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Technical report: Assistance for development of construction industries*

Prepared for the Government of the Republic of Korea
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of Mr. Fred F. Mosavenzadeh, consultant on construction and building materials

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Vienna

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CHAPTER 1

INTRODUCTION

Korea's success in the international construction market since the 1970s has been primarily due to their competitive advantage in labor intensive construction and the enormous demand in the oil rich countries of the Middle East for infrastructure construction.

Korea's competitive advantage in international construction was mostly in labor-intensive construction where they could easily establish their cost leadership. Since the Middle East market offered the type of work in which Koreans were highly competitive, they concentrated their activities in this area for the past ten years, and they achieved international significance in the international construction market. However, their competitive advantage brought limited success in other regional markets as different factors required different strategies. Because of geographical proximity, cultural background and the size of the market, Asia was traditionally considered as the logical alternative market to the Middle East, and the Koreans have had some sizable projects in this region. But Korea's traditional cost leadership based on their relatively cheap and disciplined manpower appears to be diminishing as much cheaper local laborers are now available, and increasing restrictions are being imposed upon the entry of foreign labor. The Asian market also requires competitive financing packages with technical assistance to local establishments, an area in which the Japanese have a decisive advantage considering their superior financing and technological capabilty. For these reasons the Middle East remained the most important market for Korean contractors.

The recent drop in oil prices and the completion of major infrastructure projects in the Middle East, however, has reduced the demand for Korean international construction significantly. This event has significantly impacted Korean contractors, as they have not been ble to find an alternative market to compensate for the reduced demand from the Middle East. With the reduction for demand, the nature of construction demand has also shifted to more technology-intensive projects. Many Korean contractors have no comparative advantage in this

field, and they are not competitive in this field with firms in other developed countries. Coupled with the challenge from other Third World counries in the ever-decreasing labor-intensive construction area, Korea has to restructure its strategy to sustain their high level share of the international construction market.

Due to the decreased demand in the Middle East, various studies have been conducted by Korean construction-related organizations to find ways to sustain the level of Korean international construction activities. However, their studies have invariably focused on the markets of the developing countries, the so-called traditional international construction markets outside the Middle East. Although the market in those areas is certainly the first choice with regard to consideration for further development, the constructon markets in the developed countries seem to have been grossly overlooked or have not been seriously considered by Korean firms as a potential market. Among the markets in the developed countries, North America, especially the United States, provides a unique potential market, as the demand is expected to grow significantly unlike the other regions of the market.

The market in the developed countries, especially in North America is not only large and diverse, but also stable. In the U.S. alone, the market is over $340 billion a year and all indications are that it will grow to over 10 percent of U.S. GNP in the next few years. This market, however, requires a different approach because its structure and characteristics are very different and offer a different set of challenges and opportunities. Furthermore, the contracting, subcontracting and procurement policies and procedures in the U.S. market are in many respects different from those commonly practiced in the international market. However, many are not insurmountable, and recently several European and Japanese companies have been successful in penetrating this market.

The purpose of this study is to examine the structure and characteristics of the Korean construction and building materials industry with emphasis upon their international competitiveness. To do so, this report will review:

- General characteristics of the Korean construction industry, the factors which enabled

the industry to reach its present level, its present structure, and the issues currently facing the industry.

- We will also briefly compare the U.S., and the Korean construction industry; and based on the differences and unique characteristics of the industry in Korea, review the possibility of the U.S. construction industry as a potential market for Korean contractors.

- Finally, the study will discuss the reorientation required by the Korean contractors with regard to working in the construction market in developed countries.

CHAPTER 2

THE KOREAN CONSTRUCTION INDUSTRY

2.1 General Background

During the past twenty years, Korea has shown the most impressive economic growth among developing and newly industrialized countries. The accomplishment of high economic growth is mainly attributable to the rapid industrialization and growth of export resulting from the Government's emphatic implementation of a series of economic development plans. Until the early 1960s, the Korean economy was agriculture-based and underdeveloped. The cornerstone of Korea's success has been a state commitment to outward looking trade and industrial policies. The growth of the Korean construction industry has followed its overall economy. In this regard, this chapter will look into Korea's industrialization process and structure. Based on the context of the industrialization process, the process of evolution of the Korean construction industry will be discussed.

2.1.1 Industrialization Process

The industrialization process of the Korean economy can be conveniently examined by dividing it into several periods, each characterized by distinctive features: the rehabilitation period (1954-1961), high growth and implementation of the economic development plans (1962-1971), the development of the heavy and chemical industries (1972-1978), and the structural adjustment to strengthening their industrial foundation (1979 onward).

In the 1954-1961 period, industrial policies emphasized the rehabilitation of the major industrial facilities destroyed in the Korean War (1950-1953) and the stablization of the standard of living. With the rehabilitation of such key industries as electric power and cement, some consumer goods industries were developed. Industrial progress in the 1950s, however, was minimal.

The first and second five year economic development plans were implemented from 1962 to 1971 and the economic foundation for industrial development commenced. The emphasis on industrial policies

moved to the development of strategic key industries for import substitution and export; and, to support it, social overhead capital was expanded and large-scale investment in these areas was underaken. The ratio of gross investment to GNP, which averaged 12.2 percent during the 1954-1961 period, increased to 17 percent during the 1962-1966 period and 26 percent during the 1967-1971 period (see Table 2.1.1). During the 1962-1971 period about 21.7 percent of GNP was used for capital formation. Of this, 9.7 percent was allocated to mining and manufacturing, and to social overhead capital and to other services (see Table 2.1.2). Average annual production growth rates for these two sectors was recorded at 17.1 percent and 10.6 percent, respectively over the period, which was higher than that of the 1950s (see Table 2.1.3). During this period chemical industries, including various intermediary chemical goods industries achieved a remarkable development. During the first half of the 1960s the chemical fertilizer and oil refining industries were developed to meet domestic demand. Consumer durable goods such as televisions, refrigerators, and automobiles began to be produced. The industrial activities in these industries stimulated the development of related industries such as iron and steel, petrochemical, etc. Large-scale investments for the construction of highways, railways and electric power facilities, were also undertaken, strengthening the infrastructure and industrialization.

In the 1970s greater emphasis was given to the development of the heavy and chemical industries to promote import substitution of intermediate and capital goods and to make those industries new strategic export industries. Large-scale investments were made in shipbuilding, automobile, machinery and chemical industries. As a result of the intensive development, the heavy and chemical industries became a leading sector in economic growth. In the late 1970s most of the industries became export industries, shifting industrial activities from the domestic to international area. Economies of scale were pursued to achieve international competitiveness, as industrial activities became international market oriented. The intensive development of the chemical and heavy industries in the 1970s, contributed greatly to the advancement of industrialization, but brought about a structural problem of unbalanced sectoral investment. Due to industrial policies,

Table 2.1.1 Trend of Gross Domestic Investment and Saving
(percent of GNP)

Year	Gross domestic investment	Gross domestic saving
1954-1961	12.2	3.2
1962-1966	17.0	8.8
1967-1971	26.0	16.0
1972-1976	27.1	20.8
1977-1981	30.9	22.8
1982	27.0	22.4
1983	27.8	24.8
1984	29.9	27.4

Source: Bank of Korea

Table 2.1.2 Composition of Fixed Capital Formation by Industrial Use
(percent)

Sector	1954-1961	1962-1970	1971-1978	1979-1983
Total	100.0	100.0	100.0	100.0
Agriculture, forestry and fisheries	12.6	8.3	8.9	7.8
Mining and manufacturing	22.9	23.7	22.1	15.6
(Manufacturing)	(21.6)	(22.9)	(21.2)	(15.3)
Social overhead capital	2.8	38.2	33.8	34.5
Other services	61.7	29.8	35.2	42.1

Source: National Income Accounts, Bank of Korea
Note: 1954-1961 and 1962-1970 numbers are based on 1975 price, and 1971-1978 and 1979-1983 are based on 1980 price.

Table 2.1.3 Annual Growth Rates by Industrial Sectors (percent)

Sector	1954-1961	1962-1970	1971-1978	1979-1980
Agriculture, forestry and fisheries	3.4	3.5	3.3	2.9
Mining and manufacturing	11.1	17.1	17.7	5.9
Social overhead capital and other services	3.3	10.6	9.8	4.1
GNP	3.9	8.7	9.9	4.4

Source: National Income Account, Bank of Korea

Table 2.1.4 Trend of GNP, Growth Rate and Composition (in billions of 1980 won)

	GNP					Composition		
Year	GNP	Gr.	Primary	Secondary	Tertiary	1st	2nd	3rd
1971	18,797.4	8.8	5,122.0	3,288.8	10,386.6	27.2	17.5	55.3
1972	19,868.7	5.7	5,271.6	3,711.8	10,885.3	26.5	18.7	54.8
1973	22,677.8	14.1	5,598.7	4,776.1	12,303.0	24.7	21.1	54.2
1974	24,425.2	7.7	6,013.2	5,476.4	12,935.6	24.6	22.4	53.0
1975	26,113.5	6.9	6,308.0	6,143.8	13,661.7	24.2	23.5	52.3
1976	29,803.8	14.1	6,900.3	7,493.2	15,410.3	23.2	25.1	51.7
1977	33,590.0	12.7	7,077.3	8,670.9	17,842.0	21.1	25.8	53.1
1978	36,851.6	9.7	6,429.4	10,426.2	19,996.0	17.4	28.3	54.3
1979	39,249.2	6.5	6,862.1	11,393.7	20,993.5	17.5	29.0	53.5
1980	37,205.0	-5.2	5,372.5	11,226.5	20,606.0	14.4	30.2	55.4
1981	39,509.1	6.2	6,687.7	12,083.3	20,738.1	16.9	30.6	52.5
1982	41,736.7	5.6	6,962.5	12,514.1	22,260.1	16.3	30.0	53.3
1983	45,634.6	9.5	7,400.0	13,868.6	24,449.4	16.2	30.3	53.5
1984	49,179.7	7.6	7,431.3	15,864.6	25,883.8	15.1	32.3	52.6

Source: Korean Economic Yearbook, Federation of Korean Industries, 1985

investments during the 1970s, especially in the latter half of the decade, were heavily concentrated in the heavy and chemical industries, resulting in overcapacity of production facilities. Investment for technological innovation in the light industries was overlooked, thus reducing the comparative advantage of these sectors. Many industries, which had been internationalized could not successfully compete in the international markets. The worldwide economic recession mainly due to the second oil shock in 1979 combined with the nationalization of natural resources aggrevated the problem of excess capacity and misallocation of investment resources. The international competitiveness of strategic key industries such as iron and steel, nonferrous metals and petrochemical was affected. Industrial output was substantially reduced and the GNP growth rate recorded minus 5.2 percent in 1980 for the first time since the economic development plans started (see Table 2.1.4).

In 1979 to stabilize economic growth and overcome the above problems, the Government introduced a number of economic adjustment policies designed to improve the industrial structure and to strengthen international competitiveness. Investment in the heavy and chemical industries was substantially adjusted. Taking into account Korea's limited natural resources, industries using relatively little energy and raw materials were strategically promoted such as consumer electronic goods, machinery and the fine chemical industries. Recently the development of high technology industries such as semiconductors, computers, bioengineering and new materials industries is being accelerated. Attention has been drawn to the balanced development among related component industries plus small and medium enterprises. Since the latter 1970s Korea has intensified its efforts towards structural adjustments so as to strengthen the industrial foundation for a more stable growth pattern.

2.1.2 Structure of Industry

Industrialization is generally characterized by the expansion of the nonagricultural sectors in the field of production, employment and exports. Up to the early 1960s the agriculture, forestry and fisheries sector dominated the Korean economy, accounting for 45 percent of GNP. The mining and manufacturing sector was below the 12 percent level. Rapid industrialization, however, reshaped the

industrial structure and reversed those ratios. In 1976 the mining and manufacturing sector for the first time surpassed the agriculture, forestry and fisheries sector. The expanding trend of the nonagriculture sector has accelerated along with the progressive industrialization. The ratios of the mining and manufacturing sector and other service sectors reached 32.3 percent and 52.6 percent respectively in 1984 (see Table 2.1.5).

A substantial structural change also took place within the manufacturing industry. Before 1962, light industries led the manufacturing industries with 69.3 percent of the total manufacturing products while the heavy and chemical industries stood at only 30.7 percent in 1961 (see Table 2.1.6). The structure of manufacturing changed rapidly with the implementation of the economic development plans. Leading growth industries changed from labor-intensive industries to capital intensive, and to technology-intensive industries. In parallel, industries diversified themselves from consumer goods to intermediate goods and then to high technology products (see Table 2.1.6). However, this change in the industrial structure meant a change from a labor-intensive to a capital intensive one, and this resulted in a steady decline in employment elasticity in manufacturing (see Table 2.1.7). The growth of the heavy and chemical industry brought change in the industrial pattern. The number of large firms was greatly increased and the expansion within firms predominantly increased the role of large firms in the nation's industrial activity. In the manufacturing industries, the number of large firms (those employing more than 500 persons) increased from 72 in 1963 to 575 in 1982. The contribution by large-scale firms to total production increased from 27.9 percent in 1963 to 56.9 percent in 1982 (see Table 2.1.8). The increasing number of large firms contributed greatly to productivity enhancement, product standardization and the improvement of quality and international competitiveness. The pursuit of economy of scale brought about cost reductions through mass production and increased productivity. However, this contribution resulted in excessive concentration in some industries.

Table 2.1.5 Trend of Employment by Sector
(in millions)

Year	Total	Agr., forestry & fisheries	Mining & manufacturing	Social overhead & other services
1963	7.7	4.8	0.7	2.2
1965	8.2	4.8	0.8	2.5
1967	8.7	4.8	1.1	2.8
1969	9.4	4.8	1.3	3.2
1972	10.6	5.3	1.5	3.7
1974	11.6	5.6	2.1	3.9
1976	12.6	5.6	2.7	4.2
1978	13.5	5.2	3.0	5.3
1979	13.7	4.9	3.1	5.7
1980	13.7	4.7	3.1	6.0
1981	14.0	4.8	3.0	6.2
1982	14.4	4.6	3.2	6.6
1983	14.5	4.3	3.4	6.8
1984	14.4	3.9	3.5	7.0

Source: Korean Economic Yearbook, Federation of Korean Industries, 1985 Economic Statistics Yearbook, Bank of Korea, 1976

Table 2.1.6 Structural Changes in Manufacturing
(in percent)

Industry	1954	1961	1966	1971	1976	1981	1983
Heavy & chemical ind.	25.8	30.7	36.3	42.5	53.1	60.0	60.6
Industrial chemical	0.4	1.4	2.6	4.8	7.0	7.7	7.3
Petroleum product	-	-	8.3	16.4	10.3	9.4	8.9
Iron & steel	0.3	2.5	3.8	4.2	7.4	10.7	10.8
Machinery	2.3	2.8	2.0	1.4	2.3	3.0	3.4
Electrical machinery	0.5	1.0	2.3	2.6	5.3	8.5	8 6
Transportation equip.	2.5	3.2	4.1	2.8	4.2	4.3	5.1
Other	19.8	19.8	13.2	10.3	16.6	16.4	16.5
Light industry	74.2	69.3	63.7	57.5	46.9	40.0	39.4
Food & beverage	33.3	33.0	24.4	19.3	14.7	12.3	12.8
Textile	21.1	17.6	13.7	12.7	14.5	12.8	11.9
Wearing apparel	6.6	7.1	5.4	4.4	5.6	4.6	4.2
Other	13.2	11.6	20.2	21.1	12.1	10.3	10.5

Source: National Account, Bank of Korea
Note: 1954, 1963, 1966 numbers are based on 1975 constant market price
1971, 1976, 1981, 1983 numbers are based on 1980 constant price.

Table 2.1.7 Manufacturing Employment Elasticities

1970-1982	1.057
1970-1975	1.394
1973-1978	1.077
1975-1980	0.790

Source: Korea, Development in a Global Context, The World Bank, 1984
Note: Calculated by least squares regression with respect to real GNP

Table 2.1.8 Ratio of Output by Firm Size in Manufacturing

Year	5-49	50-199	200-499	500-	Total
1963	34.9	23.6	13.6	27.9	100.0
	(93.1)	(5.6)	(0.9)	(0.4)	(100.0)
1972	12.4	16.1	20.6	50.9	100.0
	(88.2)	(8.3)	(2.2)	(1.3)	(100.0)
1976	7.0	14.9	20.2	57.3	100.0
	(79.5)	(14.5)	(3.8)	(2.2)	(100.0)
1982	9.2	17.1	16.8	56.9	100.0
	(81.1)	(14.1)	(3.2)	(1.6)	(100.0)

Source: Manufacturing Survey, Economic Planning Board of Korea
Note: The numbers in the Parentheses denote the ratio of the number of firms

Table 2.1.9 Ratios of Export and Import to GNP
(in billions of dollars, percent)

	1961	1971	1973	1981	1982	1983	1984
GNP (A)	2.1	9.4	13.5	67.2	70.8	75.1	81.1
Total export(B)	0.04	1.1	3.2	21.3	21.9	24.9	29.3
Total import(C)	0.3	2.4	4.2	26.1	24.3	26.2	30.6
B/A	1.9	11.4	23.9	31.6	30.9	32.6	36.3
C/A	15.0	25.6	31.4	38.9	34.3	34.9	37.7
(B+C)/A	16.9	37.0	55.3	70.5	65.2	67.5	74.0

Source: Economic Statistics Yearbook, Bank of Korea

Table 2.1.10 Korea's Major Exports, Ranked by Size
(in U.S. Dollars (Millions)

1970			1975			1978			1981			Growth rate
SITC	Item	Value	SITC	Item	Value	SITC	Item	Value	SITC	Item	Value	1975-81 (%)
841	Clothing	213.4	841	Clothing	1,131.6	841	Clothing	2,523.2	841	Clothing	3,732.2	18.6
899	Other mfg. goods	104.2	031	Fresh fish	321.9	735	Ships	800.2	735	Ships	1,405.5	35.8
631	Plywood	92.2	653	Woven textiles	271.7	653	Woven textiles	775.0	653	Woven textiles	1,267.6	28.1
261	Silk	38.5	729	Elec. mach. NES	242.2	851	Footwear	686.2	724	Telecomm. eqpt.	1,118.0	39.5
031	Fresh fish	37.7	631	Plywood	208.1	724	Telecomm. eqpt.	611.5	851	Footwear	1,033.6	28.5
729	Elec. mach.	32.9	651	Textile yarn	205.0	031	Fresh fish	562.5	031	Fresh fish	765.6	17.3
653	Woven textiles	27.5	851	Footwear	191.2	729	Elec. mach. NES	486.6	729	Elec. mach. NES	706.3	18.3
652	Cotton fabrics	26.4	724	Telecomm. eqpt.	138.0	631	Plywood	414.7	651	Textile yarn	568.2	20.0
283	Nonfer. base metal ore	24.7	735	Ships & boats	137.8	651	Textile yarn	337.6	674	Iron, steel plate, sheet	564.4	40.8
851	Footwear	17.2	061	Sugar & honey	116.7	674	Iron, steel plate, sheet	293.2	678	Iron, steel tubes, pipes	514.9	44.6
292	Crude veg. materials	14.6	899	Other mfg. goods	105.1	831	Travel goods	277.1	629	Rubber articles	482.3	34.7
054	Fresh veg.	14.5	332	Petroleum prod.	95.0	894	Toys, sporting goods	261.1	631	Plywood	395.2	8.0
651	Textile yarn	13.6	629	Rubber articles NES	90.3	629	Rubber articles	225.1	672	Iron, steel primary forms	390.3	53.8
121	Tobacco unmfg.	13.4	893	Articles of plastics	86.6	891	Sound recorders	204.2	661	Cement	379.5	26.4
276	Other crude minerals	8.5	891	Sound recorders	83.2	678	Iron, steel tubes, pipes	172.7	894	Toys, sporting goods	365.2	29.9
655	Special textile products	7.7	831	Travel goods	79.4	661	Cement	167.6	831	Travel goods	344.3	23.6
674	Iron, steel plate, sheet	7.6	674	Iron, steel plate, sheet	74.3	561	Fertilizers	162.1	691	Structure & parts NES	328.4	82.3
561	Fertilizers	6.3	661	Cement	73.1	899	Other mfg. goods	143.2	731	Railway vehicles	319.2	83.2
724	Telecomm. eqpt.	5.8	894	Toys, sporting goods	69.0	734	Aircraft	133.3	673	Iron, steel shapes	290.4	47.1
734	Aircraft	5.2	121	Tobacco unmfg.	66.3	691	Structure & parts NES	113.2	891	Sound recorders	273.8	17.7
	Total Exports	835.2		Total Exports	5,081.0		Total Exports	12,710.6		Total Exports	21,253.8	34.2

Notes: (1) Growth rate 1975-81 = annual compound growth rates between 1975 and 1981 for the items listed in 1981.
(2) SITC 629 Rubber articles NES mainly consists of rubber tires.
(3) SITC 724 Telecommunications equipment = TV, radios and electronic components.
(4) SITC 729 Electric machinery NES mainly consists of transistors, batteries.

Source: UN Trade Data (World Bank Trade System).

Table 2.1.11 Total Exports by Country of Destination
(top five destinations, in millions of dollar)

Rank	1979	1980	1981	1982	1983	1984
1	U.S.A.	U.S.A.	U.S.A.	U.S.A.	U.S.A.	U.S.A.
	4,373.9	4,606.6	5,660.6	6,243.2	8,245.4	10,478.8
	(29.0)	(26.3)	(26.6)	(28.5)	(33.7)	(35.8)
2	Japan	Japan	Japan	Japan	Japan	Japan
	3,353.0	3,039.4	3,502.8	3,388.1	3,403.5	4,602.2
	(22.2)	(17.4)	(16.4)	(15.5)	(13.9)	(15.7)
3	W. Germany	Saudi	Africa	Saudi	Saudi	Hong Kong
	845.3	946.1	1,286.6	1,125.4	1,436.5	1,281.2
	(5.6)	(5.4)	(6.1)	(5.1)	(5.8)	(4.4)
4	Saudi	W. Germany	Hong Kong	Africa	U.K.	India
	740.2	875.5	1,154.7	1,096.5	1,005.2	1,048.6
	(4.7)	(5.0)	(5.4)	(5.0)	(4.1)	(3.6)
5	U.K.	Hong Kong	Saudi	U.K.	Hong Kong	Saudi
	541.6	823.3	1,136.2	1,102.6	817.7	990.3
	(3.6)	(4.7)	(5.3)	(5.0)	(3.3)	(3.4)

Source: Monthly Review, Korea Exchange Bank

Table 2.1.12 Korea's Imports, 1963-1983
(million U.S.$, current prices)

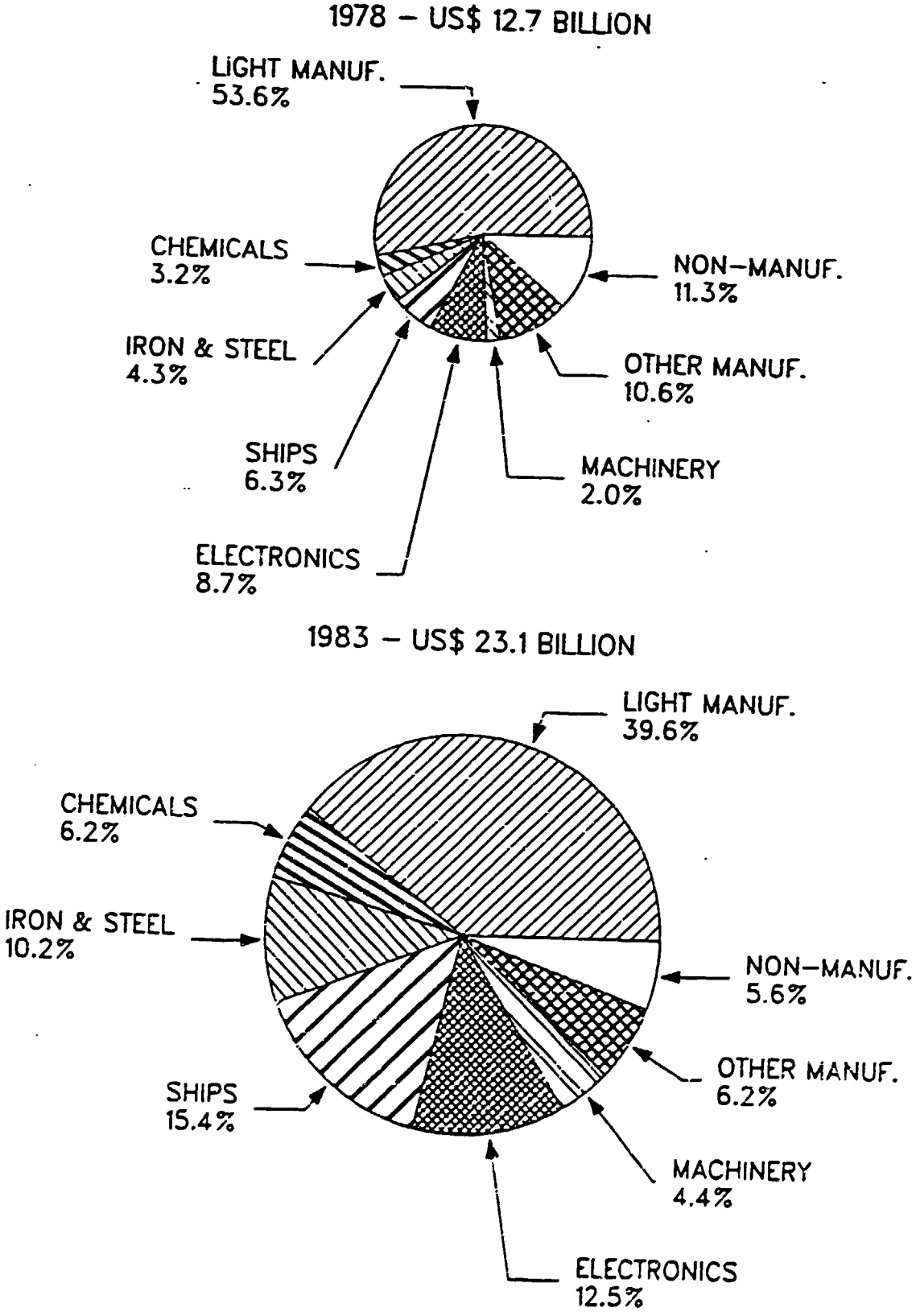
Year	Total	Capital goods	Crude oil	Raw materials for export use	Raw mat'ls for domestic use & other imports
1963	560.3	115.6	32.2	-	412.5
1964	404.4	69.5	25.9	6.9	302.1
1965	463.4	60.0	28.9	10.4	364.1
1966	716.4	171.7	40.6	101.1	403.0
1967	996.2	310.2	59.4	135.2	491.4
1968	1,462.9	533.2	72.8	213.0	643.9
1969	1,823.6	593.2	107.6	297.2	825.6
1970	1,984.0	589.5	125.0	386.3	883.2
1971	2,394.3	685.4	174.0	506.0	1,028.9
1972	2,522.0	762.0	206.0	687.6	886.4
1973	4,240.3	1,156.8	277.0	1,555.5	1,251.0
1974	6,851.8	1,848.6	966.0	2,039.3	1,997.0
1975	7,274.4	1,309.2	1,271.2	1,452.0	2,642.0
1976	8,773.6	2,427.4	1,607.0	2,144.0	2,595.2
1977	10,810.5	3,008.1	1,926.0	2,427.0	3,449.4
1978	14,971.9	5,080.1	2,187.0	2,948.0	4,756.6
1979	20,338.6	6,314.0	3,100.0	3,444.0	7,480.6
1980	22,291.7	5,125.0	5,633.0	3,799.0	7,735.0
1981	26,131.4	6,158.2	7,375.7	4,587.3	9,010.2
1982	24,250.8	6,232.7	6,102.8	4,644.5	7,270.8
1983	26,192.2	7,814.7	5,576.7	4,801.7	7,999.1

Source: Major Statistics of Korean Economy, Economic Planning Board, 1983

Korea's total commodity export reached 29.4 billion dollars in 1984 and the ratio of export to GNP accounted for 36.3 percent (see Table 2.1.9). Before the early 1960s, Korea's principal exports consisted primarily of products, but now more than 90 percent of all export merchandise goods is manufactured goods. The major exports of the early seventies: clothing, plywood, sill, toys, fresh fish, etc. were outclassed by foreign competitors, and the leading sectors of export during the eighties are: machinery transport equipment, chemical and steel. Exports were considerably diversified and the structure of the merchandise exported changed dramatically towards the heavy and chemical industries (see Table 2.1.10 and Figure 2.1.1). Diversification was also evident in the geographical area. The U.S. and Japan which had bought three-fourths of Korea's exports, took less than half, while European economies and the oil producers absorbed close to 20 percent (see Table 2.1.11). The steady growth in exports was accompanied by a similar growth in imports. The rising share of the industrial sector in GNP, particularly in exported activities, contributed to the expansion of the import bill. This was because of the Korean industry's high dependence for raw materials and capital goods on imports. Table 2.1.12 shows the steady increase in Korea's import of raw materials for both export and domestic use.

The Korean economy has depended heavily on foreign capital, and the stockpiling of foreign debts is a critical concern. The annual growth in the urban labor force is expected to be about 3 percent per annum for the next few years while the employment elasticity of the manufacturing sector has been steadily decreasing. These factors necessitate a high growth in the economy (more than 6 percent per annum), and a higher growth in exports with the growth of imports equal to that of GNP so as to improve the balance of payment. An analysis of past trading patterns suggests that as the labor rich, export-oriented countries progress towards industrial maturity, exports of raw materials and light manufucturing give way to exports of standardized intermediate goods which, in turn, are later joined by exports of differentiated manufactures. Evidently Korea is now moving to challenge the advanced countries in products such as consumer electronics, where the technology is still evolving. Behind this strategy, was the realization that

Figure 2.1.1 Composition of Merchandise Exports



rising unit labor costs in the light industries were placing Korean producers at a disadvantage in international markets. A continuation of high export growth called for a change in the mix of manufactures, as did the desire to deepen the industrial base and raise domestic value added. In expanding the exports of standardized commodities such as steel, chemicals, transport equipment, machinery, consumer durable goods and electronics, Korean firms have been aided by a number of factors:

(a) Government support, which included subsidized credit, reduced some of the risks of establishing large-capital intensive production units in the absence of assured markets.

(b) A labor force well endowed with the necessary industrial skills shortened the learning period.

(c) Fifteen years of intensive trading in light manufactures created links with foreign markets, which established the reputation of the Korean firms and concentrated within large trading corporations a wealth of experience which could be harnessed to the sale of new products. However, there are a number of disadvantages in such departure from traditional trading and industrial patterns. These include:

- The smallness of the economy militated against the realization of scale economies. If optimally sized plants were constructed, they had from the outset to depend upon their ability to sell abroad.

- The limited sophistication of the domestic market has not allowed producers the lattitude to launch, test and refine differentiated manufactures, in a protected environment before venturing overseas.

- Korea is only now beginning to accumulate sufficient reserves of scientific manpower to develop the research infrastructure needs to sustain competitiveness in quality and technology conscious differentiated product markets.

2.1.3 Development of Construction Industry

The construction industry is a major sector of the economy and reflects to a very large extent both how well the economy is doing in terms of growth, stability, and employment and in which direction the

national economy is growing. The annual volume of construction activity accounts for a significant portion of the private and public sector investment. To the extent that investment today is a prime determinant of the future productive capability of the nation, its contribution to GDP and its composition is of major concern. The contribution of construction to the Korean GDP has grown from 2.5 percent in 1962 to 6.4 percent in 1972 and 9.9 percent in 1983, with the expansion of its infrastucture and its industrial base, as well as the mass supply of housing. It is interesting to observe the difference in the growth rate between GDP and construction which has been fluctuating intensively. However, construction on the average, has grown faster than GDP (see Table 2.1.13). The construction industry employed 903,000 persons in 1984 which accounted for 6.3 percent of total employed manpower (see Table 2.1.14). The total volume of construction output in 1984 was 16.2 trillion won (about $19.6 billion) of which 8.8 trillion won (about $10.6 billion) was in the domestic market and the remaining 7.4 trillion won overseas. Approximately 51 percent of the domestic activity is engaged in public construction and the remaining 49 percent is comprised of private owners of which more than half are engaged in building construction. Table 2.1.16 shows the percentage distribution in 1984 of total construction by type and ownership. Korean contractors' international activities were started in 1965 in Southeast Asia. In 1973, they had their first contract in the Middle East. Since then, Korean contractors have shown remarkable performance in the international construction market. This performance was attributed to the acquisition of required capabilities through domestic activities.

The Korean construction industry gained its strength through reconstruction after the Korean War, and grew rapidly due to the increased construction demand for construction of industrial bases and infrastuctures during the first and second economic development plans in the 1960s. Some 42-44 percent of all industrial facilities; 40 percent of housing; 47 percent of railways; 500km of roads; 40km of bridges; and 80 percent of the power generating facilities were destroyed by the War. The rehabilitation and reconstruction efforts were made largely based on U.S. aid. Korea received $3.2 billion in economic aid from the U.S. from 1945 to 1961, and about $12.3 billion was given during the 1953 to

Table 2.1.13 GDP and Construction Statistics, 1972-1983

Year	GDP 1980 Bi. won	Constr. 1980 Bi. won	Constr./ GDP Percent	GDP Index 1980=100	Constr. Index 1980=100	GDP Growth Rate	Constr. Growth Rate	Difference Gr. Rates GDP-Const.
1972	18124	1152	6.4	54.1	38.5	5.5	0.9	4.6
1973	20615	1468	7.1	61.6	49.0	13.7	27.4	-13.7
1974	22194	1508	6.8	66.3	50.4	7.7	2.7	4.9
1975	23835	1716	7.2	71.2	57.3	7.4	13.8	-6.4
1976	26736	1894	7.1	79.8	63.3	12.2	10.4	1.8
1977	29553	2395	8.1	88.3	80.0	10.5	26.5	-15.9
1978	32303	2948	9.1	96.5	98.5	9.3	23.1	-13.8
1979	34622	3036	8.8	103.4	101.4	7.2	3.0	4.2
1980	33484	2994	8.9	100.0	100.0	-3.3	-1.4	-1.9
1981	35872	2832	7.9	107.1	94.6	7.1	-5.4	12.5
1982	37880	3399	9.0	113.1	113.5	5.6	20.0	-14.4
1983	41424	4119	9.9	123.7	137.6	9.4	21.2	-11.8

Source: Korean Economic Yearbook, The Federation of Korean Industries, 1985

Table 2.1.14 Employed Persons by Industry
(Thousand Employees by Percent)

Year	Total employed	Agriculture etc.	Manufacturing & mining	Construction	Others
1972	10,559	5,383	1,478	422	3,275
	(100.0)	(51.0)	(14.0)	(4.0)	(31.0)
1973	11,139	5,570	1,782	334	3,453
	(100.0)	(50.0)	(16.0)	(3.0)	(31.0)
1974	11,586	5,561	1,970	463	3,592
	(100.0)	(48.0)	(17.0)	(4.0)	(31.0)
1975	11,830	5,442	2,248	473	3,667
	(100.0)	(46.0)	(19.0)	(4.0)	(31.0)
1976	12,556	5,650	2,637	502	3,767
	(100.0)	(45.0)	(21.0)	(4.0)	(30.0)
1977	12,929	5,430	2,844	646	4,008
	(100.0)	(42.0)	(22.0)	(5.0)	(31.0)
1978	13,490	5,126	2,968	809	4,587
	(100.0)	(38.0)	(22.0)	(6.0)	(34.0)
1979	13,664	4,919	3,143	820	4,782
	(100.0)	(36.0)	(23.0)	(6.0)	(35.0)
1980	13,705	4,658	3,095	841	5,111
	(100.0)	(33.3)	(22.6)	(6.1)	(37.3)
1981	14,048	4,806	2,996	875	5,372
	(100.0)	(34.2)	(21.3)	(6.2)	(38.3)
1982	14,424	4,623	3,157	831	5,813
	(100.0)	(32.0)	(21.9)	(5.8)	(40.3)
1983	14,515	4,314	3,383	816	6,002
	(100.0)	(29.7)	(23.3)	(5.6)	(41.4)
1984	14,417	3,909	3,493	903	6,112
	(100.0)	(27.1)	(24.2)	(6.3)	(42.4)

Source: Major Statistics of Korean Economy, Economic Planning Board, 1980
Korean Economic Yearbook, The Federation of Korean Industries, 1985

Table 2.1.15 Total Value of Construction in Korea, 1984
(10 millions of won)

Industry	Total value of construction	
Private construction		
Residential building	95,708.459	(10.9 %)
Nonresidential building	149,280.945	(17.0)
Civil work	38,782.447	(4.4)
Other	127,951.672	(14.6)
Total private construction	411,723.523	(46.9)
Public construction		
Residential building	32,902.919	(3.7)
Nonresidential building	87,415.460	(10.0)
Civil work	249,849.243	(28.5)
Other	80,875.924	(9.2)
Total public construction	451,043.546	(51.4)
Foreign organizations in Korea	14,979.708	(1.7)
Total value of construction	877,746.777	(100.0)

Source: Report on Construction Work Survey, Economic Planning Board, 1985

Table 2.1.16 Percent Distribution of Value of Construction by Ownership

	Public						
Type	Central gov't.	Local gov't.	Other	Total Public	Private	Foreign org.	Total
Residential building	0.2 %	0.8	2.7	3.7	10.9	0.1	14.7
Nonresidential building	2.5	4.6	2.9	10.0	17.0	1.0	28.0
Civil work	5.5	12.1	10.9	28.5	4.4	0.4	33.3
Other	1.8	2.7	4.7	9.2	14.6	0.2	24.0
Total	10.0	20.2	21.2	51.4	46.9	1.7	100.0

Source: 1984 Report on Construction Work Survey, Economic Planning Board

1961 period for rehabilitation and reconstruction efforts. The Korean construction industry grew rapidly as the result of the demand created by this situation and the construction of U.S. military facilities. As a result, they also accumulated significant capital, experience and construction technologies, aided by the U.S. military build up in Korea which produced many large-scale construction projects since 1957. By 1960, construction's contribution to GNP increased to 2.1 percent from 1.5 percent in 1953.

Participation in U.S. military projects by Korean contractors provided unique opportunities to the construction industry. U.S. military projects consisted mostly of building and civil engineering projects, not new for Korean contractors, but whose characteristics were largely unfamiliar to Korean contractors. The following are a few different points observed in carrying out U.S. military projects:

- U.S. military projects were relatively more profitable than other projects (especially with the aid of continuous devaluation of the Korean currency against the dollar) and many contractors who participated in these projects later became the pioneers of the development of international construction markets in the 1960s and 1970s.

- These projects required the preparation of formal bidding documents and these requirements provided Korean contractors with the skills and experience in estimation and bidding which were necessary to enter the international construction market.

- Standard project specifications were almost nonexistent or usually ignored if they existed due to the urgency of rehabilitation in local projects. However, these specifications were strictly adhered to for U.S. military projects and this helped Korean contractors acquire the knowledge and experience of international standard specification and international standard practices of the project execution and quality control. This experience greatly helped Korean contractors to enter international construction markets.

- Generally U.S. military projects required Korean contractors to use more sophisticated equipment in project execution. This requirement forced Korean contractors to acquire and operate new construction equipment. This helped and expedited the modernization of the industry.

In 1965 U.S. military forces began to be drastically reduced and a "Buy American" policy began to be strictly enforced, thus reducing U.S. military projects in Korea. U.S. military projects contributed significantly to total Korean construction. In 1964 it reached $15.3 million which is equivalent to 17 percent of Korea's total construction that year (see Table 2.1.17). Moreover, U.S. military construction projects were more significant in terms of providing opportunities for Korean contractors to expose themselves to international standard specifications and practices in the areas of building, contracting, project execution and procurement which are vital for international construction operations.

In 1962 Korea started a series of ambitious economic development plans. The first five year plan for economic development (1962-1966) was characterized as achieving outward and export oriented economic development through establishment of industrial bases and infrastructure. They were mostly financed through foreign services. During this period, construction played a major role and grew at an average of 17.4 percent per year by constructing social overhead capitals and upstream industrial facilities such as refineries, fertilizer, cement plants, etc.

The latter part of the 1960s was characterized by Korea's involvement in the Vietnam War, the second five year and economic development plan (1967-1971), and the rapid expansion of construction demand and construction of large-scale projects such as the construction of the Seoul-Busan Highway and several multipurpose dams. It was during this period that Korea's first overseas construction started and large investments were made to the establishment of social overhead capitals such as irrigation, reclamation, roads, product facilities, electric power and communciation facilities. Private investment to plant facilities and buildings were actively made as well as Government

Table 2.1.17 Trend of U.S. Military Construction in Korea

Year	Value of U.S. military projects ($ million)	Percent of total construction
1962	14.1	12.6
1963	5.4	4.8
1964	15.3	17.0
1965	13.4	15.3

Source: Construction Association of Korea

Table 2.1.18 Foreign Financing During the First and Second Economic Development Plans (in millions of dollar)

		Loans					Foreign invest.	
Year	Total	Sub total	Official	Percent	Commerc.	Percent	Amount	Percent
1962-66	307.9	291.2	115.6	35.7	175.6	57.0	16.7	5.4
1967-71	2,261.9	2,165.5	810.8	35.4	1,354.7	59.9	96.4	4.3

Source: Economic Planning Board of Korea, 1979

investment. The investment in construction during this second five year economic development plan period accounted for 34.3 percent of total investment of 980 bilion won and 72.4 percent of total construction investment were made for the social overhead capital. One of the most important projects constructed during this period was the Seoul-Busan Highway - the first part of 10 year highway construction plan which included the construction of 1,593 km of highways. Together with highway construction, several multipurpose dams were constructed during this period and a ten year plan for four river basins developed (1972-1981) which included the construction of 12 multipurpose dams which was announced in 1971. In 1970, the task force project team was formed in to construct the subway system in Seoul.

The large-scale construction projects of the 1960s mostly financed by foreign loans and the constant increase of foreign financing further fueled the demand for construction. During the first and second economic development plan period, the amount of foreign financing reached $2,456 million and $2,170 was made during the second plan period (see Table 2.1.18). These foreign financed projects caused a lot of changes in Korean construction both in terms of quantity and quality. Although the Government or parastatal organizations owned most of the projects, those investments were thorougly examined by the foreign organizations who provided financing. Those foreign-financed projects provided Korean contractors with the momentum to improve the capabilities in design, construction, procurement, management and all the related fields.

Through post-war reconstruction and two five year economic development plans, the Korean construction industry accumulated substantial experience and technology. At the same time, the U.S. military projects in Korea and foreign financed large-scale domestic projects in the 1960s provided the necessary experience and knowledge to carry out international construction activities.

2.2 International Construction Operation

The Koreans started their international construction operation in 1965 when Hyundai Engineering and Construction Company contracted a highway construction project in Thailand. Since then, Korean overseas construction activities have mostly been in Southeast Asia and in the

Pacific Region until 1972. This period is characterized as the Korean involvement in the Vietnam War. By that, we mean that many Korean contractors could get contracts for the projects related to the military operation or rehabilitation of war destructed facilities. During this period, Korean contractors also developed many other areas of the market. When the Vietnam War ended in 1972, Korean coutractors had to find alternative markets elsewhere. In 1973, Samwhan Corporation opened the Middle East market by contracting a highway construction project in Saudi Arabia. By 1973, the Korean contractors' coverage of the international market became substantial, but their total contract amount during the 1965 to 1973 period was only about $423 million (see Table 2.2.1).

From 1974 the Korean international construction activity expanded rapidly until 1981 when the slow decline started. The 1974-1981 period is characterized as rapid expansion of Korean international construction. This period is also concurrent with the third (1972-1976) and fourth (1977-1981) economic development plans. In this period, the economic development plans placed emphasis on the development of heavy industry and export promotion resulting in rapid internationalization of the Korean economy. Internationally, this period experienced two oil shocks which caused worldwide economic recession while oil exporting countries in the Middle East realized enormous oil revenues. These oil dollars created the Middle East construction boom. Although the countries in the Middle East had more than enough financial resources for development, they lacked many other resources such as manpower, technology and management capability, all vital for development. At the same time, Korean contractors could offer their experience accumulated in the domestic market as well as in Southeast Asia, well disciplined manpower backed up by efficient support from government policies. On the other hand, the stockpiling of foreign debts due to chronic current account deficit aggravated by the oil shock became a heavy burden for the Korean economy in the 1970s. The biggest immediate task for the Korean economy at that time was earning the foreign currency to keep its economy going. Brisk performance by Korean contractors in the Middle East greatly helped their national economy out of trouble during that period. Until 1984, the total Korean international contract amount was

Table 2.2.1 Number of Firms Doing Overseas Construction (1965-1981)

Year	Middle East	South-East Asia	Pacific area	Latin America	Africa	North America
1965		3				
1966		5				
1967		12	1			
1968		11	1			
1969		10	2			1
1970		10	3			2
1971		12	4	1		
1972		13	7			
1973	1	14	7	1		
1974	7	15	9	3	1	
1975	20	12	9		2	
1976	38	8	4	2	1	
1977	51	13	5	1	1	
1978	74	11	3	1	4	
1979	60	15	3		3	
1980	64	23	1		2	
1981	72	22	2		4	

Source: Nongovernmental White Paper on Overseas Construction, Overseas Construction Association of Korea, 1984

on the order of $80 billion. Considering that the total accumulated figure for overseas contracts totalled approximately $423 million by 1973, it can be readily seen that the Korean overseas construction activity increased rapidly since 1974 (see Tables 2.2.2 and 2.2.3). International work expanded slowly until 1974, then rapidly from 1974 to 1981. From 1982, Korean international contracts started to decrease significantly. In 1984, the total overseas contract amount was reduced from $14.3 billion in 1981 to $6.6 billion. From 1976 until 1983, Korean international contracts accounted for more than 50 percent of its combined domestic and international contracts (see Table 2.2.4); however this seems to be unevenly distributed. The Koreans heavily concentrated their efforts in the Middle East market. Of the 35 to 45 percent of its international contracts, the Middle East provided Korea with more than 70 percent of its international contracts; and if North Africa is included in the Middle East, this number will go well over 80 percent.

Table 2.2.5 illustrates the rapid growth of migrant Korean labor, mostly in support of and in parallel with the construction activities of the Middle East. By 1982, overseas construction related employment accounted for 20.6 percent of total construction employment; about 68 percent was in the Middle East and more than 50 percent in Saudi Arabia. Well trained but cheap manpower was another reason for Korean competitiveness. Beginning in 1962, Korea implemented five consecutive five year economic development plans sucessfully. Throughout the 1960s, it maintained a reasonable infrastructure and industrial base which resulted in surplus trained manpower and construction equipment which they then utilized in Southeast Asia (Vietnam, Malaysia, Guam, etc.) to meet increased construction demand. By the end of the Vietnam War, Korean contractors had to find other markets for their manpower. It was the first oil shock that ignited the Middle East construction boom providing the Koreans with their largest market. They were able to carry out their Middle Eastern projects economically and efficiently through the experience they had gained in Southeast Asia.

Export-oriented Government policies and incentives have aided the development of Korea's competitiveness in the international construction market. The Korean construction industry is allowed accelerated depreciation for its construction equipment; and in order to increase

Table 2.2.2 Market Share of International Construction by 250 Largest Firms in billions of dollar (percent)

	1980	1981	1982	1983	1984	1980-1984
U.S.A.	48.3	44.1	44.9	29.4	30.7	197.4
	(44.5)	(33.9)	(36.5)	(31.4)	(38.1)	(36.8)
Korea	9.9	14.3	13.8	10.4	6.6	55.0
	(9.1)	(11.0)	(11.2)	(11.1)	(8.2)	(10.3)
Japan	4.1	8.2	9.3	8.7	7.3	37.6
	(3.8)	(6.3)	(7.6)	(9.3)	(9.1)	(7.0)
Europe	38.0	51.9	46.5	38.1	29.9	204.4
	(35.0)	(39.9)	(37.7)	(40.7)	(37.7)	(38.2)
-France	8.7	12.5	11.4	10.0	5.3	47.9
	(8.0)	(9.6)	(9.3)	(10.7)	(6.6)	(8.9)
-W. Germany	8.6	10.0	9.5	5.4	4.8	38.3
	(7.9)	(7.7)	(7.7)	(5.8)	(6.0)	(7.2)
-Italy	6.2	8.2	7.8	7.2	6.8	36.2
	(5.7)	(6.3)	(6.3)	(7.7)	(8.4)	(6.8)
-U.K.	4.9	7.9	7.5	6.4	5.6	32.3
	(4.5)	(6.1)	(6.1)	(6.8)	(7.0)	(6.0)
-Netherland	3.7	4.0	2.0	2.5	1.2	13.4
	(3.4)	(3.1)	(1.6)	(2.7)	(1.5)	(2.5)
-Yugoslavia	-	-	1.3	1.3	1.3	3.9
	(-)	(-)	(1.0)	(1.4)	(1.6)	(0.7)
-Other	5.9	9.3	7.0	5.3	4.9	32.4
	(5.4)	(7.1)	(5.7)	(5.6)	(6.1)	(6.0)
Turkey	-	2.7	2.7	3.4	1.9	10.7
	(-)	(2.1)	(2.2)	(3.6)	(2.4)	(2.0)
Other	8.3	8.7	5.9	3.6	4.2	31.1
	(8.0)	(6.8)	(4.8)	(3.9)	(5.2)	(5.8)
Total	108.6	129.9	123.1	93.6	80.5	535.7
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

Source: Various issues of Engineering News Records

Table 2.2.3 Market Share of Middle Eastern Construction by 250 Largest Firms in billions of dollar (percent)

	1980	1981	1982	1983	1984	1980–1984
U.S.A.	8.9	10.4	18.5	12.7	10.7	61.2
	(25.2)	(22.4)	(36.1)	(38.5)	(40.2)	(31.8)
Korea	7.6	10.5	10.7	4.8	4.9	38.5
	(21.5)	(22.6)	(20.9)	(14.5)	(18.4)	(20.0)
Japan	2.3	3.9	2.5	2.5	1.2	12.4
	(6.5)	(8.4)	(4.9)	(7.6)	(4.5)	(6.4)
Europe	11.7	17.2	15.4	9.4	6.8	60.5
	(33.0)	(37.0)	(30.1)	(28.5)	(25.6)	(31.4)
-France	2.5	4.2	3.7	2.3	1.6	14.3
	(7.2)	(9.0)	(7.2)	(7.0)	(6.0)	(7.4)
-W. Germany	3.1	3.0	2.4	1.3	0.9	10.7
	(8.8)	(6.5)	(4.7)	(3.9)	(3.4)	(5.6)
-Italy	2.3	2.3	2.8	1.1	1.1	9.6
	(3.5)	(4.9)	(5.5)	(3.3)	(4.1)	(5.0)
-U.K.	0.9	1.4	3.0	1.4	1.2	7.9
	(2.4)	(3.0)	(5.8)	(4.3)	(4.5)	(4.1)
-Netherland	0.9	2.1	0.4	1.3	0.3	5.0
	(2.6)	(4.5)	(0.8)	(3.9)	(1.1)	(2.6)
-Yugoslavia	-	-	0.6	0.5	0.2	1.3
	(-)	(-)	(1.2)	(1.5)	(0.8)	(0.7)
-Other	2.0	4.2	2.5	1.5	1.5	11.7
	(5.6)	(9.1)	(4.9)	(4.6)	(5.6)	(6.1)
Turkey	-	0.9	1.9	2.1	1.2	6.1
	(-)	(1.9)	(3.7)	(6.4)	(4.5)	(3.2)
Other	4.8	3.6	2.2	1.5	1.8	13.9
	(13.6)	(7.7)	(4.3)	(4.5)	(6.8)	(7.2)
Total	35.3	46.5	51.2	33.0	26.6	192.6
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

Source: Engineering News Records

Table 2.2.4 The Evolution of Korean International Construction Activity
Domestic versus Overseas Contract Amount
(millions of dollar)

	Contract amount			Percentage		
Year	Domestic	Overseas	Total	Domestic	Overseas	Total
1970	513	50	563	91	9	100
1971	467	113	563	81	19	100
1972	535	175	710	75	25	100
1973	681	238	919	74	26	100
1974	913	300	1,213	75	25	100
1975	1,056	800	1,856	57	43	100
1976	1,526	2,500	4,026	38	62	100
1977	2,608	3,516	6,124	43	57	100
1978	4,792	8,145	12,937	37	63	100
1979	5,963	6,351	12,314	48	52	100
1980	4,795	8,095	12,889	37	63	100
1981	6,056	13,536	19,592	31	69	100
1982	7,142	13,828	20,970	34	66	100
1983	7,358	10,786	18,144	41	59	100
1984	7,883	6,502	14,385	55	45	100
1985	9,545	4,500	14,045	68	32	100

Source: Economic Statistics Yearbook 1985
Statistics Yearbook of Construction Industry 1985
Korean Institute of Construction Technology 1984
Note: Discrepancy may exist in exchange rate

Table 2.2.5 Effect on Employment by Overseas Construction

	1977	1978	1979	1980	1981	1982
1. Overseas employment (person)	45,725	84,964	105,696	131,137	163,088	171,170
2. Employment opportunity (")	30,000	114,000	99,000	102,000	125,000	132,000
3. Overseas construction employment opportunity (")	75,725	198,964	204,696	233,137	288,088	303,170
4. Available manpower (thousand person)	13,440	13,932	14,206	14,454	14,710	15,080
5. Employed manpower (")	12,929	13,490	13,664	13,706	14,048	14,424
6. Construction employment (")	626	821	836	841	875	831
7. Unemployed (")	511	442	542	749	661	656
8. 3/5 (percent)	0.58	1.47	1.49	1.70	2.05	2.10
9. 1/6 (")	7.31	10.34	12.64	15.59	18.63	20.60
10. 6/5 (")	4.84	5.09	6.12	6.14	6.23	5.76
11. Unemployment rate (")	3.80	3.[illegible]	3.81	5.20	4.49	4.35
12. Increase in employment (thousand person)	373	561	174	42	342	376
13. Increase in overseas construction employment opportunity (person)	73,682	123,239	5,732	28,441	54,951	15,082
14. Rate of increase in total employment (percent)	2.97	4.34	1.29	0.30	2.49	2.67
15. Rate of increase in overseas construction employment opportunity (percent)	320.35	162.74	2.80	13.89	23.57	5.23
16. Contribution of 13 to increase in total employment (percent)	19.75	21.96	3.29	67.71	16.06	4.01

Source: Ministry of Construction
Bank of Korea

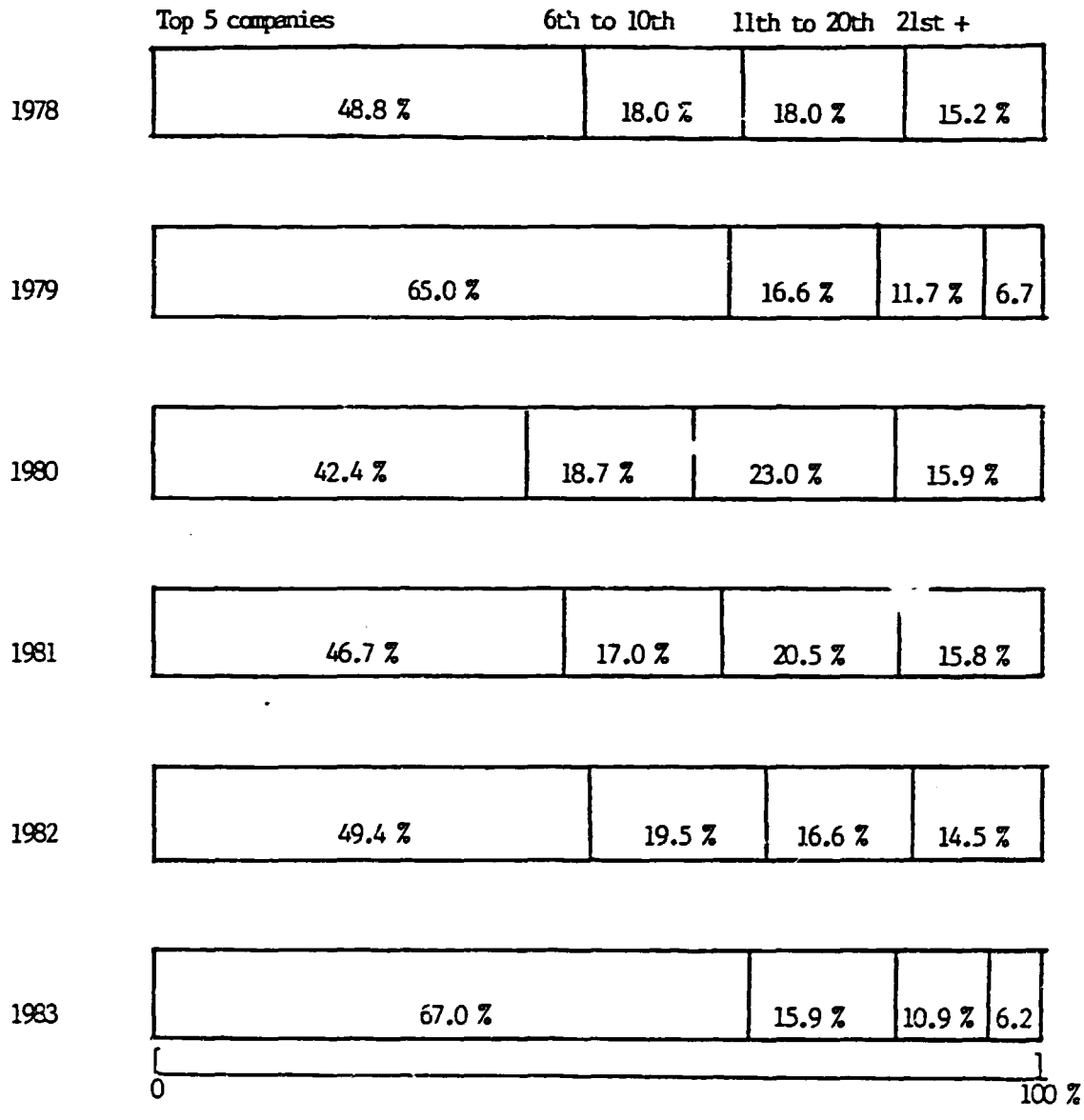
earnings of foreign exchange, domestic construction firms (as well as other exporters) are exempted from a business tax and are given a 50 percent tax credit against income and corporate taxes from all foreign currency earned. This has been enormously helpful in developing the country's construction industry and has led to Korea's success in exporting its services. Another aid has been the continuous devaluation of Korean currency.

As of 1983, 99 companies were licensed to carry out overseas construction projects. As a result of the high concentration of Korean contracts in a limited area, excessible international competition was created and prices began to decrease significantly. However, more than 80 percent of the contracts have been awarded to the ten largest companies (see Figure 2.2.1) From 1978 to 1983, the five largest companies accounted for 42 to 67 percent; the top ten accounted for 61 to 83 percent; and the top twenty for 85 to 94 percent of the total overseas orders received by Korean contractors. Since 1980, the contribution of the top five is increasing significantly and this trend is becoming more significant as market conditions deteriorate. In 1983, the top five accounted for 67 percent; the top ten for 82.9 percent and the top twenty accounted for 93.8 percent of total orders received; while 44 of the total 99 licensed companies received no orders at all. This illustrates that the bigger companies are generally more competitive in the international construction market. Based on this fact, the Korean Government has encouraged the formation of large and more competitive units. Since 1983 the amount of new orders has dropped sharply as has awards to Korean contractors. Terms of payment have become more rigid and many Korean contractors face severe financial problems. The Korean Government has had to step in to curtail the activities of several ailing contractors.

2.3 Structural Characteristics

The construction industry falls into two major categories; namely, general contractors and specialty trade contractors. In 1984, out of 10,602 construction establishments, there were 1,821 general contractos and 8,781 specialty trade contractors. If the specialization of contractors is used for classification, then the resulting major classifications are general builders, civil engineering contractors and

Figure 2.2.1 Trend of Overseas Orders by the Size of the Firms (1978-1983)



Source: Nongovernmental White Paper on Overseas Construction, Overseas Construction Association of Korea, 1984

specialty trade contractors (see Table 2.3.1). A large number of small firms and a small number of large firms make up the construction industry. In 1984, 47 percent of all construction establishments had total receipts of less than 50 million won (approximately $60,000), and 1.1 percent of all construction concerns reported total receipts of 10 billion won (approximately $12 million) or more which accounted for 73 percent of total receipts of the nation's construction industry that year (see Table 2.3.2). Another way to look at the size of construction firms is to consider the number of employees each firm has. Of the 10,602 construction industry establishments in 1984, 5,731 (54.1 percent) had less than 10 employees. These establishments had receipts of 165 billion won, which was only one percent of the total industry receipts (16,2 trillion won (see Table 2.3.3)).

In 1984, general contractors were estimated at 1,821 or 17.2 percent, but they accounted for 75.5 percent of all employees and 87.6 percent of total construction value. In a sense, one could say that the general contractors represent the Korean construction industry. This leaves only 24.5 percent of all employees and 12.4 percent of construction receipts to the specialty trade contractors, even though the number of specialty trade contractors is 8,781 or 82.8 percent of the total establishments. Among the general contractors, general builders numb· only 403 (3.8 percent), but account for 58.8 percent of the total value of construction and 45.9 percent of employees. The average number of employees per establishment varied widely by category; general builders averaged about 965 employees and 23,641 million won (approximately $29 million) receipts per year 1984, while specialty trade contractors averaged 23.6 employees and 229 million won (approximately $280 thousand) per firm. Note that the numbers for civil engineering firms are given as 176.5 employees and 3,287 million won (approximately $4 million) per firm (see Table 2.3.1). These numbers lead us to characterize the Korean construction industry as being dominated by a small number of large general builders. The area of specialty trade contractors is relatively weak. On an average monthly basis about 91 percent of all establishments had less than 100 employees. These establishments accounted for 18.4 percent of the industry's total employment, 9.5 percent of total construction receipts

Table 2.3.1 Summary Statistics for Construction Establishments, 1984
in millions of won

Industry	No. of establishments		Number of employees			Total value of construction		
	Number	Percent	Number	Percent	Av./firm	Amount	Percent	Av./firm
Construction as a whole	10,602	100.0	846,318	100.0	79.8	16,201,852	100.0	1,528
General contractors	1,821	17.2	639,062	75.5	350.9	14,188,638	87.6	7,792
-General builders	403	3.8	388,809	45.9	964.8	9,527,516	58.8	23,641
-Civil engineering	1,418	13.4	250,253	29.6	176.5	4,661,123	28.8	3,287
Specialty trade contractors	8,781	82.8	207,256	24.5	23.6	2,013,214	12.4	229

Source: 1984 Report on Construction Work Survey, Economic Planning Board, 1985

Table 2.3.2 Summary Statistics of Establishments by Receipts Size Class, 1984
in millions of won

Receipts size	Number of establishments		Number of employees		Total value of construction	
Construction as a whole	10,602	100.0	846,318	100.0	16,201,852	100.0
Less than 5 mil. won	241	2.3	294	0.0	795	0.0
5-9.9 mil. won	684	6.5	1,482	0.2	5,177	0.0
10-49.9 mil.	4,043	38.1	17,642	2.1	97,165	0.6
50-99.9 mil.	1,219	11.5	11,798	1.4	87,081	0.6
100-499.9 mil.	2,608	24.6	73,536	8.7	645,000	4.0
500-999.9 mil.	811	7.6	56,265	6.6	570,003	3.5
1,000-4,999.9 mil.	691	6.5	155,911	18.4	1,651,725	10.2
5,000-9,999.9 mil.	185	1.8	119,348	14.1	1,322,460	8.2
10,000 mil. or more	120	1.1	410,042	48.5	11,822,445	73.0

Source: 1984 Report on Construction Work Survey, Economic Planning Board, 1985

Table 2.3.3 Summary Statistics of Establishments by Employment Size Class, 1984
Amount: millions of won

Employment size class	Number of establishments		Number of employees		Total value of construction		Value added	
	Number	Percent	Number	Percent	Amount	Percent	Amount	Percent
Less than 10	5,731	54.1	24,867	3.0	165,324	1.0	80,681	1.1
10-19	1,423	13.4	19,808	2.3	199,355	1.2	95,174	1.3
20-49	1,618	15.3	51,014	6.0	561,511	3.5	272,311	3.8
50-99	856	8.1	59,588	7.1	607,945	3.8	311,225	4.3
100-199	358	3.4	50,641	6.0	573,758	3.5	299,394	4.2
200-499	344	3.2	116,283	13.7	1,402,268	8.7	698,162	9.7
500-999	184	1.7	138,938	16.4	1,865,220	11.5	883,163	12.3
1,000 or more	88	0.8	385,179	45.5	10,826,472	66.8	4,552,127	63.3
Total	10,602	100.0	846,318	100.0	16,201,852	100.0	7,192,287	100.0

Source: 1984 Report on Construction Work Survey, Economic Planning Board, 1985

and 10.6 percent of total construction industry value added. At the other end of the size scale, only eight percent of all establishments employed 1,000 or more employees, and these accounted for 45.5 percent of all industry employees, 66.8 percent of construction receipts and 63.3 percent of total value added. Medium sized firms, having 100 to 1,000 employees, accounted for 8.3 percent of the establishments, 36.1 percent of employees, 33.7 percent of construction receipts and 26.1 percent of the industry's total value added (see Table 2.3.3).

The large establishments predominate the general builders while the small establishments, with less than 100 employees, play negligible roles even in number of establishments. The negligible role of small builders suggests that either there is not much single family housing construction or that some of single family housing may not have been recorded in construction statistics. There exists some diseconomy of scale in single family housing construction and much single family housing in rural areas of developing countries is done by the informal sector of the construction industry. This may be the case in Korea. Recently the greater portion of Korea's urban housing is developed and provided in the form of multiple family housing and mostly in large-scale apartment complexes constructed by large-scale general contractors. This may be the reason why small general builders actually exist even though they account for only a negligible proportion of the total number of establishments (8 percent), 5 percent of employees, 3 percent of the value added of total general builders (see Table 2.3.4). On the contrary, the small establishments with less than 100 employees dominate the specialty trade contractors accounting for 95.6 percent of establishments, 56.4 percent of employees, 57.3 percent of the receipts and 53.1 percent of value added. This may reflect the characteristics of the specialty trade contractors' business; and unlike the general contractors, diseconomy of scale exists in this group of contractors.

Approximately one-eighth of all domestic construction receipts were in the form of subcontracting (see Table 2.3.5). However, the portion subcontracted varied widely within three major contracting groups. Only 7 percent of general builders and 5.2 percent of civil engineering contractors receipts were in the form of subcontracts while the comparable number of the specialty trade contractors was 51.3 percent.

Table 2.3.4 Distribution of Major Contracting Groups by Employment Size Class, 1984
Amount: millions of won

Employment size class	Number of establishments		Number of employees		Total value of construction		Value added	
	Number	Percent	Number	Percent	Amount	Percent	Amount	Percent
General Builders								
Less than 100	32	8.0	1,940	0.5	26,535	0.3	10,995	0.3
100-999	312	77.4	145,537	37.4	2,002,068	21.0	891,000	21.8
1,000 or more	59	14.6	241,331	62.1	7,498,912	78.7	3,187,697	77.9
Civil engineering contractors								
Less than 100	1,192	84.1	36,792	14.7	353,423	7.6	188,309	9.2
100-999	200	14.1	73,197	29.3	997,181	21.4	510,389	24.9
1,000 or more	26	1.8	140,264	56.0	3,310,519	71.0	1,349,353	65.9
Specialty trade contractors								
Less than 100	8,392	95.6	116,545	56.3	1,154,174	57.3	560,088	53.1
100-999	386	4.4	87,128	42.0	841,999	41.8	479,379	45.5
1,000 or more	3	0.0	3,583	1.7	17,041	0.9	15,126	1.4

Source: 1984 Report on Construction Work Survey, Economic Planning Board, 1985

Table 2.3.5 Percentage of Subcontracting Within Major Contracting Groups

Industry	Percentage of total construction receipts		Percent of industry receipts subcontracted	
General contractors	87.6	(77.7)	2.1	(2.4)
-General builders	58.8	(47 3)	1.5	(0.7)
-Civil engineering	28.8	(30.4)	3.3	(5.2)
Specialty trade contractors	12.4	(22.3)	50.3	(51.3)
Construction as a whole	100.0	(100.0)	8.1	(12.9)

Source: 1984 Report on Construction Work Survey, Economic Planning Board, 1985
Note: Numbers in the parentheses denotes domestic construction.

This suggests that subcontracting is the major source of revenue of the specialty trade contractors.

There are two major forms of organization for construction firms: individual proprietorships and corporations. Other less common legal forms of organization such as partnerships may also be used. According to the 1984 Report on Construction Work Survey, there were 6,496 individual proprietorships accounting for 61.3 percent of all construction establishments. These individual proprietorships accounted for construction value of 569 billion won, or 3.6 percent of total value of construction. Establishments classified as corporations accounted for 38.5 percent of all establishments and 96.5 percent of total business receipts. Although there are a large number of individual proprietorships, their contribution to the number of employees and value of construction is negligible in construciton as a whole. For the general builders, comprised of large companies, the contribution is more significant. The specialty trade contractors are more or less the smaller companies and naturally the proportion of individual proprietorship is higher accounting for 69 percent of establishments, 24.6 percent of total employees and 21.8 percent of total value of construction (see Table 2.3.6).

2.4 Development of Engineering Consultancy and Design Capability

Before 1961 almost no investment in engineering services took place in Korea. During the first five year economic development plan (1962-1967), plants for fertilizer production and petroleum refining were built on a turnkey basis. This had little impact on Korea's indigenous engineering capability. Some pioneering efforts by technical entrepreneurs in the 1960s to establish integrated engineering firms failed due to restricted domestic demand and lack of technical capability. Only construction and architectural design services maintained their operations. In the late 1960s, a partial localization of engineering services was accomplished in the construction of several chemical plants by a fertilizer company's technical team. In the early 1970s, the first integrated engineering firm (Korea Engineering Co., Ltd.) was created under the auspices of the Korean Government, as a joint venture with the Lummus Co. of the U.S. The company participated in a few engineering projects, but Lummus withdrew due to the lack of a

Table 2.3.6 Summary Statistics of Establishments by Legal Form of Organization, 1984
millions of won (percent)

	Number of establishments		Number of employees		Total value of construction	
Construction as a whole	10,602	(100.0)	846,318	(100.0)	16,201,852	(100.0)
Company corporation	4,080	(38.5)	780,470	(92.2)	15,625,013	(96.5)
Other corporation	26	(0.2)	784	(0.1)	7,122	(0.0)
Individual	6,496	(61.3)	65,064	(7.7)	569,718	(3.5)
General contractors	1,821		639,062		14,188,638	
General builders	403		388,809		9,527,516	
Company corporation	395	(98.0)	388,579	(99.9)	9,525,378	(100.0)
Individual	8	(2.0)	230	(0.1)	2,137	(0.0)
Civil engineering	1,418		250,253		4,661,123	
Company corporation	985	(69.5)	235,983	(94.3)	4,529,803	(97.2)
Other corporation	5	(0.3)	452	(0.2)	3,484	(0.1)
Individual	428	(30.2)	13,818	(5.5)	127,835	(2.7)
Specialty trade contractors	8,781		207,256		2,013,214	
Company corporation	2,700	(30.8)	155,908	(75.2)	1,569,832	(78.0)
Other corporation	21	(0.2)	332	(0.2)	3,638	(0.2)
Individual	6,060	(69.0)	51,016	(24.6)	439,745	(21.8)

Source: 1984 Report on Construction Work Survey, Economic Planning Board, 1985

market for engineering services. Lummus was replaced in the partnership by Tokyo Engineering of Japan. Before 1973, the Government influenced the engineering industry through the Professional Engineer's Law and, thereafter through the Engineering Service Promotion Law. The latter stipulated that when feasible a domestic engineering company should be the prime contractor for engineering services and it required registration of engineering firms and an annual report of their activities.

The value of engineering services was estimated at about one billion won (about $3.6 million) in the late 1960s, 2.1 billion won (about $4.3 million) for 632 projects in 1973; 25.6 billion won (about $50.7 million) for 3,031 projects in 1977; and 233.1 billion won (about $280 million) for 6,334 projects in 1984 domestically (see Table 2.4.1). Contract amounts have increased sharply since 1976 due to plant export as well as the localization of thermal power plants. Korean engineering services have passed through three developmental stages. The first stage was a period of foreign dependence in the 1960s, with package type foreign investment and engineering services. Local participation was restricted to some construction activities. The second stage in the early 1970s was characterized by an accumulation of technical experience, the enactment of a promotion law, and increase in plant construction. Some development was achieved in the areas of detailed engineering, procurement, supervision of construction, and project management. Construction technology was enhanced significantly. During the second half of the 1970s, the foreign construction boom (especially in the Middle East) spurred the further development of domestic engineering services. Turnkey engineering services and plant construction by domestic firms became feasible, and some plant export was achieved. Government intervention caused the localization of most engineering services, especially for plant construction. A remarkable upgrading of domestic engineering services was, therefore, achieved except for basic engineering, start-up, and operation guarantee. Beginning in 1977, Korean engineering companies started to get contracts from abroad and their foreign contract amount reached $109 million in 1982 then declined as the overseas construction activities declined (see Table 2.4.2).

Table 2.4.1 Trend of Domestic Engineering Contracts by Type
(Millions of Won)

Year	Total		Plant engineering			Integrated construction			Special engineering			Individual engineering		
	No. of proj.	Contr. amount	Number	Amount	Pct.	Number	Amount	Pct.	Number	Amount	Pct.	Number	Amount	Pct.
1973	632	2,134	134	994	46.6				108	454	21.3	390	686	32.1
1974	1,071	4,931	223	2,371	48.1				246	972	19.7	602	1,588	32.2
1975	1,738	8,629	243	3,246	37.6				430	2,462	28.5	1,065	2,920	33.9
1976	2,403	19,160	171	6,055	31.6				584	8,333	43.4	1,648	4,772	25.0
1977	3,031	24,608	375	9,801	39.8				2,619	14,687	59.7	37	119	0.5
1978	3,416	36,827	341	9,374	25.4				3,051	27,440	74.5	24	13	0.1
1979	3,838	79,032	566	48,282	61.1	68	1,385	1.8	3,204	29,365	37.1	-	-	-
1980	3,329	72,099	380	21,810	30.3	85	1,460	2.0	2,864	48,829	67.7	-	-	-
1981	3,981	105,913	314	39,409	37.2	119	1,746	1.6	3,667	66,304	61.2	-	-	-
1982	4,419	125,343	362	47,446	37.9	134	20,705	16.5	3,866	57,016	45.5	57	177	0.1
1983	4,825	177,769	526	83,550	47.0	686	37,655	21.2	3,472	55,944	31.5	141	620	0.3
1984	6,334	233,132	497	109,763	47.1	741	43,159	18.5	4,484	79,398	34.1	612	812	0.3

Source: Korean Engineering Service Association

Table 2.4.2 Trend of Foreign Engineering Contract by Type
(thousand of dollar)

Year	Total		Plant engineering			Integrated engr'g			Individual engineering		
	No. pjt.	Contract amount	No.	Amount	Percent	No.	Amt.	Pct.	No.	Amt	Pct.
1977	38	55,103	11	20,889	37.9	-	-	-	27	34,214	62.1
1978	33	20,326	17	10,399	51.2	-	-	-	16	9,927	48.8
1979	84	95,712	21	29,323	30.6	-	-	-	63	66,389	69.4
1980	66	93,194	34	30,347	32.6	-	-	-	29	62,847	67.4
1981	110	51,028	56	39,896	78.2	-	-	-	54	11,131	21.8
1982	129	109,040	62	83,303	76.4	1	362	0.2	66	25,475	23.4
1983	105	108,133	62	69,258	64.0	3	550	0.5	40	38,325	35.5
1984	136	62,990	52	48,373	76.8	3	365	0.6	81	14,252	22.6

Source: Korean Engineering Service Association

Table 2.4.3 Number of Engineering Firms by Type, 1985

Type	Number of firms
Plant engineering	14 (25)
Plant engineering	13 (10)
Integrated environmental engineering	0 (10)
Nuclear industrial engineering	1 (1)
Integrated construction engineering	7 (9)
Specialized engineering services	193 (193)
Individual engineering services	55 (55)
Total	269 (282)

Source: Korean Engineering Service Association
Note: () denotes the number of licenses.

Since the middle of the 1970s, Korean engineering services have grown remarkably. As of 1985, there were 269 engineering firms in Korea. Among them, 14 are plant engineering companies, 7 integrated construction engineering firms, 193 specialized engineering service companies, and 55 individual engineering services firms (see Table 2.4.3). They employ 25,950 employees and 2,659 of them are high level engineers or professional engineers by Korean standards (see Table 2.4.4). Fourteen plant engineering companies and 7 integrated engineering companies represent the larger and diversified engineering companies in Korea; however, the majority of these companies are more or less captive and not truly independently owned. Twelve out of 14 plant engineering companies are either subsidiaries of large integrated construction companies or part of the construction companies. This means, at least in plant engineering, that engineering companies alone have limited capability to secure the market. From the engineering company's standpoint, they have had problems in securing their workload without firm forward linkage with large construction companies or plant equipment fabricators. A possible explanation is that plant construction demand is particularly unstable compared to other kinds of construction, such as building and civil works and projects are usually come in the form of turnkey contract. At the same time, the construction companies need to have their own engineering arms to qualify themselves for turnkey projects. By having their own engineering company and sometimes general trading company, the construction company (usually a part of a large business conglomerate) can achieve vertical and horizontal integration. In addition, construction companies have developed a close cooperation with sectors of the heavy industries. The larger companies have developed heavy industry divisions with international connections for cooperation in overseas and domestic plant construction.

Although Korean engineering services have grown remarkably during last 10 years, their growth can be characterized as one of quantity rather than quality. They have achieved some capacity in basic designing especially in thermal power plant, but their activities are still mostly in detailed design. Still they have to rely on most of the basic designs of foreign engineering companies. This is partly because

the engineering workloads were acquired through the construction companies. Table 2.4.5 shows that about 80 percent of the engineering contracts acquired abroad are in the form of subcontracts. This dependency of engineering companies on construction companies is more significant in the plant construction area. So far the strategy of Korean construction companies for engineering services has not been based on long-term development of engineering capabilities. They tried to get the turnkey project for plant construction and mobilized the engineering organization around them. The construction companies, being the leader of the turnkey project organization, determine the capacity of the domestic engineering company and find foreign engineering companies for basic design and engineering if necessary. The leader of the turnkey project is generally conservative and is risk averse in selecting engineering organizations. Engineering has a vital impact on the whole project, but its cost is only a fraction of the total project cost. Furthermore, engaging a less qualified engineering company may risk the whole project.

2.5 Research and Development

The total productivity factor is influenced by a number of changes in the characteristics of inputs. The growth of output is generally ascribable to increases in the input of capital per man-hour and that which is contributed by technical change. There have been many studies to estimate the contribution of increased capital and technological change to the growth of output. The results invariably indicate the technological change is a predominant source of the growth of output. Technological change or improvement can be made by various means. While the process can commence through technology transfer from abroad, it must be supplemented by indigenous efforts in assimilating foreign technology and in innovation. In this section, Korea's industrial policies for technological changes and research and development activities, particularly in the construction industry, will be briefly reviewed.

2.5.1 Industrial Policies for Technological Changes

The source of technologies used in the development of Korean products in the 1970s has been foreign adopted and assimilated in the traditional sectors and foreign in modern industries. Foreign suppliers

2.4.5 Trend of Foreign Contract by Type of Contract (thousand of dollar)

	Total		Prime contract		Subcontract	
Year	Amount	Percent	Amount	Percent	Amount	Percent
1980	93,194	100.0	21,897	23.5	71,297	76.5
1981	51,028	100.0	7,790	15.3	43,238	84.7
1982	109,040	100.0	34,166	31.3	74,874	68.7
1983	108,133	100.0	19,208	17.8	88,925	82.2

Source: Korean Engineering Service Association

Table 2.4.4 Status of Manpower in Engineering Service Industry in Korea, 1984

	Total		Plant eng.		Int. const.		Special eng.		Indiv. eng.	
Qualification	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.	No.	Pct.
Total	25,950	100.0	8,899	100.0	2,512	100.0	14,332	100.0	207	100.0
High level engineer	2,659	10.2	1,137	12.8	358	14.2	1,127	7.9	37	17.9
P.E.*	829	3.2	330	3.7	125	5.0	349	2.5	25	12.1
Other	1,830	7.0	807	9.1	233	9.2	778	5.4	12	5.8
Engineer	9,169	35.4	3,517	39.5	1,074	42.8	4,502	31.4	76	36.7
Engr. 1st class*	3,160	12.2	1,425	16.0	376	15.0	1,336	9.3	23	11.1
Other	6,009	23.2	2,092	23.5	698	27.8	3,166	22.1	53	25.6
Other	14,122	54.4	4,245	47.7	1,080	43.0	8,703	60.7	94	45.4
Technician*	7,781	30.0	2,493	28.0	556	22.1	4,687	32.7	45	21.7
Other	6,341	24.4	1,752	19.7	524	20.9	4,016	28.0	49	23.7

Source: Korean Engineering Service Association
Note: * denote the qualification officiated by the Ministry of Science and Technology

and buyers, staffed with foreign experience and license and technical agreements, have been cited as important sources of foreign technologies primarily in modern and to a lesser degree in traditional industries. In addition, technological cooperation has enabled the Koreans to survey and study technologies unknown to them but which are complementary to their own traditional capabilities. However, the acquisition of this "know-how" is endangered by the increasing unwillingness of other countries to share technological knowledge. In addition, high technology projects offer few opportunities to discern new from traditionally familiar technologies and resources. Moreover, the policies aiming at this acquisition of "know-how" through international partnerships have resulted in the absence of substantial domestic research and development efforts which Korea is now trying to develop.

In the 1960s and early 1970s, the existing technologies reflected an increased capacity and concentration in production rather than in investment capabilities. Investments focused more in industries with long histories and less in modern industries. Only in the mid-1970s did Government policies attempt to deal with this lack of investment in modern industries. The new policies were incorporated in the Technological Development Promotio and Engineering Service Promotion Acts. These, among others, provided a framework for the assimilation of imported technologies, development of local research and development and integration of engineering, construction and managerial services in international projects. Marketing has not been a high priority for most internationally involved sectors and products. Overall, the Korean construction and related industries' marketing strategy has been focused on the reactive rather than proactive side. In the short term, reactive strategy helps maintain the current market share. Under this category, we can include the defense of building and simple infrastructure categories against international competitors and the limitation of foreign technologies. These policies have been successful in penetrating existing markets with existing products; i.e., in the building and simple infrastructure areas. One of the difficulties which the Korean construction and related industries face today is that of selling their products and services both in the existing and new markets. A proactive marketing strategy is required to

successfully attract future buyers of construction and related services. This approach needs to focus on identifying the customer's needs and putting together packages that satisfy them before other international competitors do. The indepth organization of research and development is also a proactive strategy that often places innovators way ahead of their competitors when a new technology is developed and gives them the time to capture and then maintain their market share based on the name they have established.

2.5.2 Research and Development

If we compare the resources devoted to research and development by industrialized countries to those devoted by developing countries, we find that modest amounts, both absolutely and relatively, were expended. In 1973 developing countries accounted for less than 3 percent of the total world expenditures on research and development, and their ratio of expenditures to GNP averaged about 0.36; whereas the ratio was more than 2 in industrial countires (UNIDO 1979). Until the mid-1970s, Korea's expenditures on R&D were less than .5 percent of GNP (see Table 2.5.1). Korea's ratio of expenditure on R&D to GNP at this time represented that of typical developing countries. Despite its importance, significant investments on technology development were not undertaken. With the active development of the heavy and chemical industries, however, investment for technology development was substantially boosted. The ratio of investment for technology development to GNP increased to 1.06 percent in 1983, exceeding the level of 1.0 percent which UNESCO suggests as a guideline for technological development in developing countries. Economic planners in Korea now view technology as the cornerstone of industrial maturity and fundamental to the continuance of an export-led economic growth. The Government's objective is to raise R&D spending to 2 percent of GNP by 1986 when the fifth economic development plan is finished (1982-1986), bringing Korea almost abreast with Japan which invests 2.2 percent in R&D and with the U.S. which devotes 2.3 percent of GNP to research. It is planned to increase R&D spending further to 2.5 percent of GNP by 1991, the final year of the sixth economic development plan (1987-1991).

Until recently the pattern of allocation of R&D expenditures favored the Government institutions and non-profit organizations working

Table 2.5.1 R&D Expenditures as a Percentage of GNP

Year	A. R&D Expenditures (current won in mill.)	B. GNP (current won in mill.)	A/B (%)
1970	10,547.75	2,735.93	0.39
1971	10,666.71	3,375.93	0.32
1972	12,028.15	4,154.02	0.29
1973	15,628.48	5,378.46	0.29
1974	38,182.08	7,503.10	0.51
1975	42,663.73	10,092.23	0.42
1976	60,900.04	13,881.11	0.44
1977	108,285.66	18,115.41	0.60
1978	152,418.34	24,225.30	0.63
1979	174,038.63	31,248.72	0.56
1980	211,726.65	37,204.98	0.57
1981	293,131.47	45,725.09	0.64
1982	457,688.49	51,786.60	0.89
1983	621,749.31	58,428.40	1.06

Source: Ministry of Science and Technology, Technology Annual, 1984
Note: Excluding Military and Defence R&D and Social Science and Humanities

Table 2.5.2 Allocation of R&D Expenditures by Sector
(current won in million)

Year	Total expenditures	Research institutes	Universities & colleges	Industry
1975	42,663.7	28,139.2 (66.0)	2,181.8 (5.1)	12,342.7 (28.9)
1976	60,900.0	43,780.1 (71.9)	1,978.7 (3.2)	15,141.2 (24.9)
1977	108,285.7	61,088.5 (56.4)	5,482.2 (5.1)	41,714.9 (38.5)
1978	152,418.3	78,072.9 (51.2)	20,548.4 (13.5)	53,802.0 (35.3)
1979	174,038.6	98,207.6 (56.4)	16,536.3 (9.5)	59,294.8 (34.1)
1980	211,726.7	104,472.6 (49.3)	25,902.1 (12.2)	81,351.9 (38.4)
1981	293,131.5	145,309.2 (49.6)	27,168.4 (9.4)	120,653.9 (41.9)
1982	457,688.5	186,076.5 (40.7)	66,610.0 (14.6)	205,002.0 (44.8)
1983	621,749.3	180,556.5 (29.1)	64,251.2 (10.3)	375,810.0 (60.6)

Source: Science & Technology Annual, Ministry of Science and Technology, 1984
Note: () denotes percentage

on basic research rather than industrial firms which tended to concentrate on product development and engineering. This is not particularly desirable as Government institutions normally cannot respond effectively to the actual needs and opportunities of industry. However, this tendency was reversed in 1983 when 60.6 percent of R&D expenditure was allocated to industry research organizations (see Table 2.5.2). The concentration of R&D activity in Government institutions and related organizations reflected two conditions: first, the Government was the major source of funds for R&D, and the normal practice was to support Government related organizations rather than to contract with private industry. Second, industry did not have the incentives or the funds to undertake much work on its own. However, this tendency was gradually corrected as industry's appreciation of R&D needs increased as did incentives for R&D spirited by new Government policies. By 1983, the private sector was financing a total R&D expenditure of 72.5 percent (see Table 2.5.3).

Seven hundred and twenty-three research organizations with 12,586 researchers in the Korean industry spent 375.8 billion won in 1983 which was equivalent to 0.66 percent of total sales (see Tables 2.5.4 and 2.5.5). These are in fact negligible numbers compared to the U.S., Japan, and other advanced countries. Five hundred and five thousand researchers were working in the U.S. industry, and they spent $55.7 billion in 1982. In Japan, 17,646 research organizations with 201,137 researchers spent $19.2 million in 1983. The Korean construction industry had 9 research organizations (2.6 percent) with 315 researchers (2.5 percent) spent 12 billion won (3.2 percent) for research and development. This is equivalent to .14 percent of total sales in 1983 and is one of the lowest levels of expenditures spent on R&D among all the industries. However, the figures mentioned are an average and do not represent the situation comprehensively. There are only 19 research institutions in the construction industry which are mostly operated by high ranking construction companies. This means the companies operating the research institutions are spending the money for R&D activities at a level substantially higher than the .14 percent of sales. Research efforts may be classified as:

Table 2.5.3 R&D Expenditures by Source of Funds, 1983
(millions of current won)

Sector	Total	Public	Private	Foreign
Total	621,749.3	187,897.9 (27.3)	268,747.0 (72.5)	1,043.5 (0.2)
Research inst.	180,556.5	140,188.3 (77.6)	39,653.8 (22.0)	714.4 (0.4)
Univ. & colleges	64,251.2	25,870.6 (40.3)	38,008.3 (59.2)	372.3 (0.5)
Industry	375,810.0	2,385.5 (0.6)	373,363.0 (99.3)	61.5 (0.1)

Source; Science & Technology Annual, Ministry of Science and Technology, 1984
Note: () denotes percentage

Table 2.5.4 Intramural R&D Expenditures in Industry as a Percent of Total Sales by Field, 1983

Classification	A. Intramural R&D Exp. (millions)	B. Total sales (billions)	A/B (percent)
Industry total	375,810.0	56,530.2	0.66
Agriculture and fishing	2,647.2	157.8	1.67
Mining	1,938.8	207.2	0.93
Manufacturing	342,840.8	42,381.9	0.80
Food & beverages	23,449.5	3,305.5	0.70
Textile & leather	21,118.3	2,870.3	0.73
Wood (prod.), furnitures	1,828.8	274.0	0.66
Paper (prod.), printing	4,151.9	7,860.3	0.05
Chemicals, petroleum, etc.	75,513.4	13,405.3	0.56
Non-metalic mineral products	9,335.0	1,198.5	0.77
Basic metal industries	13,034.6	3,916.1	0.33
Fabricated metal	192,549.9	9,409.5	2.04
Other manufacturing	1,859.3	142.3	1.30
Electricity, gas and water	2,355.0	2,959.7	0.07
Construction	12,004.6	8,029.9	0.14
Transport, communication, etc.	2,115.4	2,078.5	0.10
Financing, insurance, etc	7,591.6	110.1	6.89
Other industries	4,316.6	605.1	0.71

Source: Science and Technology Annual, Ministry of Science and Technology, 1984

Table 2.5.5 Industry's R&D Expenditures and Number of Researchers, 1983

Classification	No. of R&D institutes	Total expenditure (million won)	Number of researchers (person)	R&D expense per researcher (million won)
Industry total	723	375,810.0	12,586	29.9
Agriculture and fishing	4	?,647.2	123	21.5
Mining	3	1,938.8	49	39.6
Manufacturing	671	342,840.8	11,224	30.5
Food & beverages	62	23,449.5	864	27.2
Textile & leather	82	21,118.3	684	30.9
Wood (prod.), furnitures	12	1,828.8	62	29.5
Paper (prod.), printing	24	4,151.9	153	27.1
Chemicals, petroleum, etc.	139	75,513.4	2,185	34.6
Non-metalic mineral prod.	42	9,335.0	329	28.4
Basic metal industries	27	13,034.6	402	32.4
Fabricated metal	258	192,549.9	6,437	29.9
Other manufacturing	25	1,859.3	322	5.8
Electricity, gas & water	2	2,355.0	131	7.5
Construction	19	12,004.6	315	38.1
Transport, communication, etc.	3	2,115.4	89	23.8
Financing, insurance, etc.	15	7,591.6	429	17.7
Other industries	6	4,316.6	226	19.1

Source: Science and Technology Annual, Ministry of Science and Technology, 1984

- Providing solutions for the problems encountered during project execution;
- Research originated by researchers and conducted with the approval of management;
- Research based on the company's long-term technology development plan;
- Research for outside clients.

Presently the activities of the research institutions in the construction industry are more or less confined to the first two categories; however, the third category should be vigorously pursued with R&D expenditures judged by its long-term contribution. This is particularly so because the industry is already convinced that the Korean construction industry should move from the low-technology end to high-technology construction, as their competitive advantage in the low technology area is now being challenged by competitors from other third world countries which can offer much lower wages. The formation of the Korea Institute of Construction Technology (KICT) whose goals are to improve quality and productivity of construction through development of new technologies and materials or improvement of existing ones shows the recognition for R&D by the construction industry and the Government in order for the Korean construction industry to stay competitive. In January of 1986, the Ministry of Construction recommended that the 94 construction companies with annual sales of more than 10 billion won invest at least 15 percent of annual sales in R&D. Among them, 44 companies with annual sales exceeding 50 billion won should establish research institutes with not less than 10 researchers. This recommendation is a good start considering the present level of R&D expenditures in the construction industry is one of the lowest among the various industries. The fragmented nature of the industry makes it more difficult to make a concerted effort in R&D, and the Ministry of Construction's recommendations can be a very effective and relevant initiative. However, R&D efforts must not be regarded as equivalent to establishing special institutes and organizations. Care must be taken to prevent a proliferation of research institutes that are too weak to be effective. Technological capability resides in human and institutional capital. The development of research manpower which is

presently in short supply is very important. The present educational system does not fully provide the needed research personnel capability, and reform in this area is needed to meet the needs of present and future manpower requirements. Additionally, the Government's initiative in providing the research infrastructure support on a common-use or special-use basis would help eliminate the redundant investment and waste of research resources.

2.6 Construction Materials and Equipment

Factors contributing to the international competitiveness of the construction industry include the ability to provide the integrated packages of construction materials and equipments. The construction industry depends heavily on inputs from other sectors. The construction materials and equipment industries in Korea were developed partly to support domestic social overhead capital investments, primarily housing and infrastructure projects in the 1960s. Presently, most of the construction materials are produced to meet domestic needs, except for a few high quality materials. The growth in the exportation of construction materials and equipment has not kept up with that of the overseas construction market. Furthermore, despite the size and the production capacity of their plants, which are larger than what the domestic market can bear, construction equipment manufacturers are experiencing a very low operating rate.

2.6.1 Construction Materials

As mentioned earlier, Korea is now self-sufficient in most of the construction materials for domestic use (see Tables 2.6.1 and 2.6.2); however, local input into overseas construction is very low and still decreasing. From 1966 to 1983, the cost of materials constituted on average about 40 percent of the total cost; overseas construction and equipment accounted for about 8 percent. However, less than 14 percent of the materials and 8 percent of the equipment used for overseas construction during 1983 and 1984 were Korean made (see Table 2.6.3). Table 2.6.4 shows the growth pattern of Korean construction materials production in comparison with that of overall producer goods and construction GDP. The production growth rate for construction materials has been slower than that of producer goods, but faster than that of domestic construction (see Figures 2.6.1, 2.6.2, and 2.6.3); however,

Table 2.6.1 Self-Sufficiency Rate of Construction Materials
(percent)

Item	1980	1981
Cement	100.0	100.0
Slate	-	99.9
Reinforcing bar	100.0	100.0
Steel section	63.6	55.1
Steel plate	93.0	94.9
Steel wire	66.8	72.4
Steel pipe	85.6	83.3
Plywood	100.0	100.0
Tile	98.3	98.3
PVC	74.0	95.0
Coating	96.9	95.2
Plate glass	88.2	94.7
Ceramic sanitary	98.7	99.1
Electric wire	91.2	86.4
Bulbs	97.9	99.6

Source: KICT, Construction, Construction MAterials and Machinery Industry in Korea, For UNIDO Special Industrial Services, April, 1985
Note: Self-sufficiency rate = 1 - amount imported/domestic demand

Table 2.6.2 Self-Sufficiency Rate of Construction Equipments
(percent)

Item	1980	1981
Buldozer	30.4	40.8
Loader	28.9	40.2
Motor Grader	12.5	41.9
Excavator	96.4	92.9
Crane	-100.0	-168.0
Fork lift	75.5	93.0

Source and Note, same as Table 2.6.1

Table 2.6.3 Composition of Construction Materials and Equipments Used in Overseas Construction by the Origin
(percent)

		1979	1980	1981	1982	1983	1984
Materials	Domestic	30.9	25.0	23.9	18.7	13.8	13.6
	Foreign	69.1	75.0	76.1	81.3	86.2	86.4
Equipment	Domestic	26.3	26.0	13.8	14.8	8.1	8.2
	Foreign	73.7	74.0	86.2	85.2	91.9	91.8
Total	Domestic	29.9	24.3	22.1	18.0	13.7	13.2
	Foreign	70.1	75.7	77.9	82.0	86.3	86.8

Source: KICT, Construction, Construction Materials and Machinery Industry in Korea, For UNIDO Special Industrial Services, April, 1985

Table 2.6.4 Production of Construction Materials versus Producer Goods and Construction in GDP (based on 1975 constant price)

	Producer goods			Construction materials			Construction in GDP		
Year	Index 1975=100	Growth rate	Cumu. growth	Index 1975=100	Growth rate	Cum. growth	Index 1975=100	Growth rate	Cum. growth
1966	15.2			25.5			28.9		
1967	17.9	18	18	34.3	35	35	34.5	19	19
1968	28.1	57	85	47.2	38	85	47.8	39	65
1969	35.0	25	130	55.9	18	119	65.7	38	127
1970	33.9	-3	123	56.2	1	120	69.0	5	139
1971	38.2	13	151	63.8	14	150	67.5	-2	133
1972	43.2	13	184	66.9	5	162	66.8	-1	131
1973	60.9	41	301	89.1	33	249	85.6	28	196
1974	83.2	37	447	91.7	3	260	87.8	3	204
1975	100.0	20	558	100.0	9	292	100.0	14	246
1976	131.0	31	762	128.0	28	402	122.3	12	288
1977	158.4	21	942	166.4	30	553	140.6	25	386
1978	198.8	26	1,208	204.5	23	702	176.2	25	509
1979	224.8	13	1,379	213.0	4	735	179.2	2	520
1980	224.0	0	1,374	203.2	-5	697	177.7	1	515
1981	251.4	12	1,554	214.9	6	743	168.8	-5	484

Source: Major Statistics of Korean Economy, The Bank of Korea, 1982

Figure 2.6.1 Production Indexes (1970-1981)

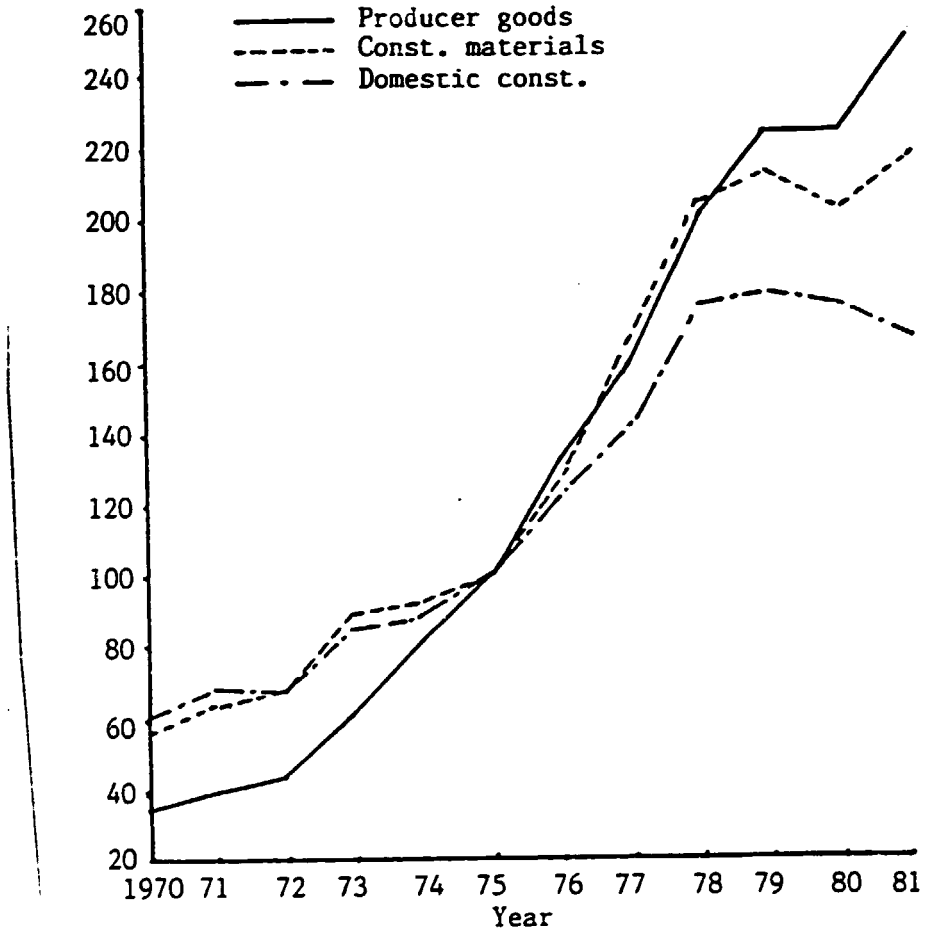


Figure 2.6.2 Growth Rates (1970-1981)

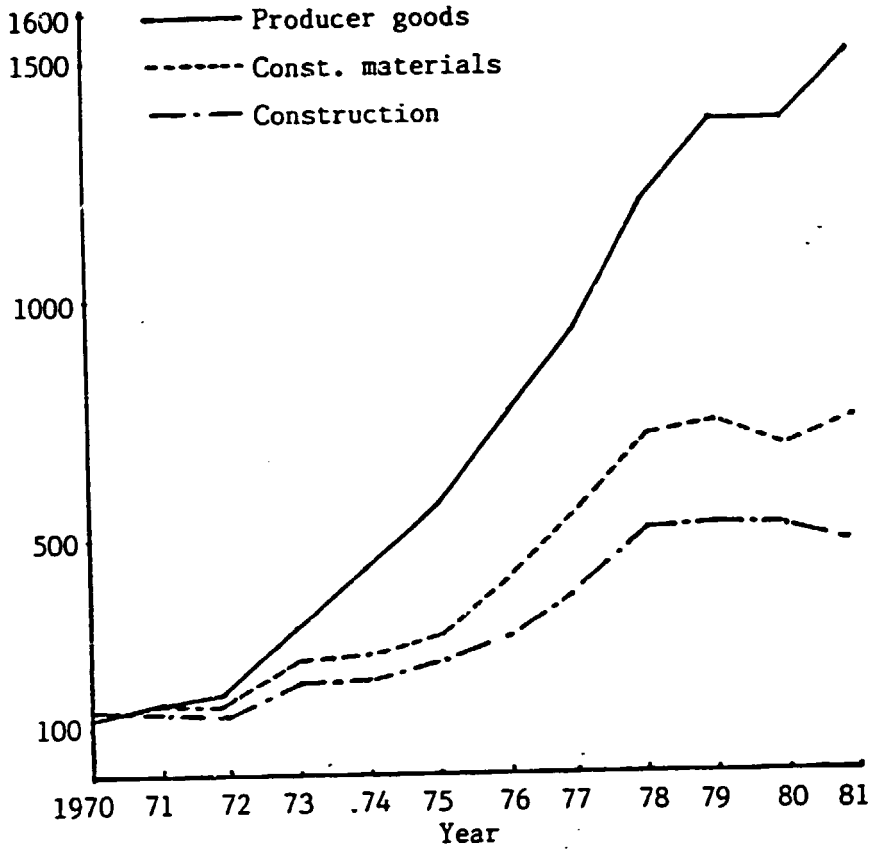
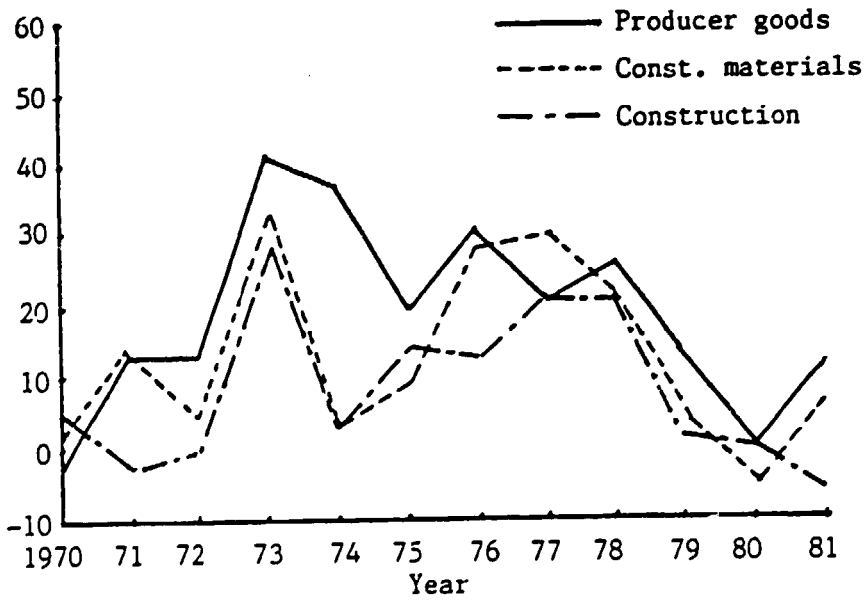


Figure 2.6.3 Cumulative Growth Rates (1970-1981)



the production of construction materials has been slow when it is compared to the growth of total domestic and overseas construction (see Table 2.6.5). This suggests that the Korean construction materials industry depends on the demand generated by domestic construction activities even though there has been a tremendous increase in overseas construction. The reasons for this are: first, the demand for domestic construction has increased very rapidly and second, either the quality of Korean produced construction materials does not meet internationally accepted quality standards or even though the quality standard have been met, they are not fully appreciated by foreign clients. Take cement as an example. Korea consumes more than 80 percent of its domestically produced cement (see Table 2.6.6).

The construction materials industry can be best understood by comparing it with the manufacturing industry. Korea's commodity exports recently accounted for about 1.5 percent of world trade. This is a result of the remarkable growth in the Korean economy, but this number is not very impressive when compared with that of Korea's overseas construction which accounted for about 10 percent of the total international construction over the past few years. This may mean that Korean international construction has grown disproportionately compared to the size of the economy backed up by the various manufacturing industries. Expanded international construction activities of Korean contractors provided excellent opportunities for the construction materials industry to expand its export market. As the owners or engineers who determine and approve the materials that are incorporated into the project are mostly conservative and risk averse in selecting the required materials the Korean have to produce differentiated products in order to be successful in the international market. It is especially difficult for newcomers like the Koreans to penetrate invisible barriers of this kind without support from project designers and engineerers. Like other manufacturing industries, the size and the limited sophistication of the Korea's domestic market is a big disadvantage as economy of scale is difficult to achieve and the market provides no latitude for launching, testing and refining differentiated manufacturing products in a protected environment.

Table 2.6.5 Total Construction Contracts and Production of Construction Materials Indexes (1970–1983)

Year	Domestic + Overseas contracts	Construction materials
1970	42	56
1971	49	64
1972	53	67
1973	69	89
1974	64	92
1975	100	100
1976	194	128
1977	270	166
1978	511	205
1979	409	213
1980	395	203
1981	547	220
1982	596	237
1983	548	292

Source: Moavenzadeh, A Brief Overview of the South Korean Construction and Construction Materials Industries, 1985

Table 2.6.6 Supply and Demand of Major Construction Materials

Item	Unit	Year	Production capacity	Production	Domestic demand	Export	Import
Steel	1,000 M/T	1980	-	8,397	5,636	4,818	2,162
(All products)		1981	-	10,244	6,880	5,618	2,152
		1982	-	11,262	6,969	6,094	1,387
		1983	-	12,557	8,248	6,319	2,180
Re-bar	1,000 M/T	1980	-	1,991	1,419	567	0
		1981	2,859	1,795	1,277	537	0
		1982	-	2,285	1,793	-	-
		1983	-	2,774	-	-	-
Cement	1,000 M/T	1980	22,185	15,574	13,172	2,300	0
		1981	23,825	15,600	12,489	3,243	0
		1982	23,450	17,913	14,301	3,561	0
		1983	23,450	21,282	17,649	3,602	0
Plywood	Million	1980	6,300	4,239	1,797	2,564	0
	Sq. Ft.	1981	6,134	4,303	1,563	2,701	0
		1982	5,198	3,291	1,845	1,588	0
		1983	5,106	3,298	2,405	889	0
Glass	1,000	1980	4,550	3,168	3,430	146	323
(Plate)	Case	1981	6,620	3,888	3,500	579	32
		1982	6,620	4,229	3,580	846	68
		1983	6,620	5,081	4,609	612	169

Source: Moavenzadeh, A Brief Overview of the South Korean Construction and Construction Materials Industries, 1985

After reaching a record $1 billion in 1981, the exportation of home produced construction materials and equipment has been decreasing. If the Korean construction materials industry is meant only to satisfy local market demand, then only moderate growth can be achieved as the level of sophistication of the local construction demand and the size of the domestic market increases in line with the growth of the national economy. For further growth, the construction materials industry has to look beyond the demand from local Korean contractors. Let's compare construction materials export by Japanese and Korean manufacturers to that of Saudi Arabia. In 1980, Japan exported $1.1 billion worth of construction materials to Saudi Arabia, while Korea exported only $.5 billion. The difference is more significant if we consider that Korea contracted $7.6 billion worth of international construction in the Middle East that year while Japanese only $2.7 billion (see Table 2.6.7). Below are some reasons for this inactivity in the overseas market.

- Because of a lack of understanding of Korean products, technical services companies and owners have displayed a preference for the products of developed countries.
- For financing and technical reasons, Korean contractors have preferred foreign produced goods. Quite often foreign producers offer better financial terms while Korean producers often lack the necessary technical data and expertise needed to obtain approval for the usage of certain materials for their project.
- Weak promotional activities and inflexible delivery terms.
- Low international competitiveness in the area of quality control and standards.
- Import restrictions favoring local produced materials.

Domestic operational characteristics contribute significantly to the problems encountered in penetrating the international market and the following are examples:

- A technological lag in the manufacturing area;

Table 2.6.7 Comparison Between Korean and Japanese Construction Materials and Equipments to Saudi Arabia (in millions of dollar)

	1978	1979	1980
A. Korea			
Materials	244.5	331.3	502.7
Equipments	12.3	41.7	12.9
Sub total	256.8	373.0	515.6
B. Japan			
Materials	685.6	924.2	1,093.4
Equipments	82.4	105.4	115.5
Sub total	768.0	1,029.6	1,208.9
A/B: Percent			
Materials	35.7 (16.8)	35.8 (20.4)	46.0 (30.4)
Equipments	14.9 (4.4)	39.6 (15.2)	11.2 (6.4)
Sub total	33.4 (15.1)	36.2 (19.7)	42.7 (27.3)

Source: Korea Institute for Industrial Economics & Technology, Strategy to Promote Construction Materials and Equipment to Middle East.

Note: Numbers in Parenthesis are for the Total of the Middle East.

- Excessive price competition; and
- Limited quality control.

2.6.2 Construction Equipment

Construction equipment manufacturing differs from other machinery manufacturing. First, there are numerous kinds of construction equipment, but the production facility of each type requires a large investment and the return on investment is slow. Second, it is ofen characterized as an assembly of various parts with a heavy dependence on the skill of the technicians in contrast to its capital-intensive nature. Third, it involves many different parts and consequently depends largely on the industry's part supplying capacity. Fourth, unless the firm is large enough to cover the market worldwide, planned production is difficult. The demand is not large enough. The Korean construction equipment manufacturing industry started out as repair shops but expanded rapidly with the growth of the construction industry. In the latter part of the 1970s, with the emphasis placed on the heavy and chemical industries, the construction equipment manufacturing plants grew into integrated machinery manufacturing plants. However, investment proved to be excessive; and this excessive investment, coupled with reduced demand due to the worldwide recession, brought about an extremely low operating rate. Although domestic parts manufacturing has not been fully established, investment in construction equipment manufacturing has concentrated on the final assembly plants, thus the Korean construction equipment manufacturing industry is dependent on imported parts. The problem is that domestic demand is not sufficient to reach the necessary economy of scale and the prospect for the export of a large number of construction equipment is not probable in the near future.

The contribution of the construction equipment manufacturer to the success of the overall construction operation is critical and quality control is essential; however the industry's technological level is not as high as it should be to produce the differentiated quality. This is due to:

- An inadequate supply of capital and technological "know-how";

- Inadequate R&D research expenditure;
- Inadequate design capability.

Along with the rapid growth of the automobile industry, there is a corresponding growth in the parts industry and one can now expect support from the parts industry for construction equipment manufacturing. For the market to reach economy of scale in manufacturing construction equipment, cooperation with the U.S. and other European manufacturers is important and it is this cooperation coupled with Korean labor productivity and modern facilities that will lead to success. The size of the Korean domestic market makes it impossible to be competitive if it does not expand beyond its domestic market.

2.7 Issues Presently Facing the Korean Construction Industry

As previously noted, Korean international construction contracts rose sharply until 1981 and then started to decline. By 1984 total overseas contracts had decreased to $6.6 billion from the 1981 figure of $14.3 billion. To date the common priority of Korean contractors seems to be the expansion and growth of its market, regardless of the side effects caused from this fast-track growth. During periods of rapid growth, these problems can be ignored but not so in a period of recession. Considering the current international market condition, the rapid growth experienced in the 1970s will not be duplicated. There has to be a consolidation of effort in order to gain the necesary momentum for future growth. In a sense, the difficulties presently experienced by many Korean contractors should be considered as an opportunity to improve its overgrown company structure. Within this context some of the issues facing the Korean construction industry are highlighted below.

2.7.1 Issues Related to Activities in the Middle East

Demand for international construction has decreased significantly. It reached its peak in 1981 when total international contracts amounted to $129.9 billion but by 1984 this figure was reduced to $480.5 billion (see Table 2.7.1). This decrease is mainly due to the decrease in construction demand from the Middle Eastern oil-exporting

Table 2.7.1 Regional Distribution of New Orders Contracted Abroad with 250 Largest Firms (billions of dollar)

	1980	1981	1982	1983	1984	1980–1984
Middle East	35.3	46.5	51.2	33.0	26.6	192.6
	(32.5)	(35.8)	(41.6)	(35.3)	(33.0)	(36.0)
Asia	15.9	21.4	23.5	15.4	18.3	94.5
	(14.6)	(16.5)	(19.1)	(16.5)	(22.7)	(17.6)
Africa	18.7	23.9	17.7	21.4	12.5	94.2
	(17.2)	(18.4)	(14.4)	(22.9)	(15.5)	(17.6)
Latin America	15.8	17.4	10.3	6.3	5.4	55.2
	(14.5)	(13.4)	(8.4)	(6.7)	(6.7)	(10.3)
Europe	12.3	9.8	11.1	9.5	9.2	51.9
	(11.3)	(7.5)	(9.0)	(10.1)	(11.4)	(9.7)
Canada	7.7	6.4	4.5	4.4	2.9	25.9
	(7.1)	(4.9)	(3.7)	(4.7)	(3.6)	(4.8)
U.S.A.	2.9	4.5	4.8	3.6	5.6	21.4
	(2.7)	(3.5)	(3.9)	(3.8)	(7.0)	(4.0)
Total	108.6	129.9	123.1	93.6	80.5	535.7
	(100.0)	(100.0)	(100.0)	(100.0)	(100.)	(100.0)

Source: Engineering News Records
Note: Numbers in the parentheses denote percentage

countries which accounted for about 35 to 45 percent of international construction. This lessened demand is due primarily to the decline in oil prices. Because of its heavy concentration in this area, the curtailing of overseas awards by the Middle Eastern countries severely impacted the Korean international construction market (see Table 2.7.2). Korea's concentration in the Middle East is much more significant if we compare this with that of the U.S. and Japan. The U.S. has markets all over the world and their share is more or less balanced. Japan has a larger market in Asia than it has in the Middle East (see Tables 2.7.3. and 2.7.4).

Since 1973 oil-exporting countries in the Middle East have carried out ambitious economic development plans using enormous oil revenues. A major portion of this investment has been in infrastructure, housing, and urban development. These are mostly labor intensive or are projects requiring the lower end of technology, areas in which the Korean contractors are competitive; In fact, more than 80 percent of the Korean contracts in this region are civil works and building construction (see Table 2.7.5). In many of the Middle Eastern countries the need for infrastructure building however is nearly complete, thus the nature of future projects will be shifting to the so-called "high technology content," with a very strong demand for innovative engineering and design components. Moreover, we will witness more reliance on new financing schemes, such as counter-trade barter systems and equity participation, which will require a bidding practice involving knowledge of economics as well as financial risk determination. Firms participating in this new market will have to provide highly sophisticated, up-to-date engineering and design capabilities as well as financial packaging capabilities. Innovative financing and turnkey capabilities are essential to this market. A major element of the turnkey operation is a strong, well-qualified engineering and design component capable of providing the conceptual as well as detailed design needed for the sophisticated construction of this market. Having in the past executed projects in collaboration with foreign companies who provided all of the design and engineering services, the Koreans have little opportunity to develop their own expertise in this area. This is a major handicap for the Korean international contractors.

Table 2.7.2 Trend of Korean Overseas Construction Contracts by Region
billions of dollar (percentage)

	1980	1981	1982	1983	1984	1980-1984
Middle East	7.6	10.5	10.7	4.8	4.9	38.5
	(76.8)	(73.8)	(77.5)	(46.2)	(74.2)	(70.0)
Asia	0.7	1.4	2.4	1.2	0.8	6.5
	(7.1)	(9.8)	(17.4)	(11.5)	(12.1)	(11.8)
Africa	1.6	2.4	0.6	4.4	0.9	9.9
	(16.2)	(16.8)	(4.3)	(42.3)	(13.6)	(18.0)
Latin America	-	-	*	*	*	0.1
	(-)	(-)	(-)	(-)	(-)	(0.2)
Europe	-	-	-	-	-	-
	(-)	(-)	(-)	(-)	(-)	(-)
Canada	*	-	-	-	-	*
	(-)	(-)	(-)	(-)	(-)	(-)
U.S.A.	-	-	-	-	-	-
	(-)	(-)	(-)	(-)	(-)	(-)
Total	9.9	14.3	13.8	10.4	6.6	55.0
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

Source: Engineering News Records
Note: * denote the amount less than 50 million dollars.

Table 2.7.3 Trend of U.S. Overseas Construction Contracts by Region
billions of dollar (percentage)

	1980	1981	1982	1983	1984	1980-1984
Middle East	8.9	10.4	18.5	12.7	10.7	61.2
	(18.4)	(23.6)	(41.2)	(43.2)	(34.9)	(31.0)
Asia	10.5	9.4	9.4	4.8	8.8	42.9
	(21.7)	(21.3)	(20.9)	(16.3)	(28.7)	(21.7)
Africa	4.0	3.2	2.8	2.4	1.6	14.0
	(8.3)	(7.3)	(6.2)	(8.2)	(5.2)	(7.1)
Latin America	9.8	9.1	3.9	1.7	1.6	26.1
	(20.3)	(20.6)	(8.7)	(5.8)	(5.2)	(13.2)
Europe	8.0	6.5	6.8	4.7	5.5	31.5
	(16.6)	(14.7)	(15.1)	(16.0)	(17.9)	(16.0)
Canada	7.1	5.5	3.6	3.1	2.5	21.8
	(14.7)	(12.5)	(8.0)	(10.5)	(8.1)	(11.0)
Total	48.3	44.1	44.9	29.4	30.7	197.4
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

Source: Engineering News Records

Table 2.7.4 Trend of Japanese Overseas Construction by Region
billions of dollar (percentage)

	1980	1981	1982	1983	1984	1980-1984
Middle East	2.3	3.9	2.5	2.5	1.2	12.4
	(56.1)	(47.6)	(26.9)	(28.7)	(16.4)	(33.0)
Asia	1.4	2.4	5.6	4.8	4.4	18.6
	(34.1)	(29.3)	(60.2)	(55.2)	(60.3)	(49.5)
Africa	0.3	0.9	0.8	0.4	0.6	3.0
	(7.3)	(11.0)	(8.6)	(4.6)	(8.2)	(8.0)
Latin America	0.1	0.8	0.1	0.2	0.2	1.4
	(2.4)	(9.8)	(1.1)	(2.3)	(2.7)	(3.7)
Europe	*	0.2	0.2	0.4	0.1	0.9
	(-)	(2.4)	(2.2)	(4.6)	(1.4)	(2.4)
Canada	*	*	*	-		
	(-)	(-)	(-)	(-)	0.8	1.3
U.S.A.	-	*	0.1	0.4	(11.0)	(3.5)
	(-)	(-)	(1.1)	(4.6)		
Total	4.1	8.2	9.3	8.7	7.3	37.6
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

Source: Engineering News Records
Note: *denote the amounts less than 50 million dollar

Table 2.7.5 Korean Overseas Construction Record by Type of Work
millions of dollar

Type of work	1966-1975	1976	1977	1978	1979	1980	1981	1982	1983	Total	Percent
Civil	1,112	1,448	1,571	2,019	1,679	3,739	5,023	4,876	5,494	26,961	39.8
Road	443	94	254	286	210	1,087	2,317	752	324	5,767	8.5
Harbor	479	1,325	727	313	170	496	129	476	-	4,115	6.1
Other	190	29	590	1,420	1,299	2,156	2,577	3,648	5,170	17,079	25.2
Building	263	590	1,022	4,979	2,979	3,852	7,608	6,238	3,958	31,489	46.5
Mechanical	98	381	677	469	1,219	392	692	1,677	439	6,044	8.9
Electrical and communication	24	66	219	621	470	271	295	580	501	3,047	4.5
Engineering	2	17	27	57	4	5	63	12	52	239	0.3

Source: Overseas Construction Association of Korea, Nongovernmental White Paper on Overseas Construction

The fact that many countries that were traditionally buyers of construction services and products from the international marketplace and who now focus on the development of their own indigenous construction capabilities which are preferred to those of the international firm, have changed the picture entirely. The percentage of contracts awarded domestically in the Middle East grew from 2.3 percent in 1975 to 27.9 percent in 1984. Among them, Saudi Arabia is the most remarkable, showing a percentage rate of 43.8 in 1984 (see Table 2.7.6). The indigenous construction capability is seen mostly in the area of civil engineering works and building construction, areas in which Korean contractors relied heavily. The least significant area of domestic concentration is in plant construction. Along with this preference by Arab governments for their own construction companies, the entry of Turkish, Indian, Pakistani and other firms, with lower labor costs than that of Korea, means more intense competition. This trend is particularly so at the low end of technology; and at this point in time, the Koreans are not fully equipped to switch their market to the high end of technology. In addition, due to an increase in the standard of living in Korea, construction firms are faced with higher labor costs, not necessarily accompanied by an increase in productivity (see Table 2.7.7).

The Korean domestic construction market has increased steadily over the past 20 years; however after a 21.2 percent growth in 1983, the domestic construction market remained relatively static during 1984. Government construction expanded 9.5 percent, led by new town developments; but private construction grew by only 3.3 percent, due mostly to tight credit conditions which discouraged residential construction. In spite of active investment in Government construction and factories (including subway projects), overall construction investment in 1984 was up by only 3 percent. This was due primarily to the sharp decline in housing construction. Since 1976 domestic construction has been exceeded by overseas construction which implies certain limitations in the domestic marketplace rendering it incapable of countering the sluggish overseas market. From 1982 to 1985, total contract amounts decreased although there was substantial growth in domestic construction. This excessive dependency on international

Table 2.7.6 Trend of Localization in Middle East by Contract Amount
amount in millions of dollar

Year	A. Amount localized	B. Total Contract	$\frac{A}{B}$ x 100	C. No of projects-localized	D. Total No. of projects	$\frac{C}{D}$ x 100
1975	609.5	26,917.8	2.3	39	394	9.9
1976	2,366.2	37,485.4	6.3	46	428	10.7
1977	2,998.7	49,205.8	6.1	85	546	15.6
1978	2,336.1	31,751.8	7.4	83	560	14.8
1979	3,339.0	30,574.4	10.9	99	516	19.2
1980	6,540.1	38,800.9	16.9	254	783	32.4
1981	6,444.7	62,589.4	10.3	263	912	28.8
1982	8,794.8	45,667.5	19.3	291	868	33.5
1983	5,174.6	33,494.3	15.4	228	647	35.2
1984	6,419.3	22,979.5	27.9	315	720	43.8

Source: Middle East Economic Digests

Table 2.7.7 Comparison of Manpower Productivity between Korea and Other Developping Countries (1982)

	Productivity	Wage
Korea	100	100
Other developping countries	78	56

Source: The Korean Embassy at Saudi Arabia
Note: The developping countries mean the average of Thailand, Bangladesh, India, Pakistan, Philippine and Sri Lanka.

construction makes the Korean construction industry much more vulnerable to changes in international market conditions. The share of international construction in Korea's total construction has been reduced to below 50 percent since 1984 when Korea's international construction was reduced sharply.

2.7.2 Issues Related to Activities in the Traditional International Construction Market

Looking at the traditional international construction projects, outside of the oil-rich countries, we see that the projects of the Third World capital-poor countries are financed through international agencies, bilateral and soft-loan programs and through international financial institutions such as commercial banks. A major component of such a project is a detailed and in-depth feasibility study which is normally prepared by an international consulting firm, whose primary concern is to identify the benefits of the project and to assure its financial viability. It is at this stage of project development that the level of technological sophistication, labor, materials and equipment requirements are determined. In order for Korean firms to compete in this market, it has to develop and strengthen its international consulting capabilities. Presently, this capability is at its very early stages of development and no concerted effort is being made to expedite its development. As long as these types of services are not being offered, the Korean engineering design, contracting, and supplying firms may not be able to participate very easily in this market.

As stated earlier, developing countries or owners may require contractors to participate in equity sharing. This is highly desirable for developing countries because it reduces the level of risk attached to external capital inflow and secures the benefits of technology and expertise by expanding the amount of direct investment in total external financing. As an investor, this kind of investment could be made as a defensive measure against local protectionism for certain commodity exports. Contractors, by and large, are not familiar with the nature of economic risk involved in such participation and have shied away from a project that requires equity participation. Korean contractors, at least the major ones, are in a better position to take

advantage of this opportunity fc · they are mostly members of very large conglomerates which have in-house capabilities in barter trade, commodity exchange, and in several cases financial and banking institutions. Generally speaking, however, Korean contractors have limited experience in working with international agencies and have the limited capability required by these international agencies. Furthermore, they are inexperienced in financial management. There are a few conglomerates in Korea who have had limited experience international financing, but this knowledge is not transferable to the contracting arm, and since Korean capital is limited and the very nature of financial managment is new, the Government is not likely to provide substantial funding.

It appears that the international construction market for the remainder of the century is going to concentrate mainly on high technology projects. Turnkey projects and integration of various financing schemes, such as barter agreements, counter-trade and equity participation will be its predominant characteristics. It seems that Korean contractors have reached a point where their traditional method of acquiring technology "know-how" has reached its limit,and participation in joint ventures with sophisticated technological partners is becoming more difficult, due in part to the reluctance on the part of the international owner of technology to share its knowledge with its Korean counterpart and partly due to the fact that advanced technology requires a major technological base. This leads us to the conclusion that the Korean construction industry must revise its strategy with regard to the acquisition of new technological "know-how". At the same time, it must recognize the importance of indigenously developed advanced technologies through research and development programs both for existing and new markets.

2.7.3 Markets in the Developed Countries

Finally, Korean firms have not seriously considered the markets in developed countries. Although international construction demand is decreasing, the importance of the markets of the developed countries in the international construction market is actually increasing. According to Historical Statistics of OECD, the total size of the construction market in OECD countries in 1983 was about $924

billion. Among them, the U.S. accounted for $307 billion (33.3%); Japan for $215 billion (26.9%); and the rest of the OECD countries for $152 billion. No exact statistics on the size of the construction market for the rest of the free world is available, but it is generally estimated to be about $300 billion. The size of the construction market in the developed region is overwhelmingly larger than that of the developing countries. This market, especially in North America, is not only large and diverse, but also is undergoing certain changes. In the U.S. alone, the market is over $300 billion, and all indications are that it will grow to over 10 percent of U.S. GNP in the next few years. This large and almost unexplored market requires new materials, equipment, engineering and design, as well as new management and financing methods. Although contracting, subcontracting, and procurement policies and procedures in the U.S. are in many respects different from those commonly practiced in the international marketplace, they are, however, not insurmountable; and recently several European and Japanese companies have successfully penetrated this market.

CHAPTER 3

COMPARISON BETWEEN U.S. AND THE KOREAN CONSTRUCTION INDUSTRY

In the preceding chapter, various aspects of the construction industry in Korea were reviewed. Since the U.S. construction industry constitutes the largest single market in the world, it has been targeted for potential penetration by Korean contractors. This chapter will attempt to compare the characteristics of these two diverse markets by scale of economy, structure of the industry, mode of operation, and market sectors.

It is well known that the U.S. construction market is the largest and most advanced in the world. Although Korea has shown remarkable performance in the international construction market, especially in the Middle East, it is still a developing country and the size of the local market is very small compared to that of many developed countries, particularly the U.S. The size of the Korean domestic construction market is a little more than $10 billion, and about $20 billion if you include its overseas construction. As the size of the markets in the two countries differ in scale, there are some generic differences which cannot be compared statistically. However, the comparison based on the statistics reveal some meaningful indicative characteristics of the construction industries in both countries.

Since the U.S. construction market is one of the few promising markets in the developed region of the world for Korean contractors, it is helpful to compare the construction industry statistics of the U.S. as well as other developed countries to those in Korea. In general, Korean industries have been influenced greatly by the Japanese industries - the construction industry is not an exception. In the course of comparing the Korean construction industry with that of the U.S., it may be beneficial to look at the Japanese construction industry as well, since Japan has been active in the U.S. construction market for the last few years. In fact, the U.S. has become the largest Japanese international construction market since 1984.

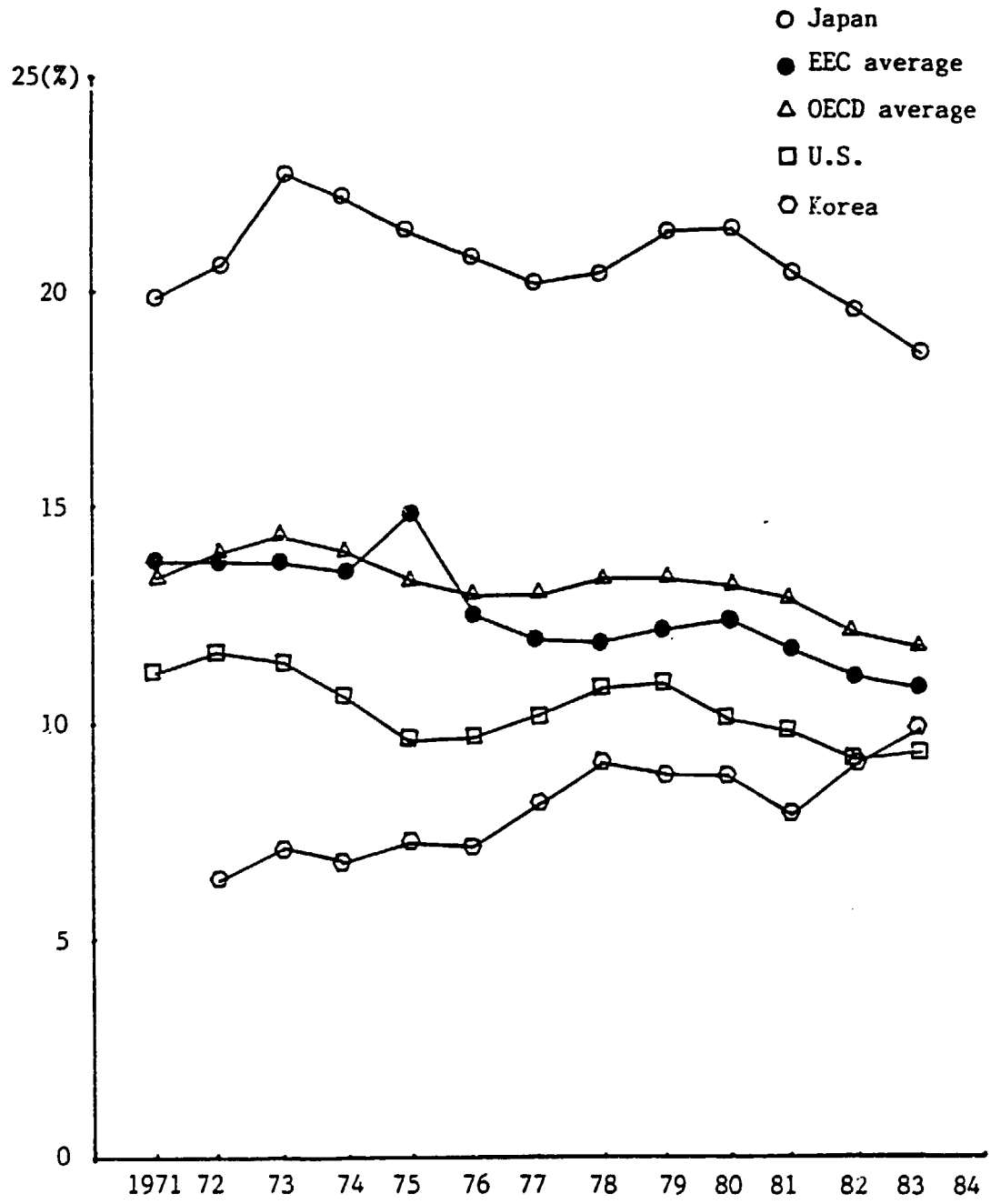
3.1 Scale and Economic Characteristics

In 1983, according to Historical Statistics of OECD, the total size of the construction market of OECD countries was about $924 billion. Among them, the U.S. accounted for $307 billion (33.1 percent), Japan for $215 billion (23.3 percent), total for EEC countries was $249 billion (26.9 percent), and the rest of the OECD countries accounted for $152 billion (16.5 percent). No exact statistics on the size of the construction market for the rest of the world is available, but it is generally estimated to be about $300 billion. The size of the construction market in the developed region is overwhelmingly larger than that of developing countries. Unlike the developing region, however, the market in the developed countries did not attract the attention of the international contractors because their demands have largely been satisfied by their own construction capacity.

The contribution of the construction industry to the Nation's GDP is similar in both U.S. and Korea. U.S. construction accounted for 9.4 percent, whereas Korea reached 9.9 percent in 1983; however, these numbers are much lower than the average for all OECD or EEC countries. The Japanese construction industry's contribution to GDP is especially high. Their number reached 18.6 percent in 1983 and it was estimated to be higher than 20 percent for the last decade or so (see Figure 3.1.1). The proportion of Japanese construction in their national economy is much larger than that of other countries. Indeed the growth of the Japanese construction industry has been sustained by the growth of its economy since World War II. This may explain why Japanese construction firms did not enter the overseas market until recently and why t are still dependenent on the overseas market as compared to the dome market which is much lower than that of other countries.

The construction industry is known to be one of the most cyclical in nature among many industries. The housing sector is generally recognized as countercyclical, as this sector is greatly influenced by Government monetary policies. However, the construction industry in general follows the cycle of overall economy although the amplitude of fluctuation is significantly larger than that of the overall economy. Construction has played a major role in the economic development of Korea. If we mpare the growth rate of GNP to that of construction in

Figure 3.1.1: Construction as a Percentage of GDP for Various Countries



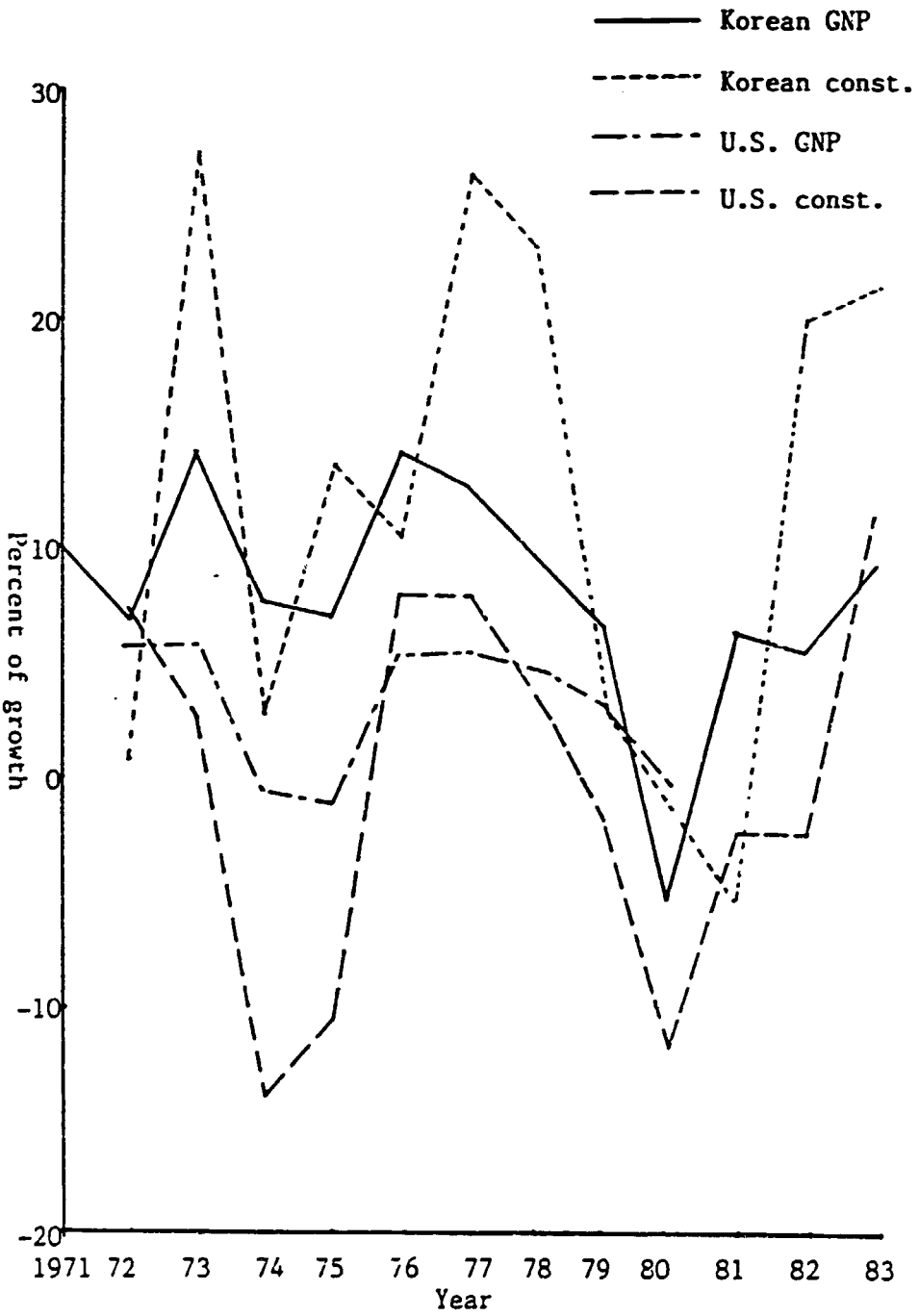
Source: OECD, Historical Statistics, Paris, 1985
The Federation of Korean Industries, Korean Economic Yearbook, 1985

Korea, we see that the growth differentials between these two areas has been fluctuating widely but that, in general, construction has been growing faster than GNP. In the case of the U.S., construction has not kept up with the growth of GNP (see Figure 3.1.2). While the growth of the construction industry is behind that of the overall economy, the composite cost index of the construction industry has been growing faster than that of the producer price index and that of the construction worker's average hourly earnings.

In 1984, the total volume of U.S. construction was $344 billion, of which $313 billion was in the domestic market and $31 billion overseas. This means the U.S. construction industry's dependency on the international market is about 9 percent, although they are number one in international construction. In the case of Japan, their dependency rate is even lower than that. The total value of construction in Korea reached about 16.2 trillion won in 1984, of which 7.4 trillion won was achieved by overseas construction activities. This means about 45 percent of Korea's total construction depends on overseas activities. This percentage is much lower than that of the last 10 years, as their overseas activities have been reduced significantly while domestic activities have been increasing constantly. Korea's heavy dependency on overseas construction may mean that the Korean construction industry has expanded disproportionately over the size of its overall economy. Another theory is that the smallness of the Korean domestic market compared to the size of the construction industry has made the industry vulnerable to international market conditions.

In 1984, the U.S. construction industry employed about 5.2 million people which is about 5 percent of the nation's total labor force, whereas the Korean construction industry employed 903,000 people, about 6.3 percent of its total 14 million labor force. The Japanese construction industry employed about same number of people as the U.S. Considering the large difference in the value of construction between the U.S. and Korea (U.S. construction is more than 15 times larger than Korea's total construction, including overseas activity), the number of employed persons (5.2 million in U.S.) is less than 6 times that of Korea. Korea's construction industry is much more labor-intensive than the U.S. and Japan. Aside from the differences in productivity, this

Figure 3.1.2: Annual Growth Rates of GNP and Construction



might have caused the fundamental differences in the perception of the industrial pattern.

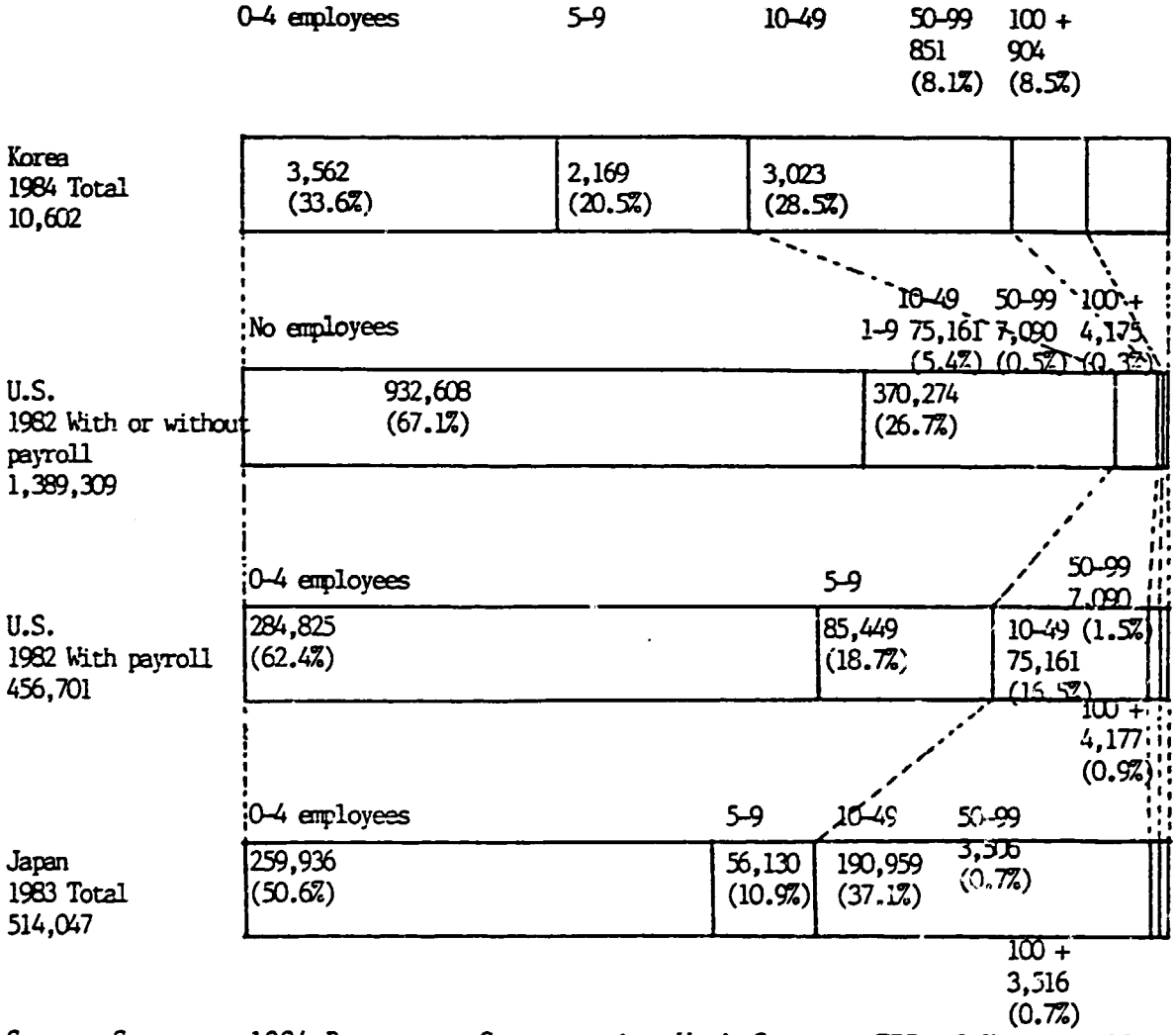
3.2 Structure of the Construction Industry

In general the construction industry is fragmented, being made of a large number of small and specialized firms. The fragmentation of the U.S. construction industry seems to be more noticeable. One distinctive aspect of the fragmentation of the U.S. construction industry is the establishments without employees, accounting for 67.1 percent of all 1.4 million construction establishments in the U.S. in 1982. As a result, 93.8 percent of all the U.S. construction establishments are being operated with less than 10 employees. This figure is much higher than in Japan or Korea. Only 54.1 percent of Korea's 10,602 firms and 50.6 percent of Japan's half a million establishments are operated with less than 10 employees (see Figure 3.2.1).

The large number of small firms perform a disproportionately small value of construction. In 1982, establishments in the U.S. with less than 10 employees accounted for 28.2 percent of all business receipts that year. If we count only the establishments with payroll, the percentage is reduced to 19.2. In the case of Japan, firms with less than 10 employees performed 4.3 percent of total Japanese construction. The comparable number of the Korean construction establishments is only 1.0 percent (see Figure 3.2.2). Most of Korea's small firms are basically comprised of specialty trade contractors, whereas U.S. and Japanese small firms are either specialty trade contractors or small-scale general building contractors. The difference may be due to the presence of a large number of single family housing contractors in the U.S. and Japan. While those numbers are counted in the U.S. and Japanese statistics, Korea does not count them as a significant portion of the single family housing construction in Korea. They have, however, been covered by the informal sector of construction (see Figures 3.2.3 and 3.2.4). The large portion of the informal construction sector is a typical characteristic of the construction industry in developing countries.

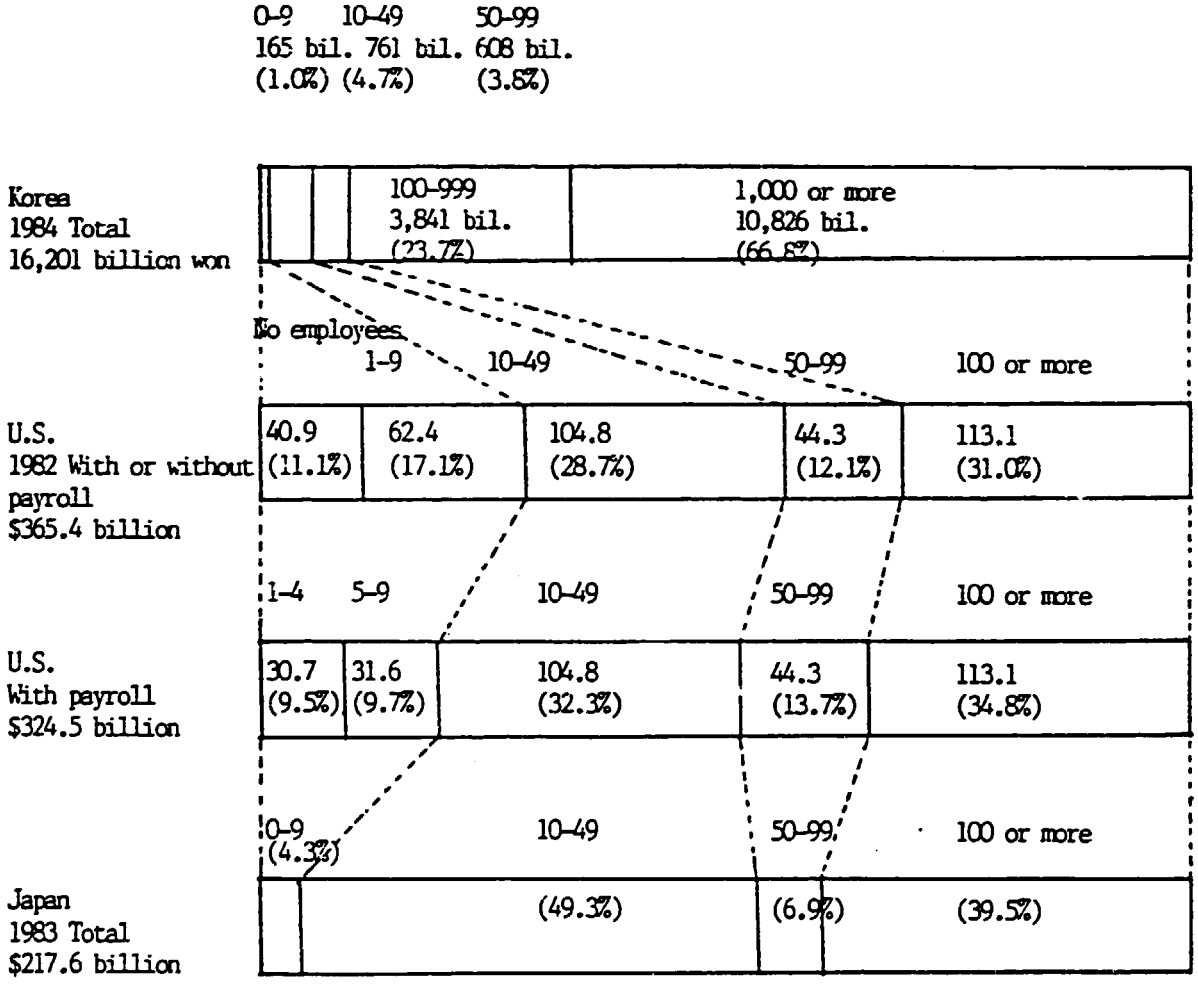
On the other hand, a very small number of large firms dominate a considerable portion of the construction market of each country. The degree of domination differs by country. In 1982, 4,175 firms with more

Figure 3.2.1: Number of Establishments by Employment Size Class



Source:Source: 1984 Report on Construction Work Survey, EPB of Korea, 1985
1982 Census of Construction Industry, DOC of U.S., 1985
Survey of Construction Statistics, Ministry of Construction Japan, 1985

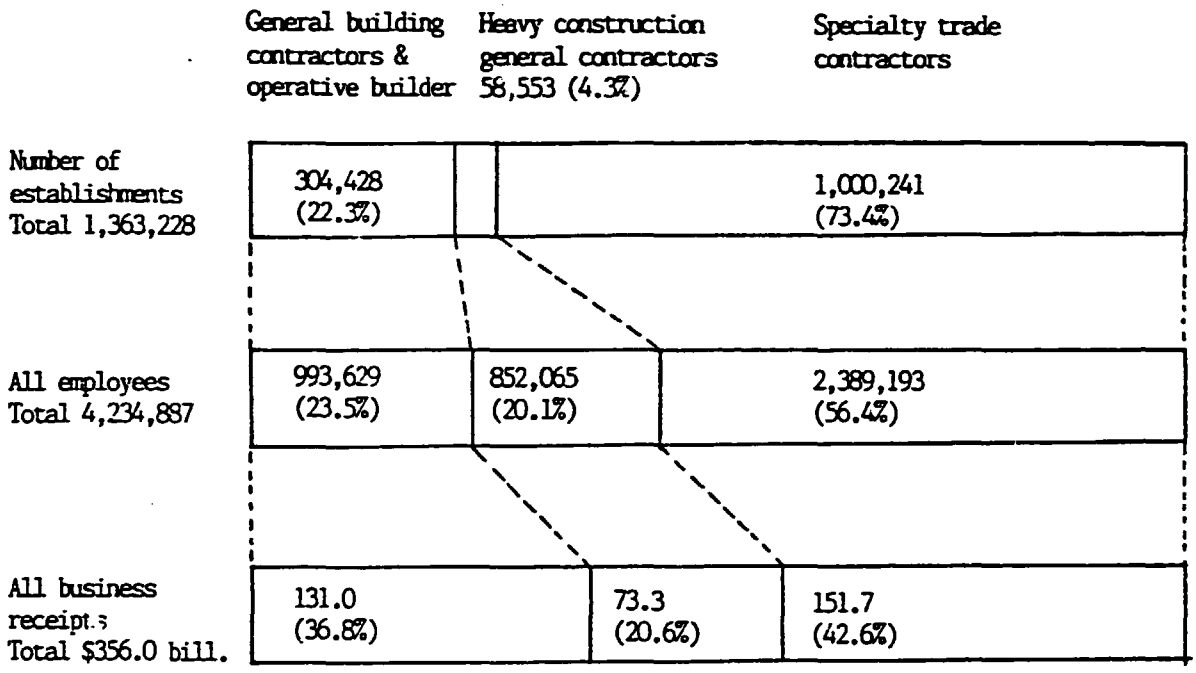
Figure 3.2.2: All Business Receipts by Employment Size Class



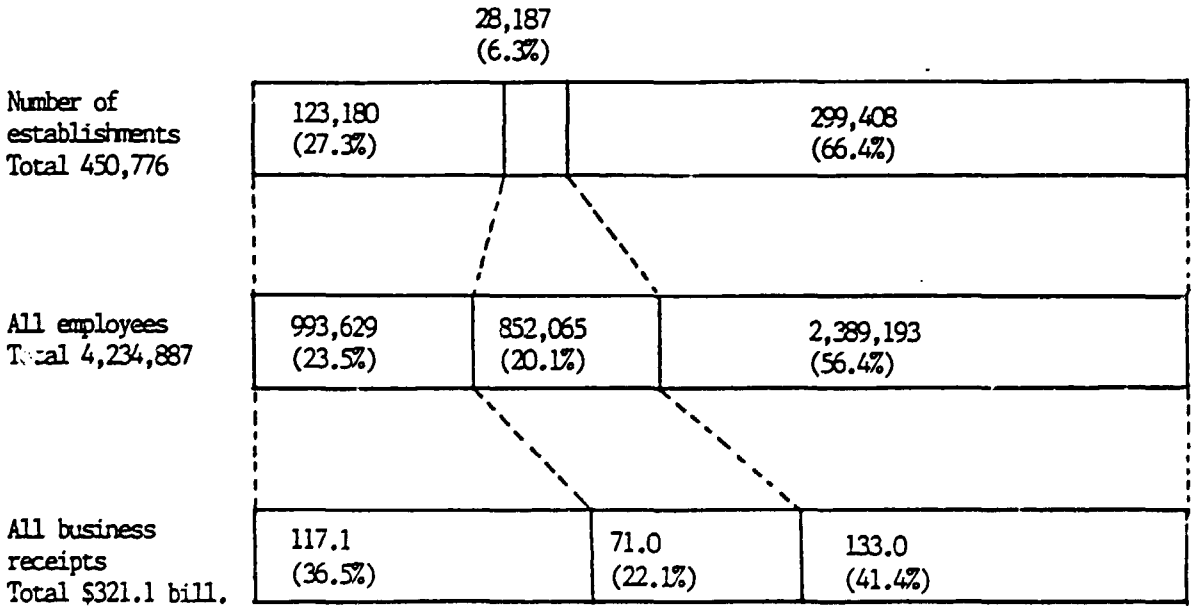
Source: 1984 Report on Construction Work Survey, EPB of Korea, 1985
1982 Census of Construction Industry, DOC of U.S., 1985
Survey of Construction Statistics, MOC of Japan

Figure 3.2.3: Establishments by Type of Works in the U.S.(1982)

Establishments with or without pavroll

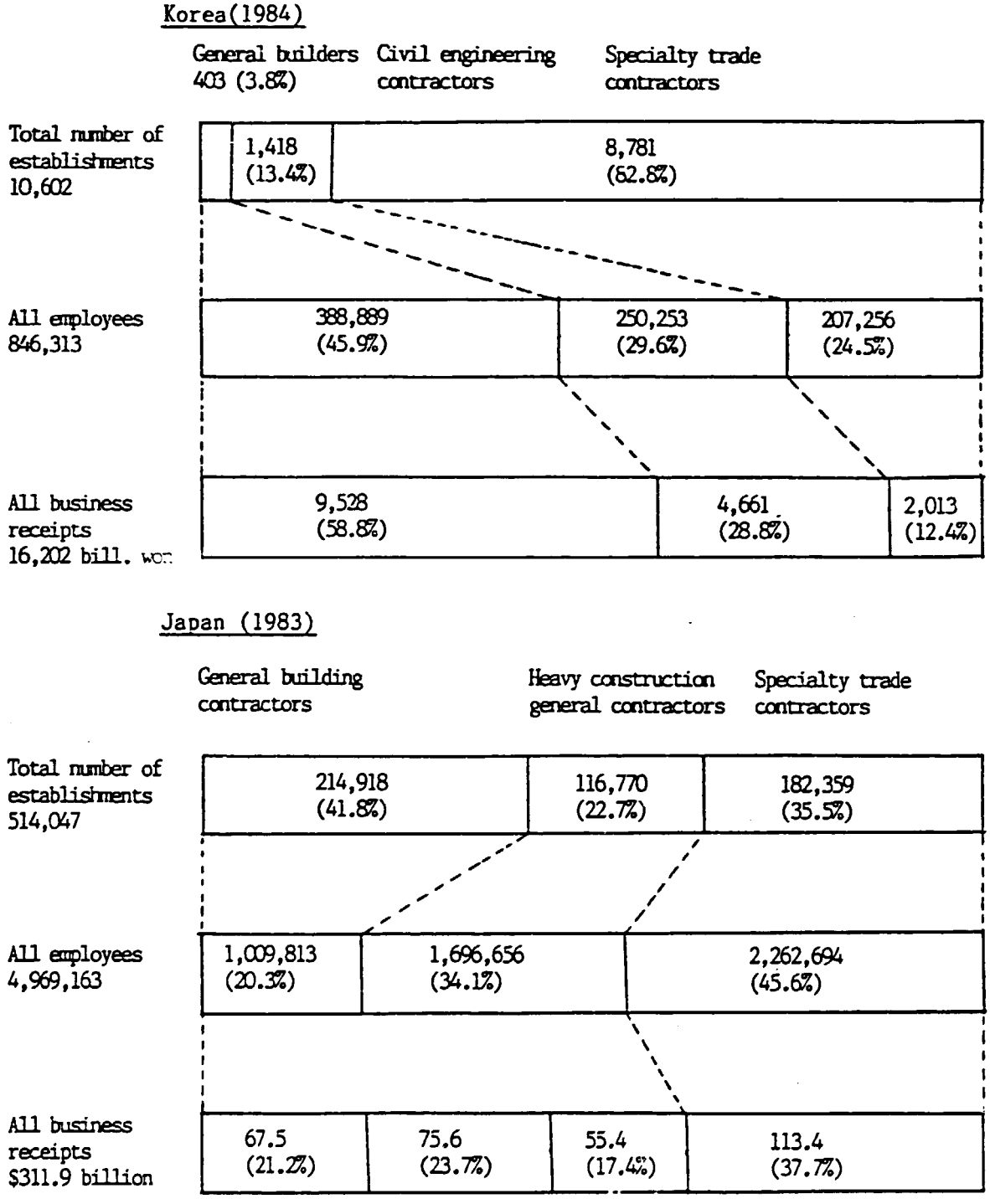


Establishments with pavroll



Source: 1982 Census of Construction Industry, U.S. Department of Commerce, 1985

Figure 3.2.4: Establishments by Type of Works in Korea and Japan



Source: 1984 Report on Construction Work Survey, EPB of Korea,1985
Survey of Construction Statistics, Ministry of Construction of Japan

than 100 employees (3 percent of all establishments) accounted for 31 percent of all business receipts in the U.S. The equivalent numbers in Japan were 3,516 firms (7 percent of all establishments) and 39.5 percent of all business receipts in 1983. The domination of large firms in Korea is most remarkable as 904 companies with more than 100 employees (8.5 percent) accounted for 90.5 percent of all business receipts and 88 companies with more than 1,000 employees (8 percent) were responsible for 66.8 percent of business in 1984. In the U.S., the construction market is shared by five groups of establishments, varying in size; i.e., establishments with no employees, those with less than 10 employees, those with 10 to 49 employees, those with 50 to 99 employees, and those with more than 100 employees. They presently share 11.1, 17.1, 28.7, 12.1, and 31.0 percent of the market respectively. The Japanese construction industry is represented by two distinctive groups, one with 10 to 49 employees, which may be categorized as medium size firms, and firms with more than 100 employees. Each group shared 49.3 percent and 39.5 percent of the 1983 Japanese construction market. In Korea, however, there was no real competition among the different company groups. Eighty-eight companies with more than 1,000 employees acounted for 66.8 percent of the market and companies with more than 100 employees accounted for 90.5 percent of the market. As in other industries, the number and market share of small and medium size companies in the Korean construction industry is less than what it should be by the standards of other countries. This unbalanced distribution of market share may have been the result of Korea's unusual rapid growth in overseas construction. The growth of the large companies has been primarily due to overseas construction activities. This kind of oligopoly may have helped the Korean construction industry become competitive in the international construction market as compared to the size of its own construction industry as a whole, but it could also mean that the Korean construction industry lacked broad-base support from the small and medium-sized firms.

3.3 Mode of Operation

The top U.S. contractors, especially the top 10 contractors, are the design constructors with expertise in design and construction of process plant and other industrial facilities. As the only sector of

the construction industry in which design-build is the dominant mode in process and industrial plant construction, the design constructors (especially the top 10 contractors) naturally mean the process and industrial plant builders. A typical characteristic of these firms is geographical diversification. Most of them are multi-national and have operating subsidiaries or prinicipal offices in foreign countries. A large portion of their business relies on foreign markets. Their business actitivites are conducted throughout the world, in highly industrialized, semi-industrialized, and developing countries. This is in large measure due to the highly technical nature of their work, the high level of expertise required, and the large number of trained and experienced personnel needed to design and build these complex facilities. The top 10 companies contracted $26.3 billion foreign projects in 1984 which was 85.1 percent of the total international contracts awarded to U.S. firms. Their dependency on foreign contracts averaged 48.1 percent in 1984 (see Table 3.3.1). This dependency on foreign contracts is now declining due to the decrease of international construction and an increase in U.S. domestic construction.

General building construction tends to be the most localized in nature. The geographical market of even some of the largest building contractors is concentrated in a particular region of a few metropolitan areas. Some high ranking heavy contractors tend to have multinational operations generally in the develping countries; however, they have to compete vigorously with contractors from developing countries like Korea. A large portion of the top contractors next to the top 10 is composed of general building contractors and heavy contractors. As mentioned before, these companies are doing most of their business in the domestic market. The dependency on foreign contracts of the second 10 largest companies accounted for only 9.8 percent and the third largest 10 largest companies for 14.8 percent.

Top ranking Japanese contractors generally specialize in building or civil engineering work or both, but a few general contractors also do plant construction, except for the building or civil engineering portion of plant construction. There are some companies specializing in this area. The size of the Japanese top 10 contractors is somewhat smaller than the U.S. top 10, but larger than the second 10 largest companies

Table 3.3.1: Top U.S. Contractors: 1984
(Millions of Dollars)

Rank	Firms	Total contract	Percent of foreign
1	Kellog Rust Inc.	10,855.0	79.5
2	Fluor Corp.	8,353.3	18.3
3	Bechtel Group Inc.	8,220.0	59.7
4	The Parsons Corp.	7,514.7	40.1
5	Stearn Catalytic Corp.	4,932.3	11.1
6	Brown & Root Inc.	3,883.9	33.2
7	Lummus Crest Inc.	3,200.0	71.9
8	Stone & Webster Engineering Corp.	2,923.2	69.0
9	Foster Wheeler Corp.	2,413.0	80.1
10	Raymond International Inc.	2,347.3	6.0
11	Turner Corp.	2,154.0	1.5
12	Morrisson-Knudsen Co., Inc.	2,086.7	[illegible]
13	Ebasco Service Inc.	1,580.5	
14	Jones Group Inc.	1,535.4	[illegible]
15	Guy F. Atkinson Co. of California	1,498.7	25
16	BE & K Inc.	1,255.0	[illegible]
17	Dravo Corp.	1,231.7	30.6
18	Gilbane Building Co.	1,149.1	[illegible]0
19	Perini Corp.	1,139.3	[illegible].4
20	Barton-Malow co.	1,126.2	0.0
21	Walbridge Aldinger Co.	1,021.6	36.8
22	George A. Fuller Co.	1,021.6	27.8
23	Centex-Bateson-Rooney-Golden	1,014.0	0.0
24	Blount International Ltd.	1,006.3	1.5
25	Dillingham Construction Corp.	860.9	33.5
26	McCarthy	805.0	1.7
27	Peter Keiwit & Sons' Inc.	776.2	14.0
28	CEI Construction Inc.	753.5	0.0
29	Hubber, Hunt & Nichols Inc.	748.4	0.0
30	Ford, Bacon & Davis Inc.	729.0	25.5

Source: ENR/April 18, 1985

(see Table 3.3.2). Since the top 10 U.S. companies are mostly plant constructors, the Japanese top 10 contractors and the U.S. contraccors below the top 10 are comparable in terms of type of specialized construction.. In this regard, the Japanese top 10 contractors are bigger in size and somewhat more diversified as they are more vertically integrated.

Except for a few, Korea's top 10 contractors are much smaller in size than their U.S. or Japanese counterparts (see Table 3.3.3). Because the Korean domestic market is small, the smaller companies (compared to U.S. and Japanese top contractors) have had to go abroad, whereas the companies of similar size in the U.S. and Japan were able to remain in the domestic market. Although they were not equipped with high level expertise, they could be competitive in infrastructure construction where they had accumulated substantial experience through their domestic construction. Since the mid-1970s, there has been a significant demand for infrastructure work in the Middle East, and the inexpensive and well-disciplined labor force of the Koreans, not normal in other international construction market, could be effectively utilized. As a result, more than 80 percent of Korea's overseas construction was achieved by building and civil engineering projects. This means the characteristics of the top Korean contractors are similar to that of Japan, although Korean companies are more flexible in the scope of services they can provide. The size of the top Korean contractors however is smaller than the U.S., unlike the case of Japan, but the size of business receipts alone cannot fully explain the general building contractor's localized stength. There are many general building contractors, of smaller size, in terms of total business receipts than the top class of Japanese or Korean general contractors who can provide much more efficient and comprehensive services if they concentrated their business in certain localities.

As previously mentioned, due to lack of broad-base support from the small and medium firms as well as that of other related industries and due to lack of research and industrial substructures, Korean contractors tend maintain self-contained structures. Whether the vertical and horizontal diversification caused by this industry's structural deficiency will work favorably in the U.S. market remains to be seen.

Table 3.3.2 Top Japanese Contractors: 1985
(Millions of Dollars)

Rank	Firms	Total contract	Percent of foreign
1	Taisei Construction	4,191.9	6.8
2	Kajima Construction	4,034.9	6.9
3	Shimizu Construction	3,998.0	8.9
4	Ohbayashi-Gumi	3,317.4	5.3
5	Takenaka Komuten	2,971.7	7.4
6	Kumagai-Gumi	2,660.1	21.0
7	Fujita-Kogyo	1,893.6	5.1
8	Hazama-Gumi	1,540.0	17.2
9	Toda Construction	1,488.5	2.8
10	Tobishima Construction	1,362.3	4.3
11	Maeda Construction	1,360.2	4.2
12	Nishimatsu Construction	1,228.1	13.6
13	Goyo Construction	1,186.4	32.1
14	Tokyu Construction	1,170.5	4.7
15	Sato-Kogyo	1,167.1	11.0
16	Mitsui Construction	1,064.5	2.0
17	Kohnoike-Gumi	990.7	1.8
18	Okumura-Gumi	981.8	1.3
19	Sumitomo Construction	837.6	2.9
20	Hasegawa Komuten	837.1	0.0
	Top Japanese Design-Constructors; 1985		
	Chiyoda Chemical Const.	1,321.6	82.0
	Nikki (JGC Corp.)	1,313.6	58.0
	Toyo Engineering Co.	747.9	86.0

Source: Yoshimitsu Nakamura, Construction Industry, Kyoiku-sha, Tokyo, 1985
Japan Company Handbook, Toyo Keizai Shipo Sha Ltd., Tokyo, 1985
Kensetsu-Kogyo Shinbun, June 28, 1985

Note: Exchange rate; $1 = 231.0 yen (average in 1985)

Table 3.3.3 Top Korean Contractors: 1984
(Millions of Dollars)

Rank	Firms	Total contract	Percent of foreign
1	Hyundai Engineering & Construction	3,018	82.6
2	Daewoo Corp.	1,050.0	64.1
3	Daelim Industrial	924.0	80.3
4	Hanyang Corp.	856.4	51.0
5	Samsung Construction	445.0	52.6
6	Samwhan Corp.	392.4	49.5
7	Lucky Development	367.7	54.0
8	Korea Development Corp.	322.2	58.9
9	Hanil Development Corp.	296.9	58.7
10	Samho International	295.6	49.5

Engineering News Record, July 18, 1985

3.4 Labor Relations

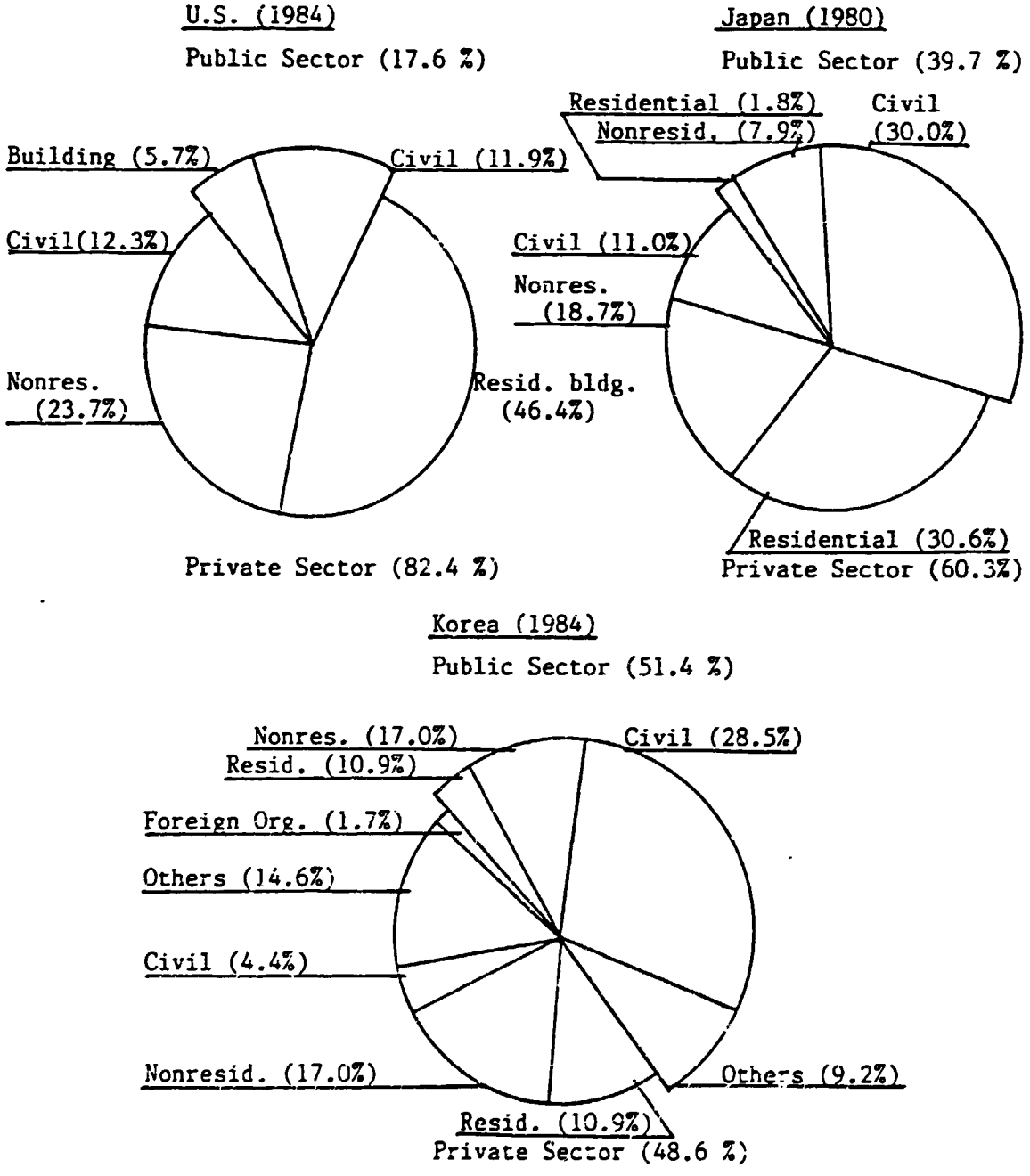
Labor union activity in the Korean construction industry, like that of most other industries, is virtually no-existent. The Korean construction industry has no concept of trade unions; however, there does exist a union of all trades within a company. Its activities are nominal and severely limited. For example, they cannot go on strike under present labor regulations. Instead of labor unions, there are some alternative mechanisms called "labor-management committees" that operate, but their activity is also very limited. In this regard, there are not enough mechanisms in the Korean construction industry, in general, for resolution of the worker's grievances. In other words, it is Korea's management, not the worker, who operates in a very protected environment. This environment provides management great flexibility in its business operation. The operational characteristics of the Korean construction companies, though not a union, are much different from that of open shop companies in the U.S. Although open shop companies in the U.S. are being operated without unions they are significantly influenced by the union shop. In many ways, they are in competition with each other. The presence of both union and open shops provides an ideal check and balance system for the operation of the construction industry as a whole. Since this mechanism does not exist in the Korean construction industry, there exists the opportunity for the Korean construction industry to engage in unacceptable labor practices, at least by American standards. Nonetheless, the absence of union activities in Korea has contributed, to some extent, to the competitiveness of the Korean contractors in the the international construction market. For this reason, Korean management is, by and large, not familiar with the concept of collective bargaining. This is an important disadvantage for the Korean contractors should they attempt to manage projects in the U.S.

3.5 Market by Sectors

In the U.S., the share of private construction is increasing constantly while that of public construction is decreasing. In 1984, only 17.6 percent of total new construction was in the public sector while the remaining 82.4 percent was in private sector construction. The size of U.S. private residential construction market is impressive

and accounts for 46.4 percent of total construction. In Japan, the portion of public construction is larger than that of U.S., accounting for 39.7 percent of the market; but the private sector is still the dominant market. In Japan, the public sector's contribution to civil works is remarkable, accounting for 30.6 percent of total construction in 1980, whereas the public sector's contribution to residential buildings is negligible. The domination of private sector construction is typical in the construction market of the industrial market ecoromy. As the private residential construction's share of the market is significant and the mortgage is the primary source of financing in this sector, government monetary policies can impact greatly on the market mechanism. Unlike the U.S. and Japan, the larger portion of the construction market is taken by the public sector in Korea. In 1984, the public sector construction accounted for 51.4 percent of total value of construction. Among the public sector, the share of the public corporation is significant, accounting for 17.9 percent of total construction. In place of a market mechanism, we see Government's direct leverage in the Korean construction market (see Figure 3.5.1).

Figure 3.5.1 Structure of Construction Market



Source: 1984 Report on Construction Work Survey, EPB of Korea, 1985 Construction Review, Sept/Oct. 1985, U.S. Dept. of Commerce Survey of Construction, Ministry of Construction of Japan, 1985

CHAPTER 4

SUMMARY, STRATEGY IMPLICATION AND RECOMMENDATIONS FOR FURTHER RESEARCH

The construction industry in developed countries grew rapidly due to the new demands created by World War II and by the rapid modernization of the industry and the modernization of the societies of those countries. The construction capacity developed during this period became greater than the demand during the past 20 years. This excess in capacity has been mostly absorbed by the developing countries. The excess demand came from the economic development of the developing countries, and this demand was further accelerated by the oil shock which enabled the Middle East countries to accumulate a large amount of investment resources. For the past few years, however, the demand from developing countries, especially from the Middle East, has been reduced significantly. This decrease is mainly due to the decrease in construction demand from the Middle Eastern oil exporting countries which accounted for more than one-third of the international construction market. This lessened demand is due primarily to a drop in oil prices. To sell products or services to a saturated market, the seller must have a comparative advantage, backed up by the differentiated services or products with competitive price. Higher productivity and differentiated products can be achieved by the development of new materials, innovative management and new technology.

This chapter will first summarize the major findings of this study, and will then make recommendations and suggestions for future work.

4.1 Summary of the Construction Industry in Korea

The Korean construction industry was able to grow and contribute much to its national economy because of the rehabilitation effort after the War; the construction of U.S. military projects in Korea; and the large construction demand for economic development which was primarily financed by foreign agencies. The growth of the construction industry, in turn, contributed much to its national economy. The Koreans were able to penetrate the markets of the Middle East because:

- The unprecedented growth in magnitude of demand for building and infrastructure construction;

- The Middle Eastern countries, though rich in financial resources, were largely in short supply of resources such as skilled manpower, technology and management capability for construction projects;

- The Koreans were able to provide their surplus resources which ideally supplemented the needs of the Middle Eastern countries, such as an economical labor force and technical and managerial capability

This unusual setting favored the Korean construction industry, and Korea's competitive advantages in this market were further backed by the Korean Government which needed foreign currency to ease the current account deficit.

As oil prices started to decline so did the demand for international construction, particularly from the Middle East. The Koreans were the hit the hardest by this reduction in demand from the Middle East because:

- The Koreans had excessively concentrated on overseas construction activities in the Middle East.

- They had an excessive dependency on low technology content projects, such as building and infrastructure works and this type of construction was nearly complete in some countries in the Middle East.

At the same time the following occurred:

- Increased localization of construction activities by the ordering companies; and

- Competition from other developing countries with lower wage levels than that of Korea increased.

These challenges occurred mostly in the building and infrastructure construction areas where Korea is considered competitive. Moreover, the nature of international construction is shifting to high technology content projects. The Koreans are not well equipped to switch their

market to the construction of high technology content projects. Other issues presently facing the Korean construction industry include:

- Lack of basic engineering skills, although the capacity to do detailed engineering has increased substantially.
- Lack of financing capability.
- Lack of backward linkages with domestic suppliers of materials and equipment in international construction.

Demonstrated strengths of the Korean construction industry include the following:

- Although Koreans are not particularly competitive in plant construction, they are still maintaining their strength in building and infrastructure construction.
- Their basic design capability still remains in the early stages of development, but they are strong in the detailed engineering area.
- The wage levels for technicians, engineers and management personnel are much lower in Korea than in the developed countries - even after adjusting for skills and productivity differences.

4.2 Strategy Implications

4.2.1 Generic Competitive Strategies

Michael E. Porter, in his book Competitive Strategy, delineated three potentially successful generic strategic approaches to outperforming others in an industry:

- Overall cost leadership
- Differentiation
- Focus

Korea's traditional competitive advantage in international construction, as in other industries, has been largely one of cost leadership based on a cheap but highly productive labor force. This advantage is not

attainable in developed countries as labor cannot be imported into the market. This is not a problem limited to developed countries; nowadays, Korean can bring only a limited labor force to most of the international construction markets, even in the Middle East, where previously foreign labor importation restrictions were relatively relaxed. In this context, Koreans cannot enjoy the labor-based competitive advantage they once enjoyed even in other traditional international construction markets. Furthermore, the wage rate for Korean labor is already higher than that of many other developing countries; and this higher labor cost is not necessarily accompanied by a significant increase in productivity. Although the contribution of an efficient labor force has been cited significantly as the basis for growth in the Korean construction industry, the contribution of the engineers and management staffs have largely been ignored. This is partly due to the fact that their level of experience and expertise is not comparable to their counterparts in developed countries. However, their wage level has been far less than that of their counterparts, even after adjusting for the differences of skills and productivity. In addition, consider the changes in the labor force brought about by a shift from physical manpower to a labor force with higher qualifications - engineers and management personnel. By using inexpensive engineering and management manpower effectively in the developed market, Korean contractors may be able to compete successfully.

Since Korea's traditional competitive strength has been the cost factor, they have not established a differentiated image for Korean products and services in the international market. Recently, however, the Korean industry has begun to produce and sell a number of differentiated and high quality goods, but buyers of Korean goods do not recognize this; and Korean products are still viewed as being of moderate quality, but at a cheaper cost. This is due primarily to the fact that Korea has long been a recipient of technology. Their marketing strategy has been to penetrate existing markets with existing products, and this strategy has proven successful; but Korea has now reached a point where it has to develop an indigenous technology in order to compete with advanced countries in the areas where technology is still evolving. Based on the present level of technology, it locks

unlikely that the Koreans will be able to provide differentiated services in the U.S. construction market or in the markets of other developed countries. At present, it seems to be more appropriate to try to provide undifferentiated services in these markets. At the same time, the Koreans have to rigorously pursue differentiation through R&D, and innovative management practices.

The low cost and differentiation strategies are usually aimed at achieving their objectives at an industry-wide level. The focus is on serving a particular target and this target can be a particular buying group, a segment of the product line, or a particular geographical market. The strategy rests on the premise that the firm is thus able to serve its narrow strategic target more effectively than competitors who are competing more broadly. As a result, the firm achieves either differentiation from better meeting the needs of the particular target, or lower costs in serving this target or both. Even though the focued strategy does not achieve low cost or differentiation from the perspective of the market as a whole, it does achieve one or both of these positions vis-a-vis its narrow market target. The focus strategy is particularly recommended for Korean contractors who want to compete in the U.S. market which is very large and diverse.

4.2.2 Strategy by the Category of Construction Specialty

As discussed before, the major classifications of construction firms based on the specializiation of the contractors are general contractors, heavy and highway contractors, and specialty trade contractors. As the general contractors cover a very large area of specialization, they are further divided into two categories: general building contractors and general plant design-constructors. Most Korean international contractors are general contractors specializing in buildings, civil engineering and some plant facilities construction. We will concentrate on three categories in discussing the Korean contractors business in the U.S. construction market as an example of a developed market.

Plant Construction: The U.S. is a dominant force in the design and construction process of industrial plants in the international construction market and U.S. leadership in construction technology has been attributed, in large part, to this segment of the

industry. The Korean construction companies, on numerous occasions, cooperated with U.S. firms in this area to supplement their capability in the design and construction of plant facilities in the international construction market. Moreover, a large portion of the plant facilities in Korea were built by U.S. contractors. This type of construction has been largely performed by the top ranking contractors in the U.S. who are equipped with high level expertise, and a large number of trained and experienced personnel. In this context, it seems unlikely that Korean contractors can be competitive in this segment of the U.S. market. The competition is particularly intensive because of large scale projects and the scarcity of projects. Implementation of these projects is very sensitive to external economic conditions. Large-scale contractors in this category depend a good deal on the workload of the international market, and the reduced international market these days has intensified further competition in the U.S. domestic market.

However, design and engineering, which account for a significant portion of the project cost, require qualified engineering expertise to do the basic design and engineering work along with a limited cadre of high level expertise with creative and conceptual design capabilities. The latter accounts for 20 to 30 percent of the total engineering effort, the remaining 70 to 80 percent is routine design. This is an area which offers a good opportunity for Korean engineering and design firms or integrated construction companies with design capabilities to penetrate the U.S. market. Currently, a man-hour of an experienced design engineer in the U.S. costs $50-60 (including overhead and profit). The comparable figure in Korea is around $12-15 per hour. Given such a high cost differential, it makes utilization of the Korean engineering capability economically attractive to U.S. engineering and design firms. The mechanism that seems to emerge is for U.S. firms to receive the contract, and then farm out the detailed engineering and design portion of the project to its Korean design counterpart firm. Considering the proportion of routine design, to the total design and enginering effort, this will provide a substantial incentive for the American firms to acquire this service at a low cost. This will free the American firms from having an expensive permanent design staff, while allowing them to concentrate on sophisticated high-end technology

It will benefit the Koreans in several other ways. A steady job will be provided for their staff; they will become familiar with more advanced design technology; and they will have an opportunity to familiarize themselves with the American market. The existence of modern communications and data transmissions almost eliminates any need for the physical presence of Korean personnel in the U.S. As the plant construction capability, especially in the design area, is strategically important to Korean international construction, this arrangement may be used as a stepping stone to enhance Korea's competitiveness in plant construction in international construction markets outside the U.S.

Heavy Construction: In comparison to any other group of firms in the construction industry, firms engaged in heavy construction, by nature, tend to perform a larger percentage of their work for public sector clients. These firms have traditionally generated the greater portion of their workload through the competitive bidding systems, both in the public and private sectors. Although there are a few additional regulatory or statutory requirements, the public sector bidding may be easier for Korean contractors to deal with, as the rules of the game are more transparent. The technologies engaged are mostly conventional, and the technological gap between U.S. and Korean contractors in this market is not very wide. The heavy contractor's market opportunities in the U.S. tend to be geographically diversified. A large number of projects are large in dollar volume, but are built much less frequently and are widely scattered geographically. Since these projects require higher than average capital investement per construction worker, the contractors have to operate over a wider geographic area in order to minimize the adverse effects associated with idle machinery and equipment. As this category of construction needs more commitment in resources, Korean contractors, if they want to get the work, must seek some kind of cooperation with U.S. contractors to reduce the risks involved in covering such a wide geographical area. Although the Koreans have demonstrated their strength in heavy construction in other international construction markets, they do not have any decisive competitive advantage over their U.S. counterpart, as most of the technologies that the Koreans have mastered are conventional and in fact mostly acquired through companies in the U.S. To be successful in this

market, the Koreans have to come up with new technologies or techniques which can save time and cost substantially without sacrificing quality. Here, the R&D efforts based on a long-term objective is recommended for Korean construction companies. The case of the Japanese company Ohbayashi-Gumi's in the San Francisco sewage tunnel project and the Australian company, Il Bau Ag's, in the Washington Metropolitan Area Transit Authority's project are good examples of success in the U.S., using innovated construction and equipment.

Building Construction: Total dollar volume of general building contractors, especially when the volume of work performed by the specialty trade contractors is included, makes it the largest sector in the construction industry. By nature, building construction tends to be the most fragmented and localized. The geographic market of even some of the largest building contractors is concentrated in a particular region or a few large metropolitan areas. This geographically concentrated nature of building construction places out-of-area establishments in a disadvantaged competitive position with local firms which have better local business contacts and better knowledge of local construction labor market. Considering the localized nature and high percentage of subcontracts, there seems to be not much room for foreign contractors to enter this segment of the market. In this respect, what the Japanese construction companies are doing in the U.S. can be a good reference for Korean contractors who are planning to enter this market. Japanese construction companies are mostly involved in real estate development, either independently or in conjunction with a local real estate developer. This seems to be based on the premise that building construction activity alone cannot be profitable for foreign contractors. Foreign companies therefore have to provide a total package including financing and design in addition to the actual construction. The marginal risk involved in engaging a large number of outside participants and making the project profitable as a whole is reduced.

When we discuss international construction, the subject of single family housing is usually excluded as this is an area mostly covered by the small establishments of the local area, and the economy of scale in this segment of the market is hard to achieve. However, it is also true

that the number of the single family house construction is so large that the total volume of this segment of the makret is one of the largest in the industry. With the help of innovative materials and building technology this market has a good potential. The case of Misawa Home of Japan is a good example. They developed a new material called "PALC" (Precastable Autoclave Lightweight Ceramics) which has all the advantages of conventional materials such as wood. Houses made of PALC are several times stronger than their U.S. counterpart, yet no more expensive per square foot. With this kind of innovative material or patented technology, this largely untouched market by the foreign contractors can be transformed into one of the largest markets ever due to the large number of the single family housing.

4.2.3 Marketing Policy Implications

The Korean international construction industry is now in difficulty because of decreased orders and serious losses due to many underbid projects and tight payment conditions. To make matters worse, many projects in the Middle East were contracted to the barter trade arrangement for oil. With plummeting oil prices due to the excess supply of oil, it is not easy to sell the oil to the international spot market without a loss.

Although the contribution of Korean international construction to the overall economy during the 1970s and early 1980s was tremendous, it has become a burden to the national economy, especially to the Korean financial institutions who guarantee contractor payments. As previously mentioned, reduced demand for international construction, along with Korea's limited capacity in financing, make any tangible growth in Korea's international construction unlikely in the near future. Two scenarios for Korean international construction industry can be envisioned. The first is to curtail international construction activity to a minimum level and shift the emphasis to the domestic market and other industries. The second is to maintain the emphasis on the role of international construction industry, as there still exists a great potential for the Korean construction industry. Although the international construction market is not as active as it used to be, we can identify many large potential markets in the near future. Those potential markets include:

- China, which is thought unlikely to be opened to Korean contractors; but considering the size of the market, it should be worth trying; and one may be able to find some alternative ways to exploit the potentials in this market.

- Middle East, now sluggish but has the potential to demand a great amount of reconstruction effort when the war between Iran and Iraq is ended.

- Southeast Asia, nowadays the size of this market is comparable to that of Middle East.

Aside from these three traditional international construction markets, there also exists some potential in the markets of the developed countries which include:

- The United States

- European Market, which Koreans have not seriously considered, but the size of this market is approximately a quarter of the total of the world's construction market. The U.S. and Japan have substantial amounts of construction activity going on in the European market while the Koreans have never even tried.

- Japanese market, which seems to be another closed market. Although very close geographically to Korea, this market has not been seriously considered as a potential market by Korean contractors. Once opened, the Koreans may have a better opportunity than other countries because of their proximity and similar cultural background. Furthermore the issue of the balance of trade may be a most useful bargaining tool in opening the Japanese construction market to Korean contractors.

Many Koran contractors are reluctant, and understandably so, of going into the markets of the developed countries. This is due to a lack of familiarity with the market and their unfamiliarity with the advanced technological content of the project. Korean contractors, however, should recognize that international construction, unlike the Middle East market, requires financial and technological resources, which require a new strategy on the part of Korean contractors. In this

this respect, Koreans have to free themselves from the perception that the international construction is inseparable from Korean labor. Over the past 10 or 20 years, Korea has accumulated a good deal of experience and expertise in construction, which should not be wasted. Exporting construction services to the advanced countries is not difficult and does not require more invstment in R&D than that for electronics, automobiles and other high technology. In this regard, long-term developmental strategies for construction technology and materials, through concerted efforts in the fields of R&D and educational programs, seems to be the most important task which the Korean construction industry must start to pursue.

4. 3 Recommendations for Further Research

This report reviewed many aspects of the Korean construction industry and has concluded that in order for the Korean construction industry to maintain its current international position, it has to develop appropriate strategies to penetrate the construction market in developed countries as well as in developing countries.

Two strategies for entry into the foreign market can be identified: First, export the products to the target country from a production base outside that country. Second, transfer necessary resource in technology, capital, human skills, and enterprises to the foreign country where they may be sold directly to users or combined with local resources to manufacture products for sale in local markets. Construction falls primarily into the second category. As Korean contractors move from their traditional market in the Middle East to other third world countries and to developed countries, the mix of importable resources will vary and require new marketing research along with more sophisticated strategic planning. A thorough assessment of opportunities and challenges facing the Korean contractors in these new markets require thorough, in-depth research and study. It is therefore strongly recommended that Korean contractors, through their overseas contractor associates, undertake a major market research program in both developed as well as developing countries to identify these markets, or segments of the market, which offer a potential for penetration by Korean contractors.

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