., ranked fifth in terms of revenues from projects outside the home country of the contractor. The second largest U.S. contractor, Bechtel Group Inc., ranked fifteenth, and the third largest, Foster Wheeler Corp., ranked twenty-first. Fourteen European companies, four Japanese companies, and two U.S. companies were the top 20 contractors in terms of revenue.[4]

A total of 52 U.S. contractors ranked among the top 225 international contractors in 1994 based on the value of the companies' international revenues. Similarly, in 1993 American firms accounted for a total of 54 of the top 225 companies based on value of international contracts won in that year. However, the U.S. contractors' share of the revenues earned by the top 225 in 1994 was only 18.1 percent compared with a much larger 42.8 percent based on value of contracts in 1993.[5]

In terms of revenues in 1994, European and Japanese firms were the strongest international competitors. For example, of the total revenues earned by the top 225 international contractors, European contractors accounted for 49.1 percent and Japanese contractors for 21.1 percent. Korean and Chinese contractors each earned only 3.5 percent of the total.[6]

European firms dominate the foreign firms competing in the U.S. market. In 1994, European firms accounted for 81.6 percent of the revenues earned by foreign firms from projects in the United States. Japanese firms were second with 14.6 percent of the revenues.[7]

U.S. companies are especially strong in international markets for construction work relating to industrial or petroleum plants, power plants, and sewer/waste treatment plants. In each of these categories, 6 or 7 U.S. companies were among the top 10 companies in terms of value of contracts won in 1993. U.S. companies, however, have not been so successful in international work relating to building construction and water resource work. In 1993, U.S. companies accounted for only 2 of the top 10 in international building construction work (the two U.S. companies ranked 7 and 8) and for only 3 of the top 10 in international water resource work (ranking 5, 6, and 8).[8] Figure 1 shows U.S. contractors' shares in 1993 of various categories of international construction contracts.

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[4]Because of the change in the data series, it is not clear to what extent the U.S. share of the international market changed from 1993 to 1994. See McGraw-Hill, ENR (August 28, 1995), p. 83.

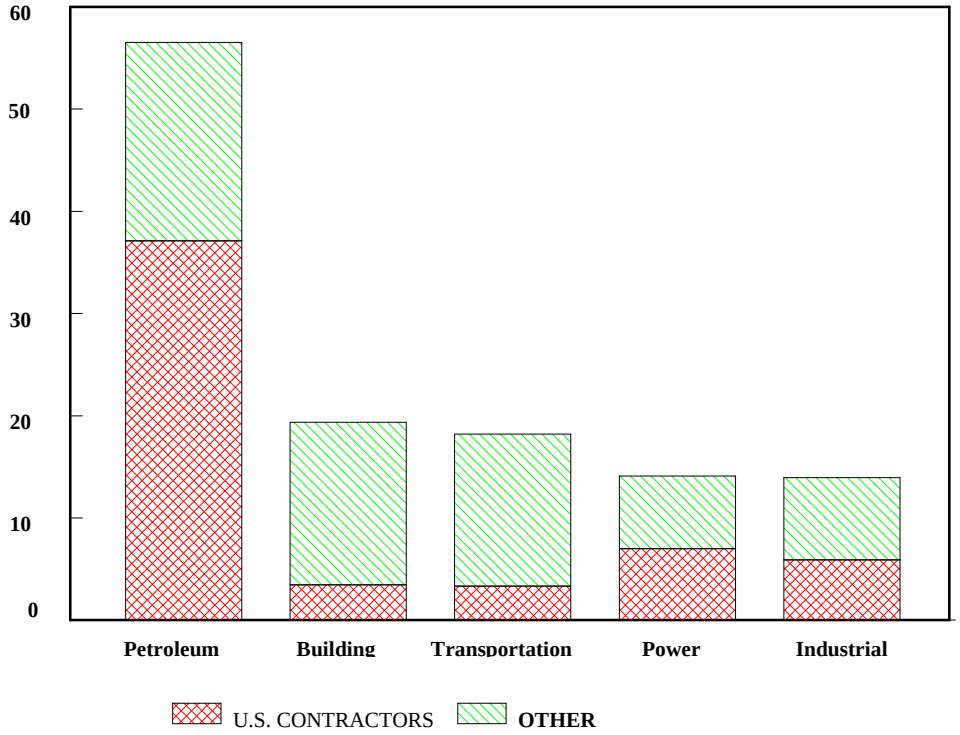
[5] McGraw-Hill, ENR (August 28, 1995), p. 37, and (August 29, 1994), p. 28. The percentages noted here were calculated by taking the value for the U.S. contractors among the top 225 international contractors ($14.8 billion in 1994) and dividing by the total value for the 225 but excluding the value accounted for by U.S. buyers ($92.2 billion minus $10.2 billion, or $82.0 billion in 1994).

[6]McGraw-Hill, ENR (August 28, 1995), p. 37. These percentages are the individual countries' shares of total international construction revenues excluding revenues from projects in the United States

[7]Ibid., p.37.

[8]McGraw-Hill, ENR (August 29, 1994), p. 30.

Figure 1
Value Of International Construction
Contracts Awarded In 1993 To Top 225 Contractors
(Billions of Dollars)



Note: These are the five largest categories in terms of value of international awards in 1993.
Source: McGraw-Hill.

U.S. contractors' relatively strong position in international industrial/petroleum projects is also reflected in revenues earned in 1994. For example, four U.S. firms were among the top ten international contractors in this field. In addition, there were three U.S. contractors (ranked 7, 8, and 9) among the top ten in terms of revenues earned for international work relating to hazardous waste. However, in the manufacturing, power, and sewer/waste areas only one U.S. contractor ranked among the top ten in international revenues, and in building, water, and transportation work, no U.S. contractor was among the top ten.[9]

U.S. contractors' strength in petroleum-related construction is important because it has typically accounted for a large share of the total international construction market. In the case of U.S. purchases from foreign contractors, in contrast, building construction accounts for a large part of the total and petroleum construction for a small part. (Tables 2 and 3.)

In 1994, there was no U.S. contractor among the ten largest in terms of total revenues earned from both domestic and international projects, and only two U.S. contractors among the 20 largest. Japanese companies dominate the list of the world's largest contractors—for example, the world's five largest contractors in 1994 were Japanese, and thirteen of the twenty largest were Japanese. Most of these very large Japanese contractors specialize in general building construction in the Japanese home market. Of the 13 largest Japanese contractors, only Mitsubishi Heavy Industries, Ltd. (which specializes in power and

[9]McGraw-Hill, ENR (August 28, 1995), p. 40.

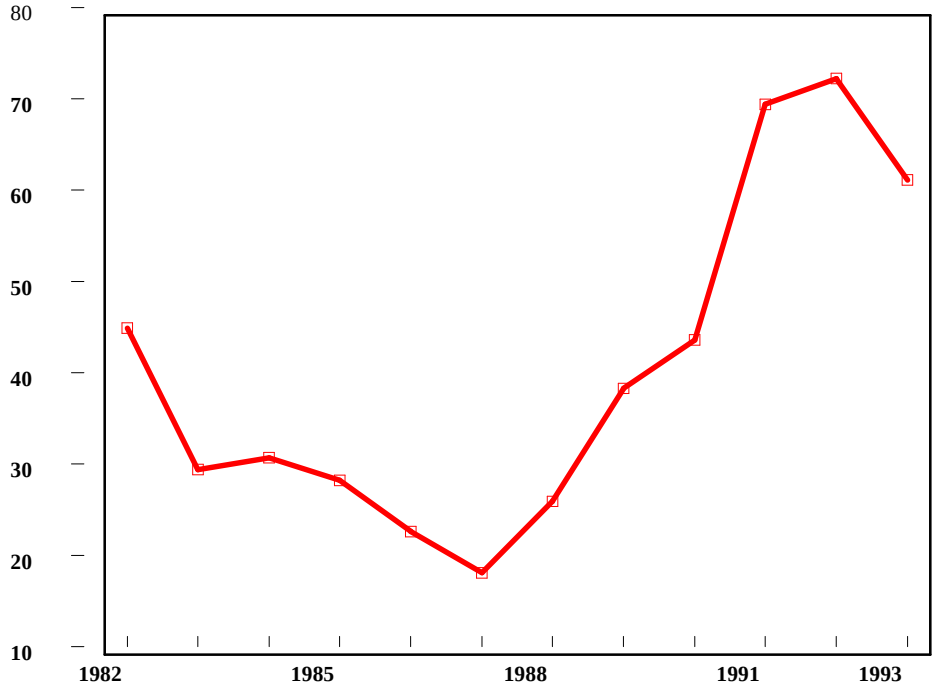
industrial/petroleum work) was among the 20 largest contractors in terms of 1994 revenues from international projects.[10]

Moreover, as the yen strengthened relative to other currencies, Japanese contractors were increasingly forced in recent years to rely on non-Japanese suppliers and workers when competing for international construction work. For example, Chiyoda has been buying 80 percent of its equipment from non-Japanese firms. To restrain costs, it does not use Japanese engineers on overseas projects and has formed joint ventures with companies in the Philippines and Indonesia.[11]

2.1 Trends in International Work of the Largest U.S. Contractors

After a period of weakness in the middle and late 1980s, the international business of U.S. construction companies increased substantially. (Figure 2.) These companies benefited from both a stronger international construction market and an increase in their share of that market that occurred in part because of the improvement in U.S. competitiveness made possible by the depreciation in the dollar relative to other currencies (Figure 3). Especially important was the increase in the U.S. share of the rapidly growing Asian market brought about in part because of accelerating Asian investment in energy projects and public infrastructure, areas in which U.S. companies are strong competitors. However, as Figure 4 indicates, U.S. contractors supply a much larger share of the Canadian and Latin American international markets than they do of the Asian market. (Tables 4, 5, and 6.)

Figure 2
International Awards to U.S. Contractors
(Billions of Dollars)



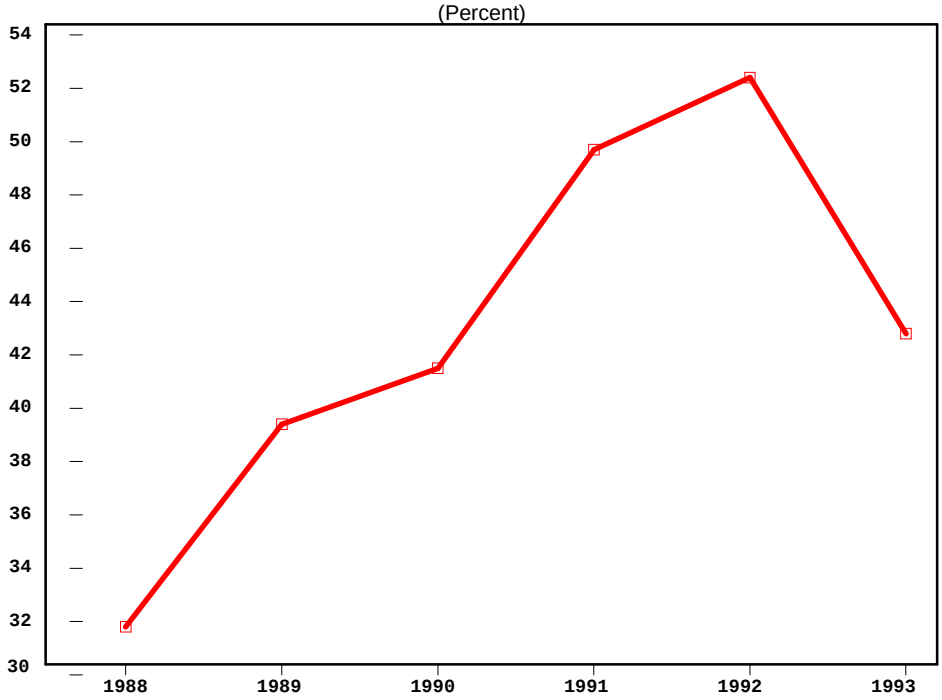
Note: Covers U.S. contractors among the top 225 (top 250 before 1991) international contractors.

[10]In U.S. dollar terms, the total revenues of Japanese construction companies have been relatively high in recent years compared with those of U.S. construction companies, in part because of the strength of the yen relative to the dollar. McGraw-Hill, ENR (August 28, 1995), pp. 83 and 99.

[11] Ibid., pp. 36-37.

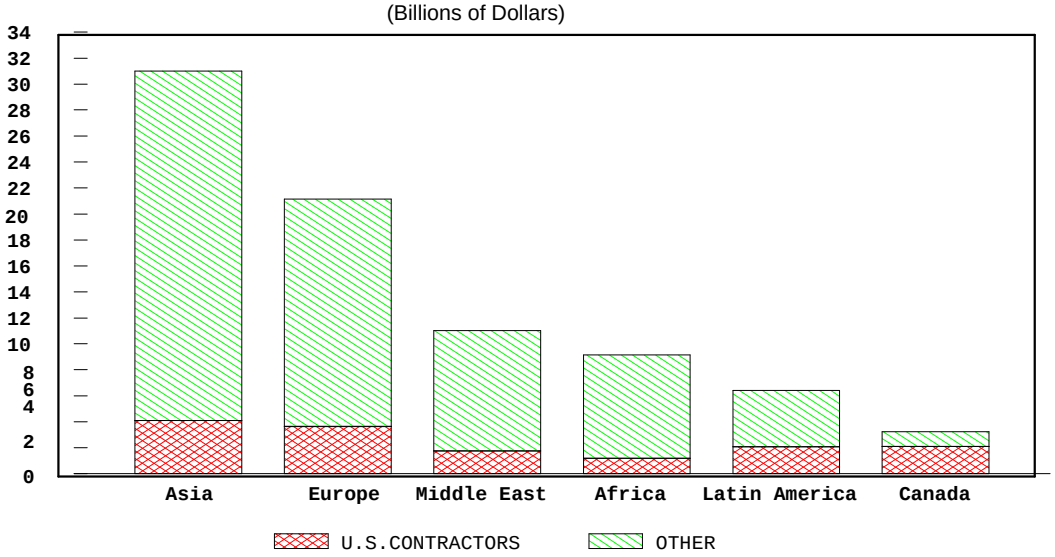
Source: McGraw-Hill.

Figure 3
U.S. Contractors' Share of Value of International Contracts Awarded by Buyers Outside the United States
(Percent)



Note: Covers contractors among the top 225 (top 250 before 1991) international contractors.
Source: McGraw-Hill. Data are not available to calculate this percentage for the years before 1988.

Figure 4
Largest U.S. Contractors' Revenues in 1994
from International Projects, by Region
(Billions of Dollars)



Note: Covers the 52 largest U.S. and the 173 largest foreign contractors in terms of international revenues in 1994.
Source: McGraw-Hill.

Other markets in which U.S. construction business increased substantially from the late 1980s to the early 1990s include the Middle East, which benefited from a rise in crude oil prices, and Latin America, which enjoyed an upturn in economic growth. However, U.S. business in the Middle East has not recovered to the peak levels stimulated by increased demand resulting from rapid petroleum price increases in the late 1970s. As Table 7 indicates, sales by U.S. companies' construction industry affiliates in the Middle East were much lower in 1993 than they were in 1982 and 1987. Moreover, economic difficulties in Mexico recently have dampened construction in that country

In 1993, petroleum and petrochemical projects accounted for the largest part of the international construction market—37 percent of the value of all international contracts and 61 percent of the value of the contracts awarded to U.S. companies.[12] (Table 8) Similarly, in 1994 such projects accounted for a large part (25.9 percent) of the revenues that the largest 225 international contractors earned from international projects. Next in importance were building (22.3 percent of total revenues) and transportation (16.8 percent), categories in which U.S. contractors are generally less internationally competitive.[13]

The United States is a strong competitor in international petroleum construction in large part because of the skills U.S. contractors have gained in the many years the United States has been a major force in petroleum production and distribution. Also, the United States has an internationally competitive petroleum equipment manufacturing sector that complements our construction industry. For example, a large part of U.S. merchandise exports to Venezuela, Nigeria, Saudi Arabia, and other major petroleum producing nations consists of petroleum-related civil engineering and contractors' plant and equipment (SITC 723).[14]

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[12] The data referred to here relate to contracts awarded in one country to contractors based in another country. Only contracts awarded to the top 225 international contractors are covered. See McGraw-Hill, ENR (August 29, 1994), p. 26.

[13] ENR (August 28, 1995), p. 42.

[14] U.S. Department of Commerce, International Trade Administration, U.S. Foreign Trade Highlights 1994 (September 1995), pp. 160, 182, 184.

In 1993, 28 Japanese contractors were among the top 225 international contractors. These Japanese contractors won international awards valued at only about a third of the international awards to the 54 U.S. contractors among the top 225 ($20.2 billion versus $61.0 billion).[15] *In terms of revenues*, the picture is very different. For example, in 1994, the 26 Japanese contractors in the top 225 international contractors had larger total revenues from international work ($18.8 billion) than did the 52 U.S. contractors in the top 225 ($14.8 billion). The Japanese lead in 1994 reflects their relatively strong position in work in Asia and the Middle East, where many Japanese companies have established manufacturing plants and other facilities that are willing to accept and act favorably on bids by Japanese contractors. However, these contractors rely heavily on affiliates and partners outside of Japan to complete their foreign projects. Thus, only a part of the total revenues consists of value added by the Japanese economy.[16]

Foreign Affiliates. In order to gain access to foreign market opportunities and minimize costs, U.S. construction companies, especially the large ones, conduct much of their business in foreign countries through facilities they own in those countries and through subcontracting with locally owned enterprises. Local operations are important because they provide U.S. contractors with information about the needs and concerns of foreign buyers and help to offset discrimination against foreign companies. In 1993, a total of 26 U.S. construction industry parent companies had 347 foreign affiliates. The sales of these affiliates in 1993 amounted to $10.0 billion, compared with $28.9 billion of sales in the United States by the U.S. parent companies. U.S. merchandise exports from the parent companies to their foreign affiliates amounted to only $133 million, and the parents' imports from their foreign affiliates were an even smaller $6 million. (Table 9)

Foreign affiliates of U.S. construction industry parent companies are concentrated in several important market areas. U.S. construction companies have a very small base of operations in Japan, even though that country is one of the largest if not the largest construction markets. One indication of the large size of the Japanese market is that in 1994 Japanese contractors accounted for 18 of the top 25 contractors in terms of total revenues from domestic and international business, and that for almost all of these 18 Japanese contractors domestic business accounted for the bulk of their revenues.[17] The small U.S. presence in the Japanese market is underscored by the fact that affiliates located in Japan accounted for only 0.4 percent of the total sales in 1993 by foreign affiliates of U.S. construction companies ($45 million of the total $10 billion).[18]

If they are to take best advantage of the new opportunities now developing in Japan (see section 2.2), U.S. construction companies will probably need to expand their base of operations in that country. Even compared with other U.S. industries, the U.S. construction sector has little direct investment in Japan. For example, affiliates of U.S. construction-industry parent companies accounted for only 0.02 percent of the sales in 1993 by all nonbank affiliates in Japan in which U.S. companies held ownership. In contrast, affiliates of U.S. construction companies accounted for 0.7 percent of the total sales by U.S. nonbank affiliates in countries other than Japan.[19]

Foreign companies have a relatively small base of operation in the U.S. construction sector. In 1993, U.S. construction industry affiliates of foreign companies had sales of $15.6 billion.[20] In that year, the gross

[15] ENR (August 24, 1992), p. 36, and (August 29, 1994), p. 28.

[16] ENR (August 28, 1995), p. 37.

[17] McGraw-Hill, ENR (August 28, 1995), p. 99.

[18] U.S. Department of Commerce, Bureau of Economic Analysis, U.S. Direct Investment Abroad, Operations of U.S. Parent Companies and their Foreign Affiliates, Preliminary 1993 Estimates (Washington, June 1995), Table II.E 9.

[19] Ibid., Table II.E 9.

[20] U.S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business (May 1995), p. 75.

product originating in these affiliates (i.e., their value added) amounted to a little under $4.0 billion, an amount equal to 1.7 percent of U.S. construction industry gross product.[21]

U.S. affiliates of foreign companies also account for only a small part of total U.S. construction employment. In 1993, the construction industry affiliates employed 63,000 Americans, 1.3 percent of U.S. construction employment, up from 57,000, 1.1 percent of U.S. construction employment, in 1987. In contrast, the share of all U.S. private business employment accounted for by U.S. affiliates of foreign companies was 5.0 percent in 1993 and 3.7 percent in 1987.[22]

The foreign owners of U.S. construction industry affiliates are based mainly in industrialized countries. European companies are among the major direct investors in the U.S. construction industry. Japanese construction companies have much larger participation in the U.S. economy than do U.S. construction companies in Japan.[23]

The U.S. affiliates' shares of total U.S. sales values vary substantially across the different categories of construction industries, but their share is not particularly large in any major category. The highest reported shares in 1987 (based on establishment data) were for industrial buildings and warehouses (SIC 1541), 6.7 percent; installing building equipment, nec (SIC 1796), 5.5 percent; and bridge, tunnel, and elevated highways (SIC 1622), 4.0 percent. The share for construction industries as a whole was 1.8 percent, compared with affiliates' 9.6 percent of sales by U.S. manufacturing industries as a whole.[24]

In sum, large construction companies conduct business in countries outside their home base to a large extent through foreign affiliates. However, affiliates account for a relatively small part of total construction activity in the United States and other countries.

2.2 Trends in U.S. Exports and Imports of Construction, Engineering, Architectural, and Mining Services[25]

Exports of construction and related services from U.S. companies to *unrelated* foreign buyers in 1994 were valued at $2.7 billion, more than four times the value for 1987.[26]

In recent years, goods and services produced in the United States have accounted for about two-thirds of the value of U.S. contractors' foreign projects (excluding projects involving U.S. contractors and their foreign affiliates). For example, in 1994 such projects resulted in total gross operating revenues of $5.0 billion, of which U.S. exports of construction and related services accounted for $2.7 billion and U.S. merchandise exports an additional $.6 billion. The remaining $1.7 billion consisted of foreign expenses or disbursements. (Table 10.)

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[21] Ibid., p. 63 and (April 1993), p. 47. The percentage figure shown here is based on affiliate data that are on an industry of affiliate basis, while the total industry data are on an establishment basis.

[22]U.S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business (July 1994), p. 161 and (May 1995), p. 66. The shares referred to here are based on affiliate data classified on an industry-of-sales basis and all-U.S.-business data classified on an establishment basis.

[23] Foreign Direct Investment in the United States (June 1995), Table G-6 and U.S. Direct Investment Abroad (June 1995), Table II. G-11.

[24]U.S. Department of Commerce, Bureau of Economic Analysis and Bureau of the Census, Foreign Direct Investment in the United Sates, Establishment Data for 1987 (Washington: U.S. Government Printing Office, June 1992), pp. 3-4. Comparable data may be published later for the year 1992. Shares based on establishment data are the best available indicators of the relative importance of foreign affiliates in the various U.S. industries.

[25]Bureau of Economic Analysis data on these four categories of services are grouped together.

[26]U.S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business (September 1994), p. 105, and (September 1995), p. 76. "Exports" here means net receipts or the portion of gross operating revenues from foreign projects that U.S. contractors retain, either as profits or as returns to other U.S.-located factors of production.

From 1987 to 1990, there was a general decline in the share of the contractors' operating revenues from foreign projects that was accounted for by goods and services produced in the United States. Since 1990, this share has increased erratically, as U.S. exports of construction and related services have increased.

As their economies have strengthened in recent years, Asian and Pacific countries have accounted for growing shares of the value of all U.S. exports of construction and related services (rising from 30 percent in 1992 to 52 percent in 1994). Latin America and Europe accounted for much smaller shares, 17 percent and 13 percent in 1994 The largest single foreign country market in 1994 was Venezuela. (Table 11.)

2.3 Financial Position of U.S. Construction Industry

Net profits of the U.S. construction sector as a whole declined in 1990-92 as economic activity slowed, but improved in 1993 with economic recovery. In 1993, the parent companies of U.S. construction industry multinationals had net profits of $503 million compared with $281 million for their majority-owned foreign affiliates. (Table 12.)

Except in 1993, foreign affiliates of U.S. construction industry parent companies have generally been more profitable than the U.S. construction industry affiliates of foreign companies. Moreover, the foreign affiliates in which U.S. construction industry parent companies hold majority ownership have generally been more profitable than the operations of the parent companies themselves. (Table 12.) From 1982 to 1993, the net profits of majority-owned foreign affiliates averaged 5.5 percent of end-of-year assets. In contrast, the U.S. parent companies' net income averaged 1.4 percent of assets. While the parents' operations suffered net losses in several years, their majority-owned affiliates were profitable in every year.

In all but two years from 1982 to 1993, the U.S. affiliates of foreign construction companies had net losses. The losses became very large in 1990-92, when U.S. construction activity was depressed.

The relatively high profitability of foreign affiliates of U.S. construction companies may partly reflect the fact that competition is not as strong in many foreign markets as it is in the U.S. market. In addition, the total profits of U.S. foreign affiliates in any given year reflect economic conditions in a number of countries, and thus are not closely tied to any particular country's economic strength. Compared to U.S. construction industry parent companies, U.S. construction industry affiliates in other countries rely less heavily on borrowing to finance their operations. Thus, a smaller part of the affiliates' return on capital takes the form of net interest payments (e.g., the difference between interest payments and receipts). However, even if the net interest payments are added to net income, this amount as a percentage of sales is still larger for the construction-industry majority-owned affiliates than for the construction-industry U.S. parents.[27]

Tax avoidance may partly explain the low reported returns on U.S. affiliates of foreign companies in this and other industries. In this connection, the United States had a higher effective tax rate on income in January 1991 than each of the four countries with the largest U.S. construction industry affiliate sales in recent years—namely, Japan, the United Kingdom, Germany, and France.[28]

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[27]Based on data in U.S. Department of Commerce, Bureau of Economic Analysis, U.S. Direct Investment Abroad, 1989 Benchmark Survey, Final Results (October 1992), pp. 96, 120, 179, and 276. Net income plus net interest payments were equal to 2.2 percent of the sales in 1989 by U.S. construction-industry parents, compared with 4.2 percent for the majority-owned construction-industry foreign affiliates of U.S. companies. Net income (alone) was equal to 1.4 percent of sales by the parents and 4.2 percent of those by the affiliates. Data are not available to calculate such percentages for the affiliates of U.S. construction-industry parents.

[28] U.S. Department of Commerce, Bureau of Economic Analysis, Foreign Direct Investment in the United States, Operations of U.S. Affiliates of Foreign Companies, Preliminary 1993 Estimates (June 1995), Table E-3, and Survey of Current Business (August 1992), p. 84.

III. FORCES SHAPING THE INDUSTRY

A variety of factors will determine the future growth of the international construction market and U.S. contractors' success in that market. Of particular importance will be the rate of world-wide economic growth. Also important for U.S. contractors will be the openness of foreign markets to international competition, the ability of U.S. contractors to remain technologically strong, and their access to the capital needed to finance large projects abroad.

3.1 Economic Growth

In recent years, developing countries in Asia and Latin America have accounted for most of the growth in international construction activity. Construction activity in these regions has benefited from the adoption of market-oriented policies and from the greater stability of governments. The high saving rates of the rapidly developing countries, together with their ready access to the increasingly sophisticated international capital markets, are important factors in fostering the construction boom underway in Asia. The current slowdown in the Mexican economy may restrain construction activity in that country in the next few years.

The Asian Development Bank estimated early in 1994 that by the end of the century new spending on infrastructure in that region would amount to $1 trillion. The major areas would include energy, telecommunications, and transportation. More recent estimates are for even greater amounts of infrastructure spending in Asia. For example, according to Hong Kong's Peregrine group, China, South Korea, Taiwan, Hong Kong, and the five largest nations of Southeast Asia will spend a total of $1.9 trillion.[29] According to a World Bank study, over the coming decade developing nations will need to spend about 7 percent of their gross domestic product on infrastructure.[30] The resulting construction spending boom should provide major opportunities for U.S. contractors

3.2 Openness of Foreign Markets.

Construction markets in a number of countries have been virtually closed to outside bidders. In response to U.S. pressure, however, governments have taken actions in recent years to open these markets to international competition. For example, on January 18, 1994, the Government of Japan announced an action plan to introduce open and competitive bidding for public works construction procurement. The new plan, known as the "Action Plan on Reform of the Bidding and Contracting Procedures for Public Works" became fully effective on April 1, 1995, and covers central and quasi-governmental entities in Japan. The reformed procedures cover construction, design, and consulting work. The Governments of Japan and the United States each year will monitor the implementation of the new procedures.[31]

While it is too early to assess the effectiveness of the agreement, it appears that it has already aided U.S. contractors in their efforts to gain business in Japan. For example, U.S. firms recently won contracts relating to the Osaka International Conference Center, NHK's Osaka headquarters, and the Kitakyushu Asian Import Market.[32] Also, Fluor Daniel recently entered into a partnership with Hitachi Ltd. to provide engineering, construction, and other services to pharmaceutical companies' building projects in Japan.[33]

Opportunities for U.S. companies will also be expanded in Japan as a result of the new World Trade Organization's government procurement code (see section 2.3). This code obligates all 48 prefectures and

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[29] Business Week (November 28, 1994), pp. 62 and 66.

[30] McGraw-Hill, ENR (October 2, 1995), p. 7.

[31] U.S. Department of Commerce, International Trade Administration, Business America (November 1995), pp. 14-15.

[32] Ibid., p. 14.

[33] McGraw Hill, ENR (October 30, 1995), p. 5.

12 designated cities in Japan to utilize open and competitive procedures beginning on January 1, 1996. As a consequence, local and prefectural governments will have to reform their bidding procedures to bring them into compliance with the requirements that in April 1995 began to apply to Japan's central government agencies. Under the procurement code, construction firms can no longer be required to maintain a place of business in a region in order to qualify to bid on public works projects in that region.[34]

Japan is only one of the foreign markets that have recently become more open to international competition. However, the Japanese market is important because, at an estimated $700 billion per year, it currently may be the world's largest single construction and design market. Further, early in 1995 the Government of Japan announced a pump-priming package calling for an estimated $80 billion in additional money to be devoted to public works, thereby boosting future construction purchases.[35]

Anti-competitive pricing by foreign contractors has been a major problem for U.S. contractors. On September 16, 1994, the U.S. Justice Department sued 53 Japanese construction companies on grounds that they rigged bids on contracts awarded by the Atsugi Naval Air Facility, a U.S. naval base in Japan. The suite, filed in Tokyo District Court, seeks $5.5 million in damages. Previously, in July 1993, the Justice Department announced that 27 Japanese firms had paid $1.1 million to settle bid-rigging charges involving the U.S. Naval Base at Sasebo. As of that date, the United States had obtained total settlements in such cases since 1989 amounting to $72 million.[36]

The openness of the Chinese market is also important in view of the rapidly growing importance of China in the world economy. Bechtel Group, Inc., recently became the first U.S. company that China granted a full construction license. This license will enable Bechtel to act as the prime contractor for work it does in China. It gives the company increased flexibility since it can now "execute work, open bank accounts, subcontract and buy in...[its] own name." Three other non-U.S. companies—all based in Hong Kong—had already been granted similar licenses to operate independently in the Chinese construction industry.[37]

3.3 Uruguay Round and North American Free Trade Agreement

The Uruguay Round of trade negotiations and the North American Free Trade Agreement should have favorable implications for U.S. construction contractors seeking international business. Of particular importance is the Government Procurement Code, negotiated in the Uruguay Round, which became effective on January 1, 1996, and replaced the 1979 Code. The 1996 Code specifically applies to procurement of construction and other services, as well as to merchandise.

The new Code contains detailed provisions on such items as technical specifications, qualification to bid, publication, selection, time limits, bid documentation and submission, receipt and opening of bids, awarding of contracts, contract negotiation, and limited tendering. It contains requirements that countries establish a bid challenge mechanism and prohibit offset requirements.[38] In addition, the new Code introduces flexibility to accommodate advances in procurement techniques, such as electronic tendering.[39]

U.S. industry leaders were disappointed that negotiators in the Uruguay Round were not successful in reaching additional agreements to liberalize trade in construction and engineering services. However, they

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[34] Business America, p. 17.

[35] Ibid., p. 14.

[36] McGraw-Hill, ENR (September 26, 1994), p. 9.

[37] The Journal of Commerce (January 24, 1995), p. 3A.

[38] Offset requirements generally oblige the winning foreign bidder to make arrangements to expand the buying country's exports or reduce its imports.

[39] U.S. Department of Commerce, International Trade Administration, Uruguay Round Update (January 1994), p. 20. Also see 103d Congress, 2nd Session, House Document 103-316, "Agreement on Government Procurement."

expect that the Round will contribute to general economic growth and thereby improve business for construction and engineering companies.[40]

NAFTA should have favorable implications for U.S. construction contractors since it provides for the elimination, within five years, of restrictions on Mexican investment by U.S. and Canadian construction firms. U.S. companies will have increased opportunities to enter the Mexican market either through the establishment of a Mexican subsidiary or through cross-border provision. NAFTA will eliminate the Mexican practice of screening all U.S. investment in construction firms above 49 percent of equity and reserving the right to deny investment approvals on a variety of grounds.[41]

3.4 Tax Treatment of U.S. Nationals Who Work Abroad

One of the costs of overseas construction work by U.S. companies relates to the employment of American citizens in foreign countries. Unlike most countries, the United States taxes the worldwide income of its citizens and resident aliens who live in other countries. This approach may place U.S. construction contractors at a disadvantage in international competition.

Under current law, "a U.S. citizen or resident alien who is a bona fide resident of a foreign country...or who maintains a tax home in one or more foreign countries for 11 months out of 12...may exclude from gross income up to $70,000 per year of foreign earned income plus a 'housing cost amount'." Further, "the combined amount [of the exclusion] may not exceed the individual's total foreign earned income for the period." Also, "foreign taxes paid with respect to the excluded income may not be claimed as a credit nor are certain expenses attributable to excluded income permitted as deductible."[42]

Under the Economic Recovery Act of 1981, the exclusion was to increase to a maximum of $95,000 in 1986. With the Tax Reform Act of 1986, the maximum annual exclusion was reduced to $70,000, and previously scheduled increases were repealed.[43]

Occupations relating to construction and related industries are among the top three categories of occupations of Americans working abroad. In 1987, there were 21,800 persons in construction and related fields who worked abroad and qualified for the earned income exclusion. The total income of these persons was $1.4 billion. Seventy-two percent of these persons, a relatively high percentage compared with other occupations, had incomes of $50,000 or more.[44]

3.5 Export-Import Bank

The Export-Import Bank of the United States has the responsibility to finance and promote U.S. exports, especially exports to developing countries. The Bank in 1993 authorized more than $15 billion in loans, guarantees, and insurance for U.S. exports. The Bank used most of these funds to facilitate exports of merchandise, although some of the funds aided exports of construction and engineering services.[45] (See Table 13 for information on foreign construction projects for which the Export-Import Bank has provided funding for U.S. exports in recent years.)

For example, the Bank provided a loan guarantee of almost $200 million to assist exports of engineering and construction services by Bechtel International, Inc., to Algeria. In addition, the Bank provided

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[40]McGraw-Hill, ENR (December 12, 1994), p. 7.

[41]U.S. Department of Commerce, International Trade Administration, North American Free Trade Agreement, Opportunities for U.S. Industries (October 1993), p. 3 of section on construction machinery.

[42]Department of the Treasury, Taxation of Americans Working Overseas, The Operation of the Foreign Earned Income Exclusion in 1987 (January 1993), p. 4.

[43]Ibid., p. 4.

[44]Ibid., p. 16 and 18.

[45]Export-Import Bank of the United States, "Ex-Im Bank Jobs Through Exports," Annual Report for 1993, p. 2.

assistance to aid U.S. exports of a variety of construction equipment, such as cement plant equipment to Mexico and Trinidad and Tobago. Also, the Export-Import Bank recently loaned $298 million and the Overseas Private Investment Corporation $100 million of the $920 million needed for the first phase of the first privatized power project in India.[46]

In 1995, the Export-Import Bank greatly increased its financing of foreign construction projects as a result of a major change in financing procedures. Under the new procedures, the Bank now directly finances the sale of U.S. goods and services to foreign companies without making loans to governments or requiring local bank guarantees with the resulting fees and paperwork. This new approach is helping to foster a small boom in major construction projects in Mexico and other Latin American countries. On a worldwide basis, Export-Import Banking financing of construction projects increased sevenfold in the past year, to a 1995 total of $2.1 billion.[47]

According to an Export-Import Bank spokesman, "[o]ur mission is to help provide a level playing field for U.S. exporters by countering the export credit subsidies of other governments." "Our loan programs include working capital guarantees, export credit insurance, guarantees of commercial loans to foreign buyers of U.S. goods and services and direct loans to foreign buyers."[48]

3.6 Cost of Capital

Cost and availability of capital influence both the demand for construction in a nation and the ability of individual contractors to compete for work in that nation. Cost of capital tends to be relatively low in nations with high saving rates, growing economies, stable governments, and legal systems that provide for the enforcement of contracts. In such nations, lenders require relatively small built-in risk premiums.

Japanese contractors have benefited from the access to capital they have enjoyed as a result of Japan's position as a major creditor nation. Of particular importance have been the investments that Japanese contractors have made in various Asian nations.

3.7 Exchange Rates

Goods and services produced in the country of the project typically account for a large part of the value of construction projects that U.S. contractors undertake in other countries. Thus, the foreign exchange value of the dollar is not likely to be a critical determinant of the international competitiveness of these contractors, especially if they enjoy a strong technological advantage. The exchange rate may have an important effect, however, on the extent to which the various contractors use U.S. made materials and equipment in their U.S. and overseas work.

Exchange rate developments contributed to causing the U.S. trade balance in construction materials to deteriorate from the early to the mid 1980s and to improve in the late 1980s and early 1990s. More important, however, in causing changes in the trade balance in construction materials were changes in the strength of construction activity in the United States. For example, the U.S. trade deficit in non-wood building products peaked in 1986-88 when construction activity was strong. The United States had a small trade surplus in these products in 1991-92 when U.S. construction activity was depressed.[49]

Exchange rates are also important to international construction because of the effect they have on the costs of borrowing. Foreign buyers and their lenders must take into account exchange rate risk when they consider using dollar-denominated financial instruments to pay for construction projects. For example, the importance of this risk became clear as a result of the recent steep depreciation in the value of the Mexican

[46]Ibid., pp. 19-29. Also McGraw-Hill, ENR (March 13, 1995), p. 17. This first phase consists of the construction of a 695 Mw gas-fired powerplant.

[47] McGraw-Hill, ENR (November 13, 1995), p. 12.

[48] Ibid., p. 12.

[49]Data supplied by U.S. Department of Commerce, International Trade Administration.

peso. That depreciation caused serious problems for Mexican companies that were obliged to repay loans in much more costly dollars while earning most of their revenues in pesos.

3.8 Technology of Companies

As is happening in many sectors of the economy, technological advances are causing major changes in international construction. Important advances have occurred, for example, in materials and equipment used in the construction process. U.S. companies are in the forefront with respect to many of these advances, such as high-performance concrete, waste treatment facilities, and environmental work. However, Japanese companies enjoy the technological leadership in high-performance steel, automated equipment, intelligent buildings, and building systems. Europe is the leader in high-performance asphalt, tunneling, high-speed rail work, and marine construction.[50]

Information technology, an area in which the United States has led the world, is helping to increase international competition in construction markets. For example, a contractor based in the United States now can quickly and cheaply transmit information to its affiliates or sub-contractors abroad. Thus, contractors find it easier to bid on projects in other countries and promptly make needed corrections or adjustments. Further, when technical problems arise at remote construction sites, on-site workers can often quickly obtain answers from skilled technicians located in another country. More generally, contractors increasingly are finding that they have relatively easy access to the services of engineers, architects, and other professional persons located throughout the world, including those located in low-wage, developing countries.

A number of contractors have reported that information technology has opened international business opportunities that previously did not exist. For example, Starnet International Corp. reports that it developed a virtual reality video of a proposed project in Beirut that aided in winning a contract for over $1 million for designing and building a large dome. Also, The Austin Company, based in Cleveland, Ohio, reports that its success in wining contracts in the Pacific Rim nations is based in large part on advantages the company enjoys with respect to software. Further, the managing director of Turner Steiner International in New York City has noted that computers and related communications technology are enabling contractors based in the United States, Switzerland, and other industrialized nations to use lower-cost engineers and other personnel from outside their home countries without sacrificing quality.[51]

Improvements in communications are helping contractors to make more efficient use of suppliers and workers throughout the world and should thereby lessen the extent to which supply bottlenecks in a given country or region slow construction activity and lead to steep price increases. Some analysts believe that improvements in communications may be reducing a contractor's need to have foreign affiliates in order to obtain information about business opportunities in foreign countries. Information technology may also help to reduce the disadvantage that small firms have typically had in competing in international construction markets, although some contractors have noted that they are reluctant to make full use of information technology because of security concerns.[52]

The U.S. construction sector spends relatively little on research and development compared with most other U.S. industries. According to the Civil Engineering Research Foundation (CERF), various other countries' construction sectors emphasize R&D more than does the U.S. industry. For example, while none of the major U.S. contractors has an R&D laboratory, nearly every major Japanese contractor has such a laboratory.[53]

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[50] Civil Engineering Research Foundation, Constructed Civil Infrastructure Systems R&D: A European Perspective, CERF Report 94-5010 (Washington, D.C., 1994), p. 5.

[51] McGraw-Hill, ENR (August 28, 1995), pp. 32-34.

[52] Ibid., p. 32.

[53] Civil Engineering Research Foundation, Transferring Research into Practice: Lessons from Japan's Construction Industry (Washington: Civil Engineering Research Foundation, November 1991), p. 1.

U.S. construction-industry parent companies that had foreign affiliates in 1989 devoted $51 million to research and development expenditures, an amount equal to only $270 per employee. In contrast, the R&D expenditures by all U.S. non-bank parent companies equaled $3,190 per employee. Employees engaged in R&D activities accounted for only 0.8 percent of the total employment of construction industry parents, compared with 3.4 percent for U.S. parent companies in all industries.[54]

CERF and the National Science Foundation found that in 1992 U.S. R&D expenditures relating to civil engineering amounted to $2.1 billion, about 0.5 percent of the value of all construction put in place in that year. (Table 14.) The federal government financed most of these expenditures, which largely went towards applied research and development. Research and development sponsored by the federal government was concentrated in work relating to energy and the environment (30.1 percent and 15.0 percent, respectively, of the 1992 federal spending). In contrast, the R&D expenditures by industry were concentrated in work relating to materials (48.2 percent of the industry total). Manufacturers of construction products, not design and construction firms, conduct most of the R&D sponsored by industry.[55]

According to industry reports, "Japan's major construction firms...are in the forefront on the level of investment in civil engineering-related R&D. They undertake major R&D efforts to solve problems posed by land shortages, crowded conditions, frequent seismic events, severe weather, [and] shortages of skilled domestic labor...." European firms also emphasize R&D more than do U.S. firms. This R&D work helps to explain why Japanese and European companies typically have been stronger competitors than U.S. companies in such areas as civil engineering, dredging, and reclamation work.[56] [57]

Industry analysts have noted that research and development, and thus technological advance, is restrained in the U.S. construction sector in part because it is difficult for an individual U.S. firm to capture the full benefits from R&D it conducts.[58] The procurement system used by the U.S. Government and some other U.S. buyers also may hinder research and development investment. Industry leaders have argued that this system too often pays excessive attention to the immediate cost of building a structure and too little attention to the long-term costs of operation and maintenance.[59]

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[54]U.S. Department of Commerce, Bureau of Economic Analysis, U.S. Direct Investment Abroad, 1989 Benchmark Survey, Final Results (October 1992), pp. 105 and 118. In the case of the construction industries, all of the R&D reported here was performed by the U.S. parents themselves. In the case of all nonbank parents, a small part of the R&D was performed by others.

[55]CERF' definition of "civil engineering R&D program areas" includes a wide range of areas, many of which are only indirectly related to construction activity, such as work relating to nuclear power, earthquakes, water supply systems, and others. CERF, A Nationwide Survey of Civil Engineering-Related R&D, pp. 6, 19, and 63.

[56]Business Week (November 21, 1994), p. 52.

[57]Civil Engineering Research Foundation, Transferring Research into Practice: Lessons from Japan's Construction Industry (Washington, November 1991), p. 2.

[58]See Civil Engineering Research Foundation, A Nationwide Survey of Civil Engineering-Related R&D, CERF Report #93-5006 (Washington, D.C., December 1993), p. 1; also, Civil Engineering Research Foundation, Transferring Research into Practice: Lessons from Japan's Construction Industry (Washington, November 1991), p. 2.

[59] Civil Engineering Research Foundation, Constructed Civil Infrastructure Systems R&D: A European Perspective, CERF Report 94-5010 (Washington, July 1994), pp. 30-31.

IV. CONCLUDING REMARKS

U.S. construction contractors are facing new opportunities and challenges in the international marketplace. New opportunities are developing as the demand for construction expands in response to rapid economic growth in Asia and parts of Latin America. In addition, a number of countries that previously were closed to international competition have recently adopted more open competitive purchasing procedures. Japanese actions are potentially of great importance in this respect.

With the growing size of the construction markets in Japan and various foreign countries has come an increase in the international competitive strength of the contractors in those countries. Japanese contractors have gained business opportunities as Japanese companies have expanded their investment in other rapidly growing Asian countries. In addition, Japanese contractors have benefited from the access to capital they have enjoyed because of Japan's position as a major creditor nation, although exports of capital have been restrained recently as a result of financial conditions in Japan.

Technology is another area in which there are growing challenges in international construction markets. U.S. contractors' experience in petroleum-related construction has given them a lead in this important area. U.S. construction contractors are also among the leaders in the use of information technology. In various other technologies, however, foreign companies tend to be the leaders.

Because of the site-specific nature of construction work, much of this work in a nation likely will continue to be performed by workers and firms based in that nation. As improvements in information technology continue to increase international competition in the construction sector, however, there will probably be growing international division of labor in the kinds of work that the various contractors perform. For example, contractors based in the most highly industrialized countries will probably continue to dominate the market for the design and management of massive, technologically sophisticated projects. Companies and workers in low-wage countries will likely gain in international competition for labor-intensive building projects.

Finally as construction contractors seek new ways to lower costs, improvements in international communication systems will put engineers, architects, designers, and other highly skilled workers in the United States increasingly in competition with similar professionals in other countries.

Table 1
Largest International Construction Contractors

Company	Nation	International Contracts in 1993 $ Bil.	International Contracts in 1993 % of Total	Rank in International Contracts 1980	Rank in International Contracts 1990	Rank in International Contracts 1993
John Brown/Davy	U.K.	11.6	90.7	*	**	1
Fluor Daniel Inc.	U.S.	11.3	44.9	3	3	2
Bechtel Group Inc.	U.S.	8.4	56.9	1	2	3
The M.W.Kellogg Co.	U.S.	7.1	78.0	12	1	4
Brown & Root Inc.	U.S.	6.4	67.1	26	9	5
The Parsons Corp.	U.S.	5.2	45.5	2	8	6
Bovis Construction Group	U.K.	4.9	81.3	***	21	7
Philipp Holzmann AG	Germany	3.7	29.3	7	6	8
Bouygues, Guyancourt	France	3.1	32.6	****	14	9
Black & Veatch/ The Pritchard Corp.	U.S.	3.1	38.7	***	***	10
SGE Group	France	3.1	42.4	35	***	11
Chiyoda Corp.	Japan	3.0	70.9	16	11	12
Mitsubishi Heavy Industries, Ltd.	Japan	2.9	21.5	***	13	13
Foster Wheeler Corp.	U.S.	2.9	48.9	5	12	14
Morrison Knudsen Corp.	U.S.	2.7	54.6	8	43	15
ABB Lummus Crest, Inc.	U.S.	2.7	85.0	***	4	16
Hochtief AG	Germany	2.3	37.8	22	23	17
JGC Corp.	Japan	2.2	75.0	42	36	18
Stone & Webster Engineering Corp.	U.S.	2.2	26.2	91	25	19
GTM-Entrepose	France	2.2	40.5	***	20	20

* John Brown Engineers & Construction, Ltd., was not listed among the top contractors. Davy Corp. Ltd ranked number 10.

**John Brown Engineers & Construction, Ltd. ranked 5. Davy Corp. PLC ranked 7.

*** Not ranked among the top international contractors.

**** Bouygues, Clamart ranked number 59.

Note: Contracts covered here include prime construction contracts, shares of joint ventures, subcontracts, design-construction contracts, and construction management (CM) contracts where the firm is exposed to financial liabilities and risks similar to those of a general contractor. CM contracts are based on the constructed value of projects. Design-construction contracts are based on the constructed value of projects, including the value of installed equipment where a firm has a prime responsibility for specifying and procuring the equipment within the scope of the construction contracts. Percentage of total refers to percent of value of all contacts awarded to the company, including domestic and international awards.

Source: McGraw-Hill, ENR (July 22, 1991), pp. 36-43 and (August 29, 1994), pp. 31-36.

Table 2
Awards in 1993 to U.S. Construction Contractors for Work Outside the United States: Total and as a Percent of Value of All Awards for International Construction Work

Category of Project	Awards to U.S. Contractors $ Mil	Percent of Total International Awards for Work Outside the United States
Petroleum	37,131	65.7
Power	7,010	49.5
Industrial	5,902	42.3
Building	3,449	17.8
Transportation	3,354	18.4
Manufacturing	2,798	43.2
Sewer/Waste	551	29.3
Water	501	12.4
Hazardous Waste	310	27.5
Other	48	0.7
Total	61,054	42.8

Note: These data apply to awards for work outside the United States to the 225 contractors that won the largest international awards in 1993. Of these 225 contractors, 54 were U.S. companies.
Source: McGraw-Hill, ENR (August 29, 1994), p. 28, and data supplied by McGraw-Hill.

Table 3
Value of Awards in 1993
to Contractors not Based in the Country of the Award
by Country or Region of Award and Category of Construction

	U.S.	Asia	All Other Areas
Total Value of International Awards $ Millions	12,453	51,442	91,263
Percentage Distribution:			
Building	33.8	13.4	13.7
Transportation	14.0	11.2	13.7
Industrial	11.9	10.5	9.4
Petroleum	10.6	42.8	37.8
Other	7.5	3.3	5.8
Manufacturing	7.0	4.0	4.8
Power	6.8	10.6	9.5
Water	4.5	2.4	3.1
Sewer/Waste	2.3	1.2	1.4
Hazardous Waste	1.7	0.6	0.9
Total	100.0	100.0	100.0

Source: Data supplied by McGraw-Hill.

Table 4
Foreign-Country Construction Contracts Awarded to Top U.S. Contractors by Region of Contract: Total and as a Percent of Value of All International Contracts Awarded to Top 225 Contractors, Selected Years

Region or Country	1982	1988	1989	1990	1991	1992	1993
Asia:							
U.S. Awards, $ Bil.	9.4	4.5	7.7	9.2	16.4	21.1	22.1
Percent of Total Awards	40.0	22.1	31.4	34.0	47.5	49.6	42.9
Europe:							
U.S. Awards, $ Bil.	6.8	8.8	11.3	13.3	12.9	16.8	13.4
Percent of Total Awards	61.3	45.4	44.5	43.8	39.2	48.8	39.8
Middle East:							
U.S. Awards, $ Bil.	18.5	5.6	7.6	10.1	16.0	17.0	13.6
Percent of Total Awards	36.1	32.2	42.7	51.0	54.7	60.4	50.7
Africa:							
U.S. Awards, $ Bil.	2.8	1.4	5.6	5.6	10.8	4.9	4.3
Percent of Total Awards	15.8	13.5	39.2	36.9	49.8	33.5	30.6
Latin America:							
U.S. Awards, $ Bil.	3.9	2.5	2.0	2.0	9.3	9.0	5.7
Percent of Total Awards	37.9	34.1	26.3	34.3	63.6	65.5	45.4
Canada:							
U.S. Awards, $ Bill.	3.6	3.1	3.8	3.2	4.0	3.4	2.0
Percent of Total Awards	80.0	48.3	52.8	49.8	61.1	81.6	49.6
All Above Regions:							
U.S. Awards, $ Bil.	45.0	25.9	38.0	43.5	69.4	72.2	61.1
Percent of Total Awards	38.0	31.8	39.3	41.5	49.7	52.5	42.8

* Top 250 for the years 1982-90 and top 225 for the years 1991-93.
Note: The data on U.S. awards are for the U.S. contractors that ranked among the top 225 or top 250 in the world in terms of value of contracts won in markets outside their home markets. The totals used to calculate the percentage figures cover only international contracts and do not cover contracts won by companies in their home-country markets.
Source: McGraw Hill, ENR (various issues).

Table 5
Total Construction Contract Awards, by Region of Award, to Large International Contractors Based in Countries Other than the Country of the Award
(Billions of Dollars)

Region or Country	1982	1989	1990	1991	1992
Asia	23.5	24.5	27.1	34.5	42.6
Europe	11.1	25.4	30.5	32.8	34.4
Middle East	51.2	17.8	19.9	29.3	28.1
Africa	17.7	14.3	15.2	21.9	14.5
Latin America	10.3	7.6	5.8	14.7	13.7
Canada	4.5	7.2	6.4	6.6	4.2
United States	4.8	15.5	15.3	12.4	8.9
Total	123.1	112.6	120.3	152.0	146.5

* Top 250 for the years 1982-90 and top 225 for the years 1991-93.
Note: These data apply to the top 225 or top 250 world contractors in terms of value of contracts won outside their home countries. Because of rounding, individual figures may not add exactly to totals shown.
Source: McGraw Hill, ENR (various issues).

Table 6
Construction Contracts Awarded by Buyers in Asia to Contractors Based in Countries Other than those of the Buyers

	Value of Contracts	Percentage Shares to Contractors Based in:			
Year	$ Bil.	U.S.	Japan	Europe	All Other
1982	23.5	40.0	23.8	23.0	13.2
1983	15.4	31.2	31.2	27.9	9.7
1984	18.3	48.1	24.0	20.2	7.7
1985	17.8	39.9	30.6	24.3	5.2
1986	17.3	23.7	31.2	32.4	12.7
1987	15.5	22.7	28.8	39.4	9.1
1988	20.5	22.1	27.4	41.2	9.3
1989	24.5	31.4	26.5	33.5	8.6
1990	27.1	34.0	34.2	22.5	9.3
1991	34.4	47.5	21.7	22.7	8.1
1992	42.6	49.6	18.8	22.1	9.5
1993	51.4	42.9	27.8	21.2	8.1

Source: McGraw-Hill, ENR, various issues.

Table 7
Sales by Construction Industry Foreign Affiliates of U.S. Companies by Country or Region of Affiliate
(Millions of Dollars)

	1982	1987	1989	1992	1993 p
Total	13,790	6,024	6,350	10,302	8,382
Canada	*	909	*	*	*
Europe	*	2,926	3,518	*	*
Latin America	1,761	180	*	329	512
Middle East	4,505	1,184	759	*	417

p preliminary
Source: U.S. Department of Commerce, Bureau of Economic Analysis, U.S. Direct Investment Abroad, for years shown.

Table 8
International Construction Awards in 1993 to the Largest International Contractors, by Nationality of the Contractor and Category of Construction Project

	U.S.	Japan	U.K.	France	All Non-U.S. Cntrs.
Number of Contractors:	54	28	14	10	171
Total Value of Awards, $ Bil.:	61.1	20.2	19.2	14.1	94.1
Percentage Distribution:					
Petroleum	60.8	35.1	26.4	23.1	22.0
Power	11.5	13.3	3.7	8.7	8.5
Industrial	9.7	2.8	27.7	8.4	10.1
Building	5.6	17.7	21.9	11.4	21.4
Transportation	5.5	13.1	8.8	13.4	17.6
Manufacturing	4.6	6.3	1.7	3.5	4.8
Sewer/Waste	0.9	1.3	0.0	2.7	1.7
Water	0.8	5.3	0.3	3.7	4.4
Hazardous Waste	0.5	0.0	1.2	2.7	1.1
Other	0.1	5.0	8.2	22.4	8.3
Total	100.0	100.0	100.0	100.0	100.0

Source: McGraw-Hill, ENR (August 29, 1994) and data supplied by McGraw-Hill for this study.

Table 9
U.S. Construction Industry Parent Companies and Their Foreign Affiliates, Selected Data
(Millions of Dollars Except Where Noted)

	1982	1989	1992	1993
U.S. PARENT COMPANIES				
Number of Companies	36	27	26	26
Sales-Total	30,999	26,818	28,856	28,912
To U.S. Persons	**	25,512	**	**
To Foreign Affiliates	**	135	**	**
To Other Foreign Persons	**	1,171	**	**
Employees, Thousands	251.0	189.1	207.5	179.1
Net Income	547	387	-362	503
U.S. Parents' Merchandise Exports To Foreign Affiliates	123	*	64	133
U.S. Parents' Merchandise Imports From Foreign Affiliates	*	8	6	6
THEIR FOREIGN AFFILIATES:				
Number of Affiliates	186	274	304	347
Majority-Owned	**	238	273	314
Sales-Total	11,727	6,954	10,854	10,048
Majority-Owned	10,483	5,159	8,451	7,729
To U.S. Parents	54	26	26	19
To Unaffiliated U.S. Persons	64	75	12	12
To Persons in Country in Which Affiliate is Located	10,123	4,240	7,124	6,744
To Other Foreign Persons	242	818	1289	954
Employees, Thousands	55.0	46.2	52.6	58.7
Net Income	415	198	**	**
Majority-Owned	263	178	163	281

* Data suppressed to avoid disclosure of information on individual companies.
** Not published.
Note: Data are for the companies' fiscal years ending in year indicated. The import and export data are from forms submitted by the parent companies. "Majority-owned" refers to affiliates in which the parents hold more than 50 percent of the combined direct and indirect ownership interest.
Source: U.S. Department of Commerce, Bureau of Economic Analysis, U.S. Direct Investment Abroad (various issues).

Table 10
U.S. Exports of Construction, Engineering, Architectural, and Mining Services, Excluding Exports from U.S. Companies to their Foreign Affiliates
(Millions of Dollars)

Year	U.S. Contractors' Gross Operating Revenues from Foreign Projects	U.S. Merchandise Exports included in Gross Operating Revenues	Foreign Expenses or Disbursements	U.S. Exports of Construction and Related Services	Total U.S. Exports as a Percent of Gross Revenues
1987	1,653	700	285	668	82.8
1988	1,533	439	304	790	80.2
1989	1,917	279	699	939	63.5
1990	2,647	238	1,542	867	41.7
1991	2,901	211	1,212	1,478	58.2
1992	3,221	369	918	1,935	71.5
1993	4,235	282	1,595	2,358	62.3
1994	5,001	643	1,654	2,704	66.9

Note: Data apply to trade between U.S. residents and foreign residents, but exclude transactions between U.S. contractors and their foreign affiliates. As calculated here, U.S. exports of construction and related services equal U.S. contractors' gross operating revenues from foreign projects less associated U.S. merchandise exports and foreign expenses
Source: U.S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business (September 1994), pp. 101, 106, and (September 1995), pp. 100-102..

Table 11
U.S. International Trade in Construction, Engineering, Architectural, and Mining Services, by Country or Region
(Millions **of Dollars)**

Country or Region	1990	1991	1992	1993	1994
			Receipts		
Canada	87	87	17	35	26
Europe	162	349	280	312	356
Latin America & Other Western Hemisphere	99	226	384	414	473
Mexico	8	16	24	45	66
Venezuela	24	96	295	300	176
Africa	84	118	210	182	166
Middle East	66	211	464	295	270
Saudi Arabia	50	198	408	198	141
Asia and Pacific	353	486	579	1,120	1,407
China	n.a.	29	48	163	143
Japan	34	70	42	33	31
Korea	91	104	88	125	135
Unallocated	16	*	1	1	3
All Countries	867	1,478	1,935	2,358	2,704
			Payments		
Canada	11	43	42	51	48
Europe	53	67	77	82	75
Latin America & Other Western Hemisphere	4	34	18	18	17
Mexico	1	1	*	2	2
Venezuela	0	2	*	1	2
Africa	6	18	8	14	27
Middle East	1	7	2	5	14
Saudi Arabia	0	4	1	1	1
Asia & Pacific	73	146	108	162	110
Japan	47	64	38	**	7
Korea	0	16	4	5	4
Unallocated	22	1	6	5	5
All Countries	170	315	261	336	296

* Less than $500,000.
** Suppressed to void disclosure of data of individual companies.
Note: Receipts for engineering, architectural, construction, and mining services are published net of merchandise exports and net of outlays abroad for wages, services, materials, and other expenses. Payments for this category of services are not published net of merchandise imports and outlays for wages and other expenses.
Source: U.S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business (September 1994), pp. 126-133.

Table 12
Net Construction Industry Profits
(Millions of Dollars)

Year	U.S. Construction Industry Total	U.S. Construction Industry Parent Companies	Foreign Affiliates of U.S. Construction Industry Parents		U.S. Construction Industry Affiliates of Foreign Companies
			Total	Majority-Owned	
1982	1,477	547	415	263	-44
1983	958	474	n.a.	340	13
1984	1,714	296	n.a.	299	-65
1985	3,130	-572	n.a.	180	-135
1986	5,356	3	n.a.	75	-112
1987	8,402	-20	n.a.	97	-157
1988	9,768	-9	n.a.	96	-155
1989	9,303	387	198	178	-70
1990	8,739	792	n.a.	541	-243
1991	6,384	765	n.a.	285	-338
1992	6,403	-362	n.a.	163	-413
1993	6,688	503	n.a.	281	369

n.a. not available.
Note: Profit data are net of income taxes. Majority-owned affiliates are ones in which U.S. parents hold majority ownership.
Source: U.S. Department of Commerce, Bureau of Economic Analysis, Survey of Current Business (various issues), U.S. Direct Investment Abroad (various issues), and Foreign Direct Investment in the United States (various issues).

Table 13
Foreign Construction Projects for which the Export-Import Bank Provided Financing

Project	Country	Principal Product or Service	Contract Price $000
		1990	
Hotel	Kenya	Various capital goods & services	2,941
Poultry Grain Storage Facility	Yemen	Construction services, procurement	8,000
Oil & Gas Field Development	China	Marine construction	24,562
Total			35,503
		1991	
Oil Refinery Storage Tanks	Morocco	Heavy construction	10,300
Oil & Gas Field Development	Nigeria	Heavy marine construction	112,451
Bridge	Belize	Prefabricated steel bridge	3,942
Total			126,694
		1992	
Housing Program	Fiji Islands	Low cost housing units	9,690
Water Supply System	Bahamas	Water works rebuilding services	7,500
Airport	Bahamas	Design & building of international airport	8,259
Total			25,449
		1993	
Apartment Building Operators	Mexico	Prefabricated apartment buildings	3,800
Dike	Venezuela	Construction equipment	25,000
Total			28,800
		1994	
Commercial Center	Barbados	Design & management services	1,623
Single Family Housing	Mexico	Preassembled custom homes	13,000
Residential Housing	Argentina	Prepackaged homes	13,000
Hotel	Dominican Republic	Engineering services	1,200
Hotel	Argentina	Furniture and fixtures	2,184
Waste Water Treatment Plant	China	Waste water treatment plant	14,368
Maintenance Hangar	Turkey	Building material & equip.	9,200
Dam Project	Spain	Conveyors	16500
Telephone & Telegraph	Mexico	Telecommunication equip.	11,910
Total			82,985
		1995 (as of May 23, 1995)	
Resort Hotel	Mexico	Building, design, labor	103,030
Airport Operation	St Kitts-Nevis	Passenger and cargo terminals	8,885
Hospital	Panama	Engineering services, design, & const.	40,000
Hotel	St Vincent	Hotel equipment	15,000

Project	Country	Principal Product or Service	Contract Price $000
Design, Construction of Medical Center	Hungary	Hospital facility and equip.	9,000
Hospital	Mexico	Design, engineering, equip.	5,000
Highway	Turkey	Construction equip.	60,000
Upgrade Telephone Lines	Colombia	Line testing equip.	1,500
Waterway Maintenance	Malaysia	Maintenance vessels	3,000
Telecom.Services	Argentina	Earth station antennas & electronics	900
Work on Lab Equipment	Peru	Various equipment and training	10,500
Work on Lab Equipment	Turkey	Various equipment and training	10,500
Total			267,315

Note: Figures may not add exactly to totals shown because of rounding. All of the projects noted here relate to construction. However, Export-Import Bank funds were used mainly to finance U.S. exports of construction services only in the case of those projects in which construction is the principal product or service.
Source: Data supplied by the Export-Import Bank.

Table 14
Distribution of U.S. Civil Engineering Research and Development in 1992 by Sponsor, Type of Research, and Program Area

	$ Mil	% of Total
SPONSOR:		
Federal Government	1,322.3	62.9
Dept. of Energy	553	26.3
Dept. of Transportation	314.8	15.0
Department of the Army	215.5	10.2
Environmental Protection Agency	54	2.6
National Science Foundation	50	2.4
Dept. of Agriculture	35.7	1.7
Department of the Navy	23	1.1
National Institute of Standards and Technology	23	1.1
All Others	53.3	2.5
Industry	343.1	16.3
Academia	257.5	12.2
State	92.5	4.4
Non-Profit	87.2	4.1
Total	2,102.7	100.0
TYPE OF RESEARCH:		
Applied	748.6	35.6
Development	707.7	33.7
Basic	285.1	13.6
Demonstration	248.4	11.8
Innovation	54.2	2.6
Unallocated	58.7	2.8
Total	2,102.7	100.0
PROGRAM AREA:		
Energy	411.3	19.6
Materials	342.8	16.3
Environmental	297.5	14.1
Structures	241.9	11.5
Mathematical Analysis and Mechanics	159.9	7.6
Construction	150.1	7.1
Infrastructure	132.4	6.3
Urban/Land Use Planning	96.5	4.6
Geotechnical	81.7	3.9
Water Resources	76.7	3.6
Natural Hazards	61.1	2.9
Unallocated	50.5	2.4
Total	2,102.7	100.0

Source: Civil Engineering Research Foundation, A Nationwide Survey of Civil Engineering-Related R&D, CERF Report #93-5006 (Washington, December 1993), pp. 61-63.