

CONSTRUCTION
INDUSTRY
INSTITUTE

JAPANESE, KOREAN, AND U.S. CONSTRUCTION INDUSTRIES

by
A. C. Sidwell
W. A. Van Metzinger
Richard L. Tucker

A Report To
The Construction Industry Institute
The University of Texas at Austin

from
The University of Texas at Austin
Austin, Texas

SD-37
July 1988

© 1988 Construction Industry Institute™.

The University of Texas at Austin.

CII members may reproduce and distribute this work internally in any medium at no cost to internal recipients. CII members are permitted to revise and adapt this work for the internal use provided an informational copy is furnished to CII.

Available to non-members by purchase; however, no copies may be made or distributed and no modifications made without prior written permission from CII. Contact CII at <http://construction-institute.org/catalog.htm> to purchase copies. Volume discounts may be available.

All CII members, current students, and faculty at a college or university are eligible to purchase CII products at member prices. Faculty and students at a college or university may reproduce and distribute this work without modification for educational use.

Printed in the United States of America.

TABLE OF CONTENTS

LIST OF FIGURES.....	ii
LIST OF TABLES.....	iii
EXECUTIVE SUMMARY.....	iv
1. INTRODUCTION.....	1
2. HISTORY OF JAPAN'S CONSTRUCTION INDUSTRY.....	2
3. THE JAPANESE CONSTRUCTION PROCESS.....	3
Project Planning and Conceptual Phase.....	3
Project Control and Design.....	3
Procurement.....	4
Construction.....	4
Construction Systems.....	5
Contracts.....	7
4. JAPANESE CONSTRUCTION MARKET.....	9
Domestic Market.....	9
Overseas Market.....	9
Japanese Investment in the United States.....	14
5. LABOR.....	16
Productivity.....	16
Accident Rate.....	16
Aging of the Work Force.....	18
Lifetime Employment.....	18
6. MANAGEMENT STYLES.....	26
7. RESEARCH AND DEVELOPMENT.....	29
Japan vs. the United States in Research.....	30
Robotics.....	34
8. THE KOREAN CONSTRUCTION INDUSTRY.....	41
Structure.....	41
Growth of the Korean Construction Industry.....	41
Korean Problems in International Markets.....	42
Research and Development in Korea.....	44
9. CONCLUSIONS.....	45
The U.S. Domestic Market.....	45
The Japanese Domestic Market.....	45
International Market.....	45
Technologies.....	46
U.S. Strategy.....	46
10. REFERENCES.....	47

LIST OF FIGURES

Figure 1.	Typical Site Organization.....	6
Figure 2.	Typical Workday Schedule.....	6
Figure 3.	Structures of Construction Investment.....	8
Figure 4.	New Contract Awards of the 250 Largest Contractors.....	13
Figure 5.	Evolution of the Work Force Composition by Age Group in the Construction Industry.....	19
Figure 6.	Change in Labor Productivity Classified by Capital Amount.....	20
Figure 7.	Change in Labor Productivity.....	21
Figure 8.	Organization of Research Conducted by Ohbayashi-Gumi Technical Research Institute.....	35
Figure 9.	Robot Research by the Big 5.....	37
Figure 10.	The Economic Implications of Construction Robots.....	39
Figure 11.	Share of Each Country in Overseas Construction Market.....	43

LIST OF TABLES

Table 1.	Contract Awards in Japan, 1981-1985.....	10
Table 2.	The Development of House Prices.....	11
Table 3.	Japanese Overseas Investment.....	14
Table 4.	Foreign Contracts Won by Japanese Construction Companies, Fiscal Years 1981-1985.....	15
Table 5.	International Comparison of Industrial Labor Productivity.....	17
Table 6.	Comparisons of Length of Service.....	22
Table 7.	Population Estimates.....	24
Table 8.	Japanese vs. American Management Styles.....	27
Table 9.	Private Construction Research Institutes of Technology.....	31
Table 10.	Commitment to Research and Development by the Big 5.....	32
Table 11.	U.S. Position on Technology.....	32
Table 12.	Japanese Construction Research Topics.....	38
Table 13.	Production of Prefabricated Units by Top Five Producers (1987 Estimate).....	40
Table 14.	Licensed Contractors by Type of Work.....	41

EXECUTIVE SUMMARY

The history of the Japanese construction industry is remarkable in its development over the last century, as it experienced steady growth during the years following the start of the Meiji restoration period. During World Wars I and II, the industry came to a standstill, but since 1945 has grown rapidly due to heavy investment by the government, private enterprise, and the United States as part of the restoration process.

The construction process in Japan is similar to that in the United States. All the larger general contracting companies have design-construct capabilities. The greater proportion of contractors, however, are sub-contractors or specialist contractors. Sub-contractors or specialist contractors are limited to areas called prefectures (or counties), whereas general contractors can obtain a license to work throughout the country. The Japanese company system is based on the group, not the individual as in the United States. This creates loyalty among Japanese workers toward their companies and results in work surpassing that of their U.S. counterparts. Furthermore, the Japanese contracting system relies much more on trust, a phenomenon illustrated by a lower ratio of lawyers per capita. This system, however, is unique to Japan and the Japanese culture and may not be transferable to Western environments.

There are a few aspects of particular interest concerning the Japanese construction industry. First is the Japanese outlook on domestic and international markets. Japan is currently experiencing a contraction of its economy due to the strong yen. However, the domestic construction market remains buoyant due to three influences: (1) stimulus of construction activity by the government; (2) the relative low reliance on overseas contracts; and (3) diversification into development by Japanese contractors. The impact of reduced international construction activity has been less on Japanese contractors than on U.S. contractors. Japan is, however, quickly entering overseas markets. Kumagai-Gumi, the sixth largest Japanese company, is pursuing a strategy of entering the Australian market initially as a developer with the objective of becoming a contractor. In contrast, it is difficult for outside contractors to enter the Japanese domestic market. The Japanese are also increasing their investment in the United States in manufacturing, as well as real estate and research.

A second interesting aspect of the Japanese construction industry concerns its labor force. Contrary to the generally high level of productivity in Japanese industry, the productivity of construction labor is low compared to other countries. The work force is aging due to a lack of interest by younger workers in entering the industry as well as Westernization of the young, who are not prepared to follow the traditional seniority system to gain advancement. The Japanese construction industry labor force follows the general cultural attitude towards the lifetime employment system of which the essence is recruitment of new graduates each year, training them, and assuring continuous employment till retirement. This unique system is also changing, however.

A third aspect is the difference in management styles between the United States and Japan. The Japanese style emphasizes group decision making and consensus, with a bottom-up power structure. The American style is directed towards the individual achiever and has a clear top-down power structure. Decisions in Japan take longer; the U.S. style facilitates flexibility and quick response.

Finally, during the last few decades, the Japanese construction companies have invested heavily in research and development. Initially, research and development (R&D) was to enhance the restructuring of Japan after World War II. Later it served in a troubleshooting role and laid the foundation for long-term investment, putting the Japanese at the leading edge in many areas. In the United States, construction problems are mainly solved at the site level, whereas Japanese companies use their research facilities in a direct support role to cope with construction problems. They also set long-term objectives to develop expertise in areas which they feel they can benefit from later. A good example is the automation of construction equipment in which Japanese contractors now lead the world.

The bottom line is selecting the strategy the U.S. construction industry should adopt in matching Japanese supremacy. The United States still holds the edge in construction management--this must be retained by continued research and development. Secondly, we must regain leadership in vital technologies such as automation of construction equipment and techniques.

The construction industry in Korea is also discussed. Due to its dependency on the Middle East market, which has dropped significantly the last few years, and on its shortage of skilled engineers, Korea is not likely to become a major power in construction in the near future, except for its low-bid capability in the competitive market.

INTRODUCTION

Access to the Japanese construction market by U.S. contractors has become an issue at a governmental level. The Japanese trade surplus with the United States was \$58.6 billion in 1986, creating concern in the marketplace. U.S. Commerce Secretary William Verity¹ has complained that while Japanese construction companies do a \$2 billion business in the United States, foreign companies have difficulty in competing for public works projects in Japan. There could be \$200 billion in such projects in Japan over the next decade. The massive \$3 trillion U.S. budget deficit is forcing the Federal Government to take a hard look at export markets and protectionist measures. The Senate already has restricted foreign bidding on U.S. Defense Department construction projects.²

The \$6.7 billion Kansai International Airport has become a key issue in the drive to allow bidding by U.S. contractors in Japan. Although the Japanese government maintains that foreign companies are provided with the same fair and non-discriminatory opportunities for participation as local contractors, the fact is that only minor contracts have been won by outside contractors.

The U.S. construction industry is also concerned about its level of competitiveness at home and the ever widening research and development gap. Japanese contractors undertake much more research than their U.S. counterparts, who do virtually no research. A recent report to the U.S. Office of Technology Assessment³ finds that Japan and European countries eclipse the United States in most new developments except computer aided design (CAD) and construction management. This steady erosion of U.S. technological superiority will reduce competitiveness in domestic markets as well as internationally. Japanese penetration of the U.S. construction market, though only around 2 percent, is nevertheless growing rapidly, second only to the Europeans.

HISTORY OF JAPAN'S CONSTRUCTION INDUSTRY

The construction industry of Japan has a history dating back many years. Some of their construction companies are more than 180 years old. Since the start of the Meiji Restoration period in 1860, Japan began to modernize by opening gates to the Western World after more than 200 years of isolation. The construction industry grew steadily until the two World Wars, when it came to a standstill.

After World War II, the Japanese industry grew rapidly. Reconstruction was supported with heavy investment by the government and private enterprise. The construction investment increased to approximately one-fifth of the gross national product (GNP) in 1968. The industry prospered particularly during the two years before the 1964 Tokyo Olympic Games. Afterwards, expansion slowed but recovered in 1966, largely due to new public works programs by the government. During these years, the economy prospered and a high economic growth rate was achieved.

The Japanese construction industry consists of more than 500,000 firms, of which 100 to 150 are general contractors with the remainder being subcontractors. The industry has been dominated for many years by the "Big Five" companies, to which a sixth has been recently added. These six are:

- Kajima Construction
- Kumagai-Gumi
- Ohbayashi-Gumi
- Shimizu Construction
- Taisei Construction
- Takenaka Komuten

In Japan, business relationships are intensely traditional, relying on trust and relationships built up over many years. Clients tend to award projects on the basis of these relationships.

THE JAPANESE CONSTRUCTION PROCESS

Project Planning and Conceptual Phase

The larger construction companies in Japan are mostly design-construct companies, and this facilitates incorporation of construction knowledge in the planning and conceptual design phase. All big companies not only have excellent planning and design knowledge, but good financing and development knowledge as well. Most of these companies have a standard project plan layout that can be used as one or in parts, depending on the client's needs. They also have excellent financing capabilities. Kumagai-Gumi is a good example. They have penetrated the Australian market as a developer in order to win construction project awards.

The planning and conceptual procedures seem to be of high standard for both small and large companies. The R&D departments of the bigger companies also enable them to optimize development in certain areas and incorporate it in their overall planning effort.

Most companies, and all big companies, offer the following basic planning and conceptual design concepts:

- Market survey and analysis
- Land survey and evaluation
- Real estate evaluation
- Economic and financial evaluation of a project
- Master planning
- Feasibility studies
- Environmental impact assessment
- Financing arrangements
- Overall budget and schedule
- Contract terms and conditions
- Qualification of contractors, major vendors and subcontractors

Project Control and Design

Project control and detail design are accomplished in a systematic manner. If design problems arise, the R&D department may be asked to research the problem and suggest solutions. Not only is the R&D department involved, but also the construction department. This enables companies, and especially bigger companies, to optimize design and improve constructability.

The larger companies have experience in a wide variety of civil engineering fields. The work of their R&D departments is incorporated into their designs. Knowledge about clean rooms, intelligent buildings, and new technology is excellent and the concepts are incorporated into ongoing research. Other fields such as energy-saving designs, fire protection, offshore structures, and mining are examples in which the Japanese are busy with ongoing research and implementation.

The project control and design services available to owners are as follows:

- Process design
- Design and drawings for a wide variety of projects
- Computer aided cost analysis
- Energy savings design
- Scale models
- Standard specifications
- Facilities planning, including computer installation and office automation equipment
- Fire protection and disaster prevention systems
- Design and construction durability research
- Cost control systems

The Japanese construction management systems differ from their U.S. counterparts. Larger design teams are established on site and more attention is given to detail design. Project management operates more by the consensus principle than by top-down authority. The impact of quality control activities also is incorporated throughout the project management phase.

It is evident that with this range of capabilities, coupled with the ability to research and find solutions in certain problem areas, larger companies have a very competitive basis from which to operate.

Procurement

The procurement phase in project development is operated in a similar manner to that of the United States. Procurement plans are set up with vendor lists with an incorporated quotation analysis. The final purchasing of material and equipment is done with special emphasis on delivery date prediction, as well as inspection of equipment to be delivered to the job site on certain dates. The overall standards of the procurement phase, however, are extremely different from the U.S. system. Reports show that overall delivery time of Japanese vendors averages less than their U.S. counterparts and is much more reliable. The cultural difference may be the main reason. Procurement orders are placed with carefully selected vendors and much negotiation is involved. Construction companies tend to use the same vendors again and again, based on considerable mutual trust. Another factor that enhances delivery times is that delivery date commitments are sacred to Japanese vendors. This has enabled the industry to develop the "just-in-time" concept in construction. Equipment and material is delivered exactly when needed on the job site. Although it involves more administration, it is very helpful on congested sites and sites exposed to severe weather. The fact that these commitments are sacred to vendors enables a project to continue without delay.

The same principle services such as purchasing, insurance, subcontracting, and construction equipment rental that are available to owners in the United States are also available to owners in Japan.

Construction

The R&D departments of construction companies assure the use of the latest construction methods and equipment available. Highly innovative construction knowledge involves a reduction of construction time. The construction services offered by companies

are subcontractor selection, labor, construction planning material control, insurance, supervision, and local procurement. This is very similar to their U.S. counterparts.

The labor is usually a lifetime part of a company. Persons joining a specific company are loyal to the company and in exchange are assured of ongoing employment. Layoffs are therefore minimized, which improves motivation. The larger general contractors, however, tend to use subcontractors as labor brokers. By contract, only 20 percent of their labor is permanently employed. The larger Japanese companies tend to form long-term relationships with subcontractor companies with which they do business year after year. Other companies not exclusively used are available when the normally used companies have insufficient capacity. Worker safety is also of utmost importance to the Japanese companies.

It is interesting to note that most construction sites are organized in the same way. A typical daily work schedule begins with bending and stretching exercises to get the body ready for work. Thereafter the project manager and staff will address different groups. This generally entails safety issues, production, and worker motivation. Following this, individual labor groups will have tool-box meetings to discuss detailed tasks. The working schedule for the specific day is discussed. Each worker is told what is expected from him during the day. Workers will work overtime to finish the packages set out for a specific day. This system demands a great deal of management and organization by the superintendent and foremen in order to assemble each person's work package.

In the afternoons, project managers meetings are held in which problems that may have arisen during the day, for example, the construction schedule, problems that subcontractors may have, and the next day's plans for labor and subcontractor, are discussed.

Figure 1 shows a typical site organization in which the managing and engineering phases are two separate entities. A typical workday schedule is shown in Figure 2.

Construction Systems

There are 500,000 construction enterprises in Japan, of which 100 to 150 are general contractors. The remainder are sub-contractors. These subcontractors operate in so-called "prefectures." Prefectures are the equivalent of a county, and Japan is divided into 47 of these prefectures. Tokyo, consisting of approximately 12 million people, is one prefecture.

All contractors are required to have a license to operate as a general contractor or sub-contractor. The two types of licenses are:

1. **General Contractors** license, which is issued by the Ministry of Construction in Tokyo and enables the general contractor to work anywhere in Japan.
2. **Prefectures** license, which is issued to sub-contractors as small general builders by the municipal authorities. The sub-contractor or small general builder can only operate within the boundaries of this prefecture.

When a client wishes to build a major project, a typical sequence is to appoint a general contractor or obtain bids from a few general contractors. The general contractor then will select sub-contractors available in the specific prefecture. The general contractor usually has "lifetime" employment for managers, architects, and engineers. The

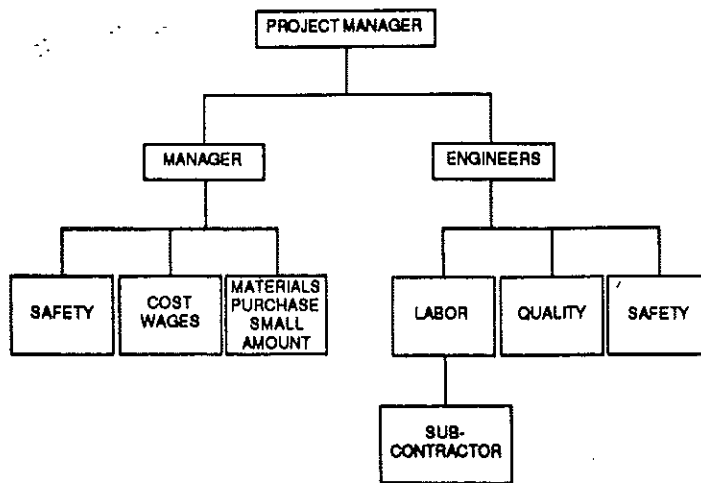


Figure 1. Typical Site Organization

8:00 - 8:10 A.M.	Stretching Exercises
8:10 - 8:20 A.M.	Project Managers Address Work Force
8:20 - 8:30 A.M.	Tool Box Meeting
8:30 - 12:00 P.M.	Work
12:00 - 12:20 P.M.	Lunch
12:20 - 5:00 P.M.	Work
ALSO -	
3:00 - 3:30 P.M.	Project Managers Meeting
10:00 - 10:20 A.M. AND 3:00 - 3:20 P.M.	Extra Non-Working Time for Labor Doing Heavy-Duty Work

Figure 2. A Typical Workday Schedule

remaining work force will be sub-contractors. Sub-contractors have about 20 percent "lifetime" employment. The rest of their labor is hired when needed. A typical example of the system is a design construction firm with 2,000 lifetime employees, comprising 1,500 engineers (architects, engineers, and developers) and 500 managers (accounting and purchasing), who will work with a total sub-contractor work force of up to 10,000 people.

Contracts

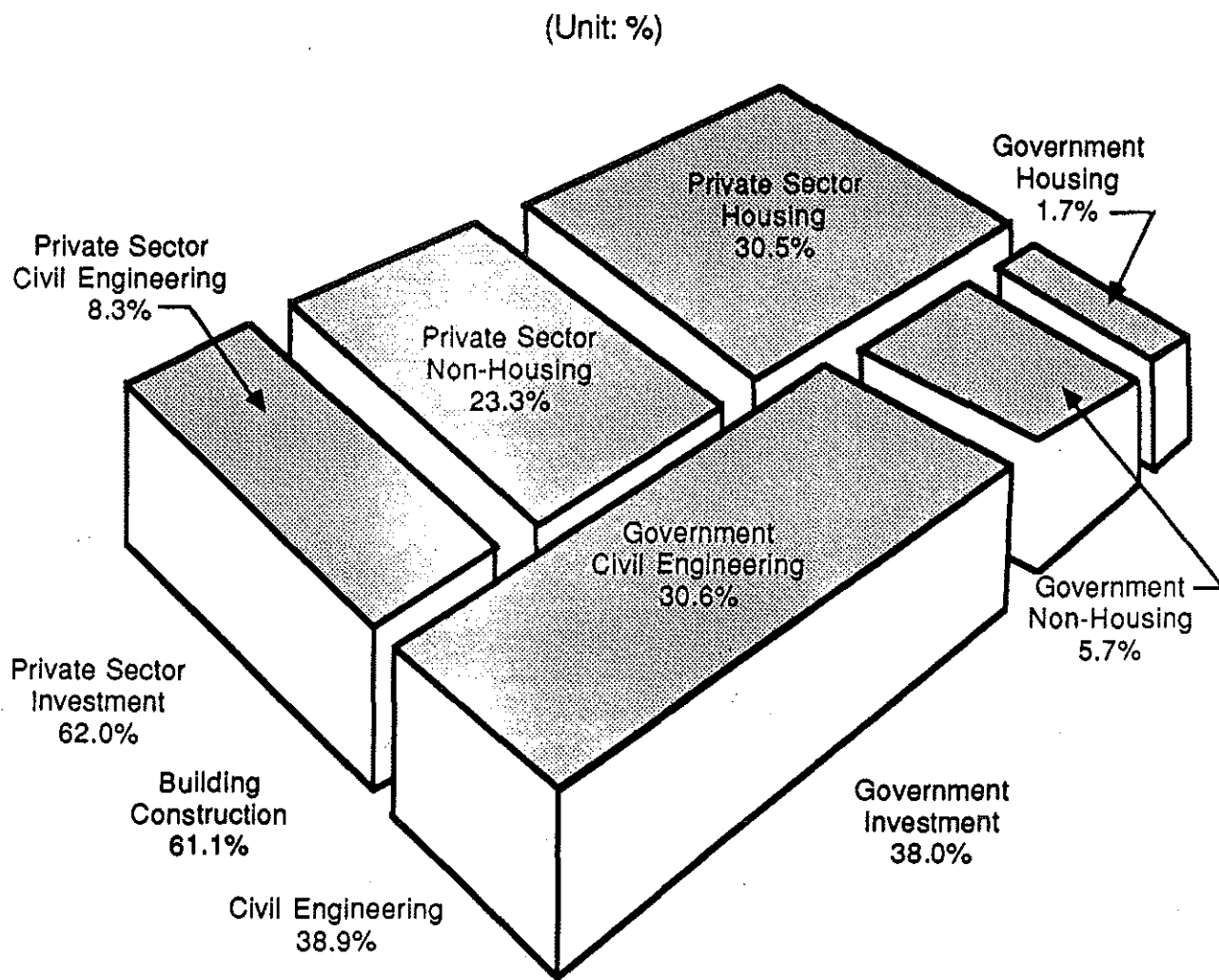
The public sector uses a system of competitive bidding from selected prequalified general contractors, which follows the normal design-bid-construction sequence. The private sector may use negotiations. Some clients have established long-term relationships with certain contractors. The prequalification of contractors is done by a so-called "ranking system." In the public sector, contractors are ranked according to their turnover of the previous year. These rankings are not published, but are kept by the authorities. For public works, contractors will be invited to bid for projects within their ranked financial capabilities. The private sector has its own unofficial rankings, which may be found in the trade press. Figure 3 shows the construction investment structure in Japan.

Usually, clients will simply tell a construction firm in general terms what they want built, when they want it, and how much they wish to pay. The traditional nature of the industry first means it is highly likely that the contractor has worked for the client before, and secondly that the prequalification and ranking system ensures the contractor has the requisite skills and expertise. The contractor then will prepare drawings illustrating the project in general. As an alternative, consultants may be hired to prepare the design and construction package. Government projects normally are let to construction firms on competitive bids based on detailed designs. Professional fees for design consultants normally are negotiated.

Most contracts are either lump sum or cost plus. Kajima Corporation, for example, prefers a reimbursable cost plus fee type contract due to the fact that the risks to both contractor and client are reduced.

Contracts executed by the Japanese are not only governed by the terms and conditions set out in the contract, but also by a sense of social obligation of both parties in a contract to sustain a good long-term relationship. This is part of the Japanese culture. Lawyers are virtually never brought into contract negotiations, and litigation is the last resort in resolving problems. The Japanese feel that bringing a lawyer to the negotiations implies mistrust. Claims for loss and expense on a project are rare. Change orders, for example, are settled by adjusting the contract sum by negotiation. Even arbitration, although allowed by the contract, is seldom used. This trust in each other is quite unique to the Japanese. However, this creates problems when the Japanese enter the international market.

The general conditions for construction contracting frequently used are prepared jointly by the Architectural Institute of Japan, The Architectural Association of Japan, The Japan Architects Association, and the Associated General Contractors of Japan. These contract conditions are straightforward and avoid legal jargon, terminology, and cross-referencing between clauses. This again illustrates the level of trust and sincerity between parties involved in the contract.



Source: Ministry of Construction's "Construction Investment"

Figure 3. Structure of Construction Investment

JAPANESE CONSTRUCTION MARKET

Domestic Market

Japan is currently experiencing a contraction of the economy and suffering from ENDAKA--the strong yen-induced crunch. Since Japan sells its products at dollar-dominated prices on world markets, the 50 percent rise in the yen against the U.S. dollar has dealt a crippling blow to Japanese merchandise exports. The yen value of exports dropped 16.6 percent in 1986, the first drop in eight years. Since 1978, some sectors are increasing, such as exports of construction machinery which increased 40 percent in 1985-86, comprising 3.3 percent of exports to the United States.⁴ Automobiles account for 71.1 percent of exports, but recent reports suggest the exchange rate makes it cheaper for Japan to import Japanese cars made in the United States.

Real GNP rose by only 2.5 percent in 1986, the slowest rate in 11 years, falling from 5.1 percent in 1984 to 4.5 percent in 1985. Badly hit in particular are coal, aluminum, and steel producers who have had to scale down production under the pressure of sagging exports, increased imports, and shrinking domestic demand. Industrial production appears to have peaked in 1985, remaining virtually flat thereafter. Exceptions to the downward slide in the economy were construction, banking, and insurance.

Part of the reason for success of the domestic construction economy is the stimulus by the government, the relatively low reliance on overseas contracts, and diversification into development by Japanese contractors.

The governments emergency economic measures in 1987⁵ include expansion of domestic construction by \$36 billion in public works contracts. The package is expected to push up sluggish GNP growth by 2 percent and reduce the current account surplus. The strong yen and a general reduction in international construction markets have forced Japanese contractors to look to their domestic market.

The size of the domestic construction market is indicated in Table 1.⁶

The value of contracts awarded in 1984 jumped significantly. Twenty percent was due almost entirely to private sector activity primarily in factories, warehouses, power stations, and residential. Construction of owner-occupied housing has declined 35 percent over the seven years preceding 1985, whereas new starts for rental housing increased by 20 percent. The greater demand for rental housing possibly may be explained by the rising number of young people in the 15-24 age group, high land costs, high interest rates, and the proportionately higher cost of housing in relation to income. Table 2⁷ shows that the house price/annual income ratio has increased from 1:1 in 1950 to 7.9:1 in 1983 in metropolitan areas. Comparative figures for the United States and western Europe would be more in the order of 2.5:1. Recent reports suggest that residential⁸ and industrial production⁹ appeared to have plateaued in 1985-86.

Overseas Markets

Overseas projects represent a diminishing market for all international contractors, spurred on by a fall in the price of oil affecting the Middle East markets and foreign

TABLE 1:
Contract Awards In Japan, 1981 - 1985*
(in billions of Yen**)

	1981	1982	1983	1984	1985
TOTAL	Y 9,674.4	Y 9,512.3	Y 9,547.0	Y 11,493.6	Y 12,157.6
YEAR ON YEAR GROWTH %		(0.02)	0.37	20.38	5.78
U.S. DOLLAR VALUE (billions)	43.86	38.19	40.2	48.39	50.37
BY SECTOR:					
Public Sector	3,531.6	3,398.7	3,259.9	3,468.5	3,370.3
Private Sector	5,408.9	5,272.1	5,363.8	6,733.4	7,430.7
BY TYPE OF WORK:					
Building:	5,722.6	5,593.8	5,712.8	7,034.3	7,579.7
Offices and stores	1,707.9	1,734.6	2,101.8	2,255.1	2,786.3
Factories, warehouses and power stations	1,004.8	981.3	915.2	1,390.2	1,332.2
Residential	1,034.3	1,063.7	973.6	1,362.9	1,453.7
Schools, hospitals and public offices	1,376.0	1,216.9	1,146.1	1,327.6	1,261.6
Other	599.6	597.3	576.1	698.5	745.9
Civil Engineering:					
Dams	341.6	295.5	337.4	313.3	288.5
Flood control	105.1	138.7	114.7	164.2	123.8
Water works and sewage	635.3	578.9	546.7	675.9	647.1
Railroads	414.3	420.6	410.7	347.0	343.6
Ports	305.7	311.4	259.2	249.0	283.4
Highways and bridges	573.0	593.4	665.7	808.4	854.8
Land development	474.0	467.5	430.7	495.7	630.5
Electricity, gas and communications	418.5	386.4	394.4	432.4	431.4
Other	684.5	725.9	674.6	973.4	977.0

* Prime contracts won by 43 major construction companies in the 1981-82 period and by the 50 big contractors in the 1983-85 period.

** The yen figures can be converted to dollars using the following average annual exchange rates: 1981 - Y220.54; 1982 - Y249.08; 1983 - Y237.51; 1984 - Y237.52; and 1985 - Y238.54.

TABLE 2:
The Development of House Prices

	1950	1955	1960	1965	1970	1975	1980	1983
A - WHOLE COUNTRY								
House Prices	223	810	1,570	3,598	7,406	17,580	26,894	32,695
of which:								
Land Prices (size of land, m ²)	44 (115)	262 (132)	744 (149)	2,044 (157)	4,555 (176)	10,431 (191)	15,794 (214)	20,445 (217)
Construction Prices (floor space, m ²)	179 (58)	548 (66)	826 (74)	1,554 (78)	2,851 (88)	7,149 (96)	11,100 (107)	12,250 (108)
Annual Income	198	350	491	809	1,374	2,827	4,196	4,876
Housing Price/Annual Income	1.1	2.3	3.2	4.4	5.4	6.2	6.4	6.7
B - METROPOLITAN AREA								
House Prices	222	758	1,618	4,643	8,499	19,856	33,261	38,826
of which:								
Land Prices (size of land, m ²)	27 (78)	221 (91)	809 (111)	3,008 (119)	5,704 (129)	12,690 (137)	22,153 (157)	26,747 (155)
Construction Prices (floor space, m ²)	195 (47)	537 (55)	808 (67)	1,635 (71)	2,795 (77)	7,166 (82)	11,109 (94)	12,079 (93)
Annual Income	244	428	581	927	1,463	3,019	4,424	4,890
Housing Price/Annual Income	1	1.8	2.8	5	5.8	6.6	7.5	7.9

** The yen figures can be converted to dollars using the following average annual exchange rates: 1981 - Y220.54; 1982 - Y249.08; 1983 - Y237.51; 1984 - Y237.52 and 1985 - Y238.54.

Sources: OECD Economic Survey, 1986/87
Japan Economic Institute (6)