

Construction Economy Report

No. 44

The Japanese Economy and Public Investment

Social Infrastructure Improvement aimed at a New Economic Growth

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Research Institute of Construction and Economy

(RICE)

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Chapter 1 Macroeconomics and Construction Investment

1.1 The Japanese Economy and Construction Investment

- The moderate recovery of the Japanese economy, led by plant and equipment investment, is expected to continue in FY2004 and FY2005. There are, however, risk factors in need of attention, including: a) the slowdown of overseas economies, b) a rising yen slowing export growth, and c) a worsened income environment and its effect on consumption.
- The overall downward trend, however, is likely to continue though the decrease in construction investment will halt, temporarily, in FY2005 due to the additional supplementary budget for disaster recovery (such as typhoons and the Niigata earthquake). Private-sector non-housing construction investment will be sustained due to the economic recovery, whereas a decrease of government construction investment, other than spending on disaster recovery, is likely to continue and private-sector housing investment, lacking a demand-driving force, will move from plateau to a slight decrease.

Trends in construction investment (Nominal, FY)

| FY | Actual | | | | Tentative/Forecast | | | |
|--|------------------------|-------------------------|-------------------------|-------------------------|--------------------------|-------------------------|--------------------------|-------------------------|
| | 1990 | 1995 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
| Nominal CI (Increase rate) | 81,440 11.4% | 79,017 0.3% | 66,195 -3.4% | 61,288 -7.4% | 56,300 -8.1% | 53,850 -4.4% | 52,270 -2.9% | 52,690 0.8% |
| Nominal government CI (Increase rate) (Contribution rate) | 25,748 6.0% 2.0 | 35,199 5.8% 2.5 | 29,960 -6.2% -2.9 | 28,193 -5.9% -3.3 | 25,370 -10.0% -4.6 | 22,970 -9.5% -4.3 | 20,530 -10.6% -4.5 | 20,830 1.5% 0.6 |
| Nominal private housing CI (Increase rate) (Contribution rate) | 25,722 9.3% 3.0 | 24,313 -5.2% -1.7 | 20,276 -2.2% -0.7 | 18,575 -8.4% -2.6 | 17,920 -3.5% -1.1 | 17,880 -0.2% -0.1 | 18,020 0.8% 0.3 | 17,810 -1.2% -0.4 |
| Nominal private NH CI (Increase rate) (Contribution rate) | 29,970 18.4% 6.4 | 19,505 -1.8% -0.4 | 15,959 0.7% 0.2 | 14,519 -9.0% -2.2 | 13,020 -10.3% -2.4 | 13,000 -0.2% -0.0 | 13,720 5.5% 1.3 | 14,050 2.4% 0.6 |
| Real CI (Increase rate) | 85,442 7.7% | 79,020 0.2% | 67,365 -3.6% | 63,007 -6.5% | 58,060 -7.9% | 55,170 -5.0% | 53,080 -3.8% | 53,450 0.7% |

(Units: billion yen. Real figures are based on 1995 prices.)

Notes:

1. CI: construction investment NH: non-housing

2. Private NH CI = private non-housing construction investment + private civil engineering investment.

1.2 Social infrastructure improvement and private-sector growth

- David Aschauer's "Is Public Expenditure Productive?" in 1989 discussed the effect of public sector investment in infrastructure on private-sector productivity, and was met with a lot of reaction.
- A number of articles were written, both in and abroad, related to his study.
- We should learn from the outcome of these papers when considering the future directions of Japan's social infrastructure improvement.

Aschauer's 1989 article

In 1989 David Alan Aschauer, then Senior Economist of the Federal Reserve Bank of Chicago, wrote an article titled "Is Public Expenditure Productive?" in which he measured the positive effects of social infrastructure improvement on productivity increases. The article, especially with its magnitude of the measured effect of spending on infrastructure, drew much attention.

In Japan, the effect of public investment had, until then, been discussed in terms of Keynesian theory and the size of the multiplier which measures the growth of GDP when public investment spending is increased. The economic effect indicated by the multiplier is the so-called Keynesian effect (demand effect or flow effect.) The Aschauer article shifted the attention of Japanese economists and researchers from the "flow effect" to the "productivity (stock) effect."

Outline of the survey study

This section of "Construction Economy Report No. 44" includes a report on the Aschauer article and following studies. It outlines the pros and cons of measuring social infrastructure and productivity increases using production functions and research conducted in recent Japan, and selects and introduces some outstanding studies from both Japan and abroad.

Studies conducted abroad

Critical articles written by foreign scholars and researchers were classified according to which aspect of the Aschauer article they focused on, in theory and, to the degree possible, in subsequent experimental studies. These included, a) reverse causality, b) mathematical model specification, c) data irregularity, and d) others.

Studies conducted in Japan

Studies were selected and introduced from among those using recent data and based on new perspective.

Conclusion

The survey study shows that Aschauer's hypothesis suggesting a positive effect of public-sector investment in infrastructure on private-sector productivity has not been fully accepted by the academic world. However, the pro-Aschauer camp seems to be dominant and research outcomes have accumulated. Earlier macroeconomic and comprehensive approaches focusing on the entire social infrastructure and private-sector productivity have shifted to more semi-macroeconomic analyses focusing on the effects by region, by industry, and by type of social infrastructure. These studies indicate that the productivity effect differs by region, industry and type of infrastructure. The findings have great implications for future efficient and focused social infrastructure improvement.

1.3 Population Decline and Economic Growth

- Factors for long-term economic growth are classified into: a) changes in labor input (population \times time), b) changes in capital input and c) changes in productivity (total factor productivity or TFP). These factors are used for Growth Accounting. A long-term population decline reduces the labor input, which may cause the economy to shrink.
- Some people are expressing concern over a shrinking economy due to a long-term population decline. This problem could be addressed by employing more women and senior citizens, thus increasing the labor participation rate. TFP growth can be accelerated by increasing the use of information technology (as management resource), raising society's learning level over time, and accumulating human resources through education and training. This in turn will contribute to the buoyant growth of the Japanese economy.

Trends in potential growth rate

Potential GDP is the level of GDP that the economy would produce if its labor were fully employed (when employment is at the level at which wages neither increase nor decrease). The growth rate of potential GDP is called the potential growth rate. Labor input (population \times time) is already making a negative contribution to economic growth (see the graph below).

Population decline and labor input

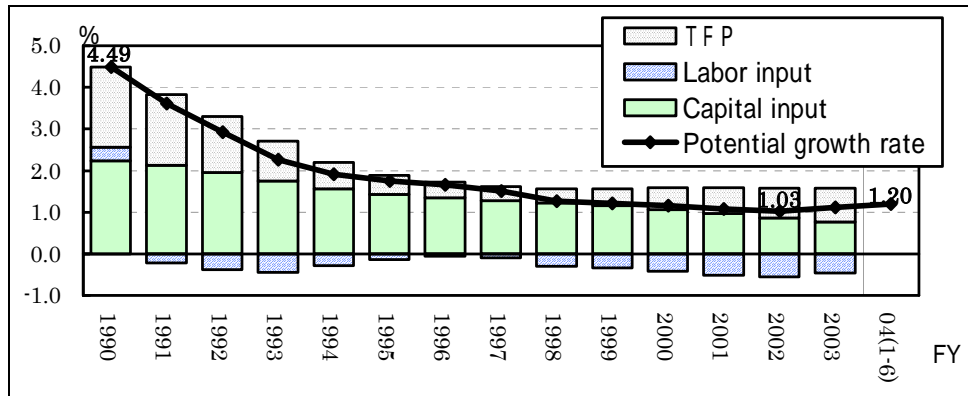
Japan's population of people of productive age (between 15 and 64) peaked at 87.26 million in FY1995 and will decline to about 74 million by 2020. But this population decrease rate (less than 1% annually) does not necessarily mean a decline in the labor input.

There are at present about 3.85 million women who are potential job seekers (currently not employed and not applying for jobs, but who *are* willing to work). The population of senior citizens will increase by 10 million by FY2020, to 34.56 million many of whom will be healthy and willing to work. The decline in labor input can be curbed by employing more women and senior citizens.

Better TFP performance

TFP growth can be maintained not solely through the traditional cost reduction and quality improvement by work unit or at the workplace, but rather by increasing the use of IT as a management resource in such management renovation as streamlining the decision-making process and increasing customer satisfaction (CS), which can be a strong driving force of the Japanese economy.

Contribution to economic growth of potential growth rate
(analysis by the Cabinet Office)



Note: Data from the Cabinet Office

1.4 Social Infrastructure Improvement to Enhance International Competitiveness

- This section attempts to objectively examine such assertions that the “hub” of international transportation infrastructure (ports and airports) should be improved, from the viewpoint of the Japanese industrial competitiveness.
- As for ports, though it is unrealistic to envisage “feeder ports only” scenario, political efforts to maintain “hub” ports would be justified in consideration to security and other factors. As for airports, though it is said improbable that an East Asia-Wide “hub and spoke” network be developed, other Asian airports have already taken from Japan some airport functions, placing Tokyo and other major cities at a disadvantage in attracting foreign businesses.
- To better meet user needs ports need to improve their services and relating systems must be modified. Narita and Haneda Airports should upgrade their facilities, and access to Tokyo and Osaka airports should be improved and transit should be made easier.

The need for “hub” ports and airports

- While major seaports of other East Asian countries are attracting business and innovating in cargo handling, major Japanese ports are losing importance. Some argue that the “hub” functions of Japanese ports should be maintained. This is a valid argument when we consider security and other factors.
- Major Japanese airports, too, are losing out to other East Asian airports. Even though there is little risk of these airports becoming “spoke” airports, their declining position is affecting the international competitiveness of Japanese cities. Inconvenient access to airports hampers the promotion of tourism.

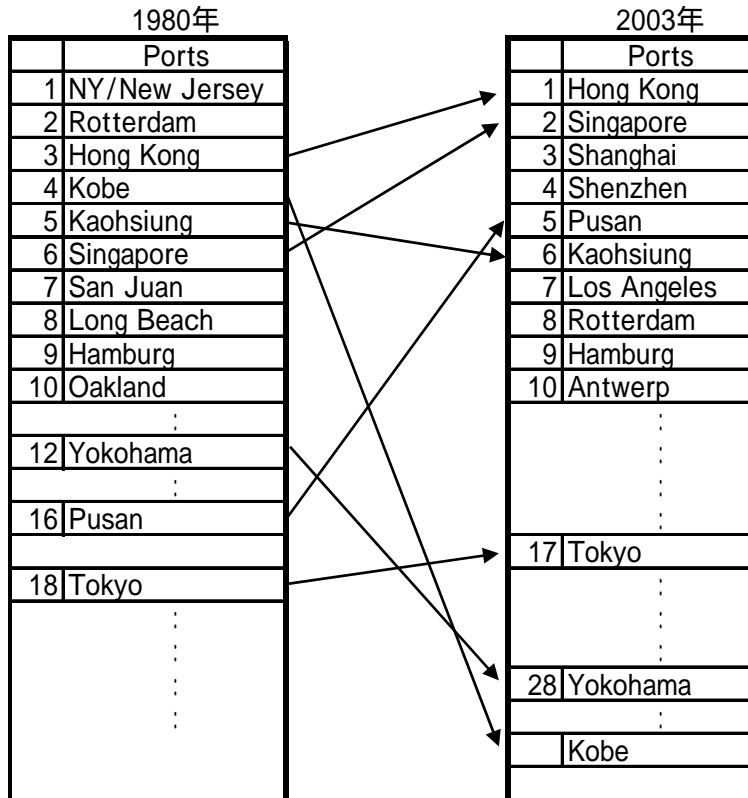
Challenges facing port and airport improvement

- The most important goal is to make it easier and less costly for businesses to use

services and set up their offices in Japan.

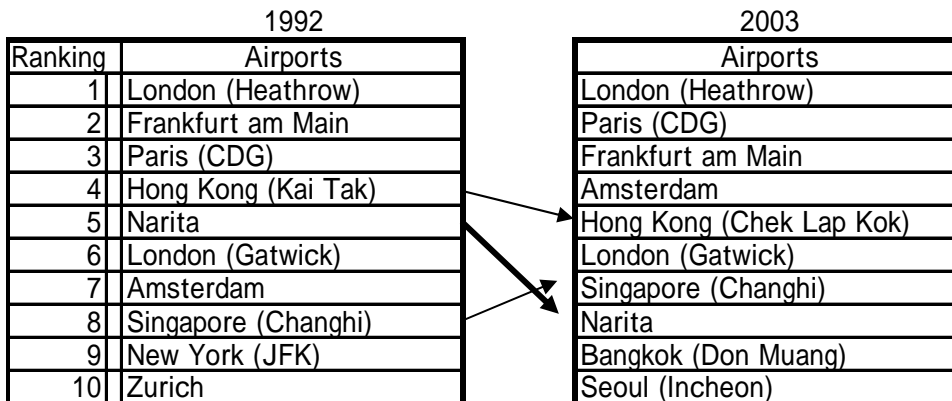
- Ports need to improve their services and relating regulations should be modified.
- Narita and Haneda Airports should upgrade their facilities. Access to Tokyo and Osaka airports should be improved and transit should be made easier. It is still very expensive to use Japanese airports, which calls for airport authorities' managerial improvement.

World ranking of major ports (1980, 2003)



Source: MLIT (“FY2004 White Paper on Metropolitan Region”) and “Containerisation International Yearbook”

Top ten airports ranked by passengers (1992, 2003)



Source: The International Civil Aviation Organization (“World Airport International Service Ranking (ICAO)”)

2.1 Support for Procurers in Public Works Projects

- Outsourcing of supervision, design and cost estimation of public works projects is progressing in Japan. Some municipalities, however, still do not turn to the services of outside agents even if the municipalities lack technical expertise and staff.
- It is common in Europe, North America and Korea to outsource all or a part of a project.
- Local governments and public agencies should utilize the services of third parties in a project which involves advanced technology, if the procurer lacks staff or technology, or when it is more efficient to outsource. Municipalities should: a) build consensus on the hows and whys of outsourcing, b) clarify and specify the scope of outsourcing by establishing manuals, laws and regulations, c) establish financing, and d) establish methods to screen and select the contractors of such services.

Support for procurers in public works projects

Projects ordered by public bodies consist of a broad range of services, including planning, feasibility studies, surveys, designer selection, design, cost estimation, contractor selection, construction management, supervision, and inspection. Outsourcing can take place when the procurer cannot implement these services on its own.

There are three patterns of outsourcing: 1) outsourcing part of the project, 2) getting support throughout the project implementation process, and 3) getting advice and other overall support.

Outsourcing in Japan

- 1) There are many cases of outsourcing supervision services among the national government and upper-tier governments, but very few among municipalities. Outsourcing by local governments of design, estimation and other services is gradually increasing.
- 2) Project process support utilizing the Construction Management (CM) method is still rare.
- 3) Some local governments are employing advisors and technical consultants.

Outsourcing in Europe, North America and Korea

- 1) The United States has an inspection system. Korea has a supervisor system. In both countries the Construction Manager (CMR) sometimes offers a portion of the inspection and supervising services.
- 2) In Europe and North America, designers, besides designing the structure, sometimes become involved in the construction project from its early stages by undertaking all or part of the feasibility study, survey and planning, support of bidding, estimation and construction management.

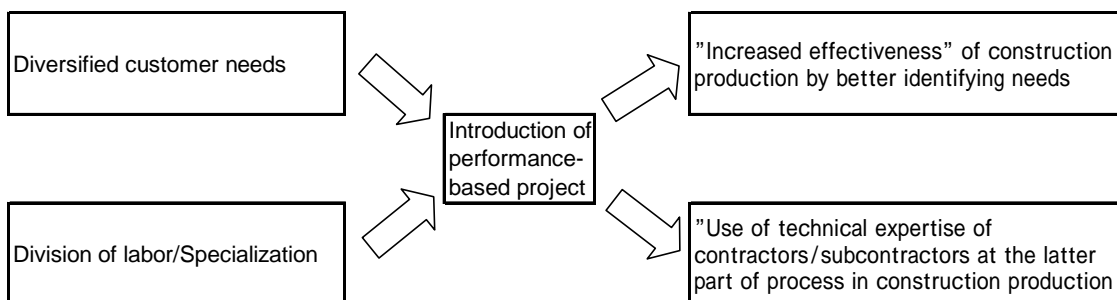
PM/CM is a contracting method commonly used in the US. Under this method, the Project Managers or CMRs support the procurer and offer all or a portion of services, including reviewing design and project procurement method, and the management of processes, quality and cost.

2.2 Performance-orientedness and Construction Production

- Performance-based construction production makes lifelong management of the structure easier. Its benefits include improved efficiency and effectiveness, and increased value of the constructed structure.
- The number of projects with emphasis on performance ordered by national and local governments is increasing. One of the problems of this type of construction is that it is difficult to set and evaluate performance indicators.
- In performance-based projects, the roles and responsibilities of each player should be clarified. The procurer should make a cost estimate with risks in mind, and objectively evaluate the technical expertise of the contractors. Contractors, on the other hand, should be prepared to bear risk and establish adequate specifications.
- When introducing performance-based projects, procurers should examine the nature of the project and the accountability of the procurer. The traditional procurement system should be medified to match this performance-based method to maximize its effect.

Merits of performance-based projects

- Performance-based construction makes lifelong management of the structure easier. Efficiency can be improved by measuring performance.
- Procurers can focus on identifying customer needs and can increase the effectiveness of construction production. As the emphasis is on “performance,” contractors and subcontractors involved in the latter part of the construction process can better exercise their technical expertise. As a result, the value of the completed structure will be increased.



Introduction of performance-based projects

- As several performance indicators of technologies and construction methods have been established, the number of performance-based projects ordered by national and local governments and other public entities is increasing.
- Problems of performance-based projects (from a questionnaire survey)
(Procurer) It is difficult to establish objective performance indicators and evaluate them. The procurer is not prepared to place this type of project.

(Contractor) Should be prepared to avoid the risk of not reaching the required performance, which is a great burden (improvement of specifications).

Future issues and prospects

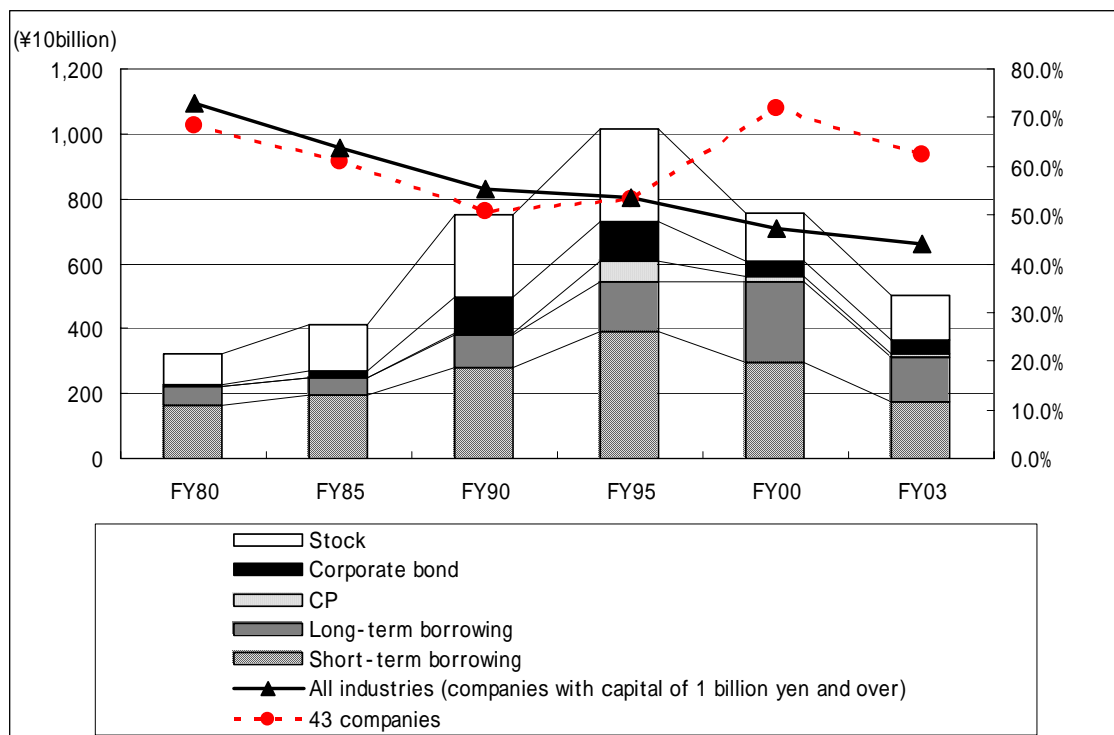
- In addition to clarifying the roles and responsibilities of each player, the procurer should: a) include costs related to risk in the project budget, b) accurately explain the performance, c) accurately evaluate the technical expertise of the contractor, and d) achieve transparency and clarify the responsibilities of the procurer. The contractor should: a) prepared to deal with risk, b) set adequate specifications, c) thoroughly manage quality, and d) develop new technology.
- Performance-based projects are only effective when cost can be reduced and quality can be increased by technical and managerial expertise of the procurer. Whether to adopt this type of project depends on technical difficulty of the project, technical ability of the procurer, and accountability to citizens benefiting from the project.
- Conventional procurement systems (the cost estimation method, for example) are not suited to performance-based projects and need to be improved. Procurers lacking in suitable technical ability should be supported.

Chapter 3 Trends in the Construction Industry

3.1 The Changing Capital Market and Financing by Construction Companies

- Dependence on indirect financing chiefly borrowing from the main bank is relatively high among major construction companies (43 companies). The degree of dependence increased during the 90s (while that of other industries decreased) but in recent years, it too has started to decrease.
- Looking at the 43 companies, the relation between the corporation and the main bank has not necessarily weakened, but has changed due to the development of the capital market and the diversification of finance methods. The state of strong mutual dependence based on corporate financing is changing, to become a state of coexistence with both sides more aware of risk and return.
- Both large and small construction companies should be more aware of the capital market, and realign their management to survive in the changing business environment.

Borrowing trends and borrowing rate (the 43 major construction companies, non-consolidated)



Notes:

1. Compiled from financial statements of the 43 companies and "Corporation Statistics" of the Ministry of Finance. The polygonal lines show the ratios of borrowing to total fund procured (percentage shown in right column).

2. The 43 companies are classified as follows, based on the non-consolidated average sales of the past four years (FY2000 to 2003).

Major companies: Average sales of over 900 billion yen (Kajima, Obayashi, Taisei, Shimizu and Takenaka)

Second-tier Group A: Average sales of over 250 billion yen (Toda, Nishimatsu, Goyo)

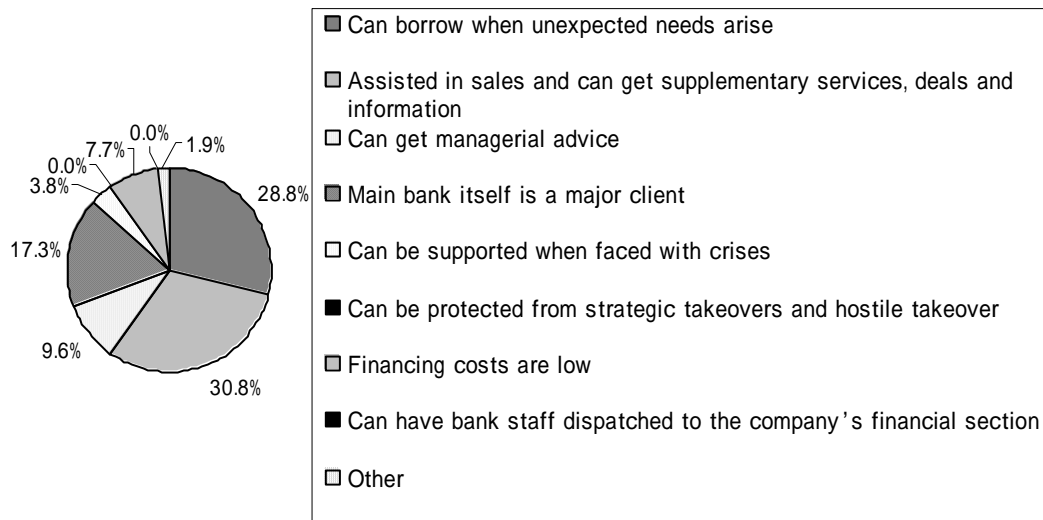
(aka Penta-Ocean), Maeda and Okumura)

Second-tier Group B: Average sales of over 250 billion yen and financially supported (Kumagai, Hazama, Mitsui-Sumitomo, Tokyu, Haseko, Tobishima and Fujita)

Medium-sized Group A: Average sales of over 100 billion yen (Toa, Zenitaka, Tekken, Ando, Asanuma, Toyo, Fudo, Taihei, Matsumura, Daiho, Arai, Fukuda and Wakachiku)

Medium-sized Group B: Average sales of less than 100 billion yen (Daisue, Magara, Yahagi, Odakyu, Matsui, Kitano, Totestu, Nakano-Fudo, Saeki, Sata, Aoki-Asunaro, Katsumura and Ueki)

Reasons for either strengthening or maintaining financing from the main bank

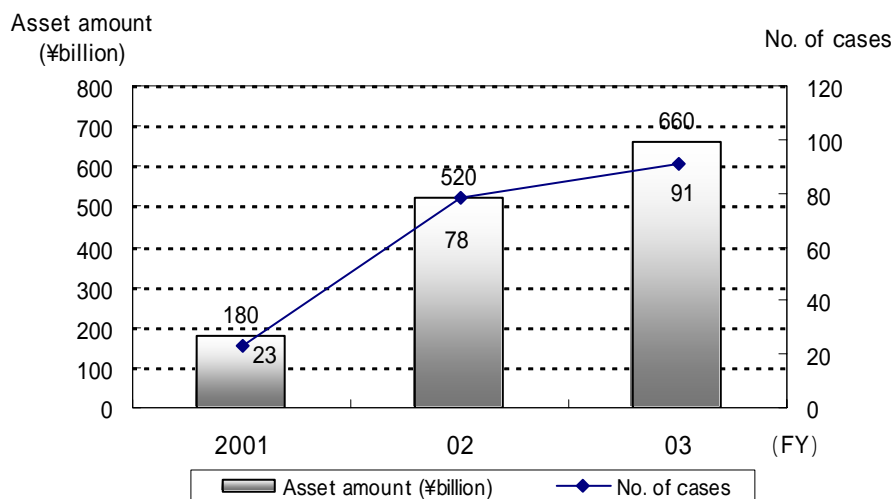


Note: Compiled from a questionnaire survey on 43 companies by RICE conducted in November 2004 (collection rate of 53.4%).

3.2 Development-oriented Securitization of Real Estate and the Construction Industry

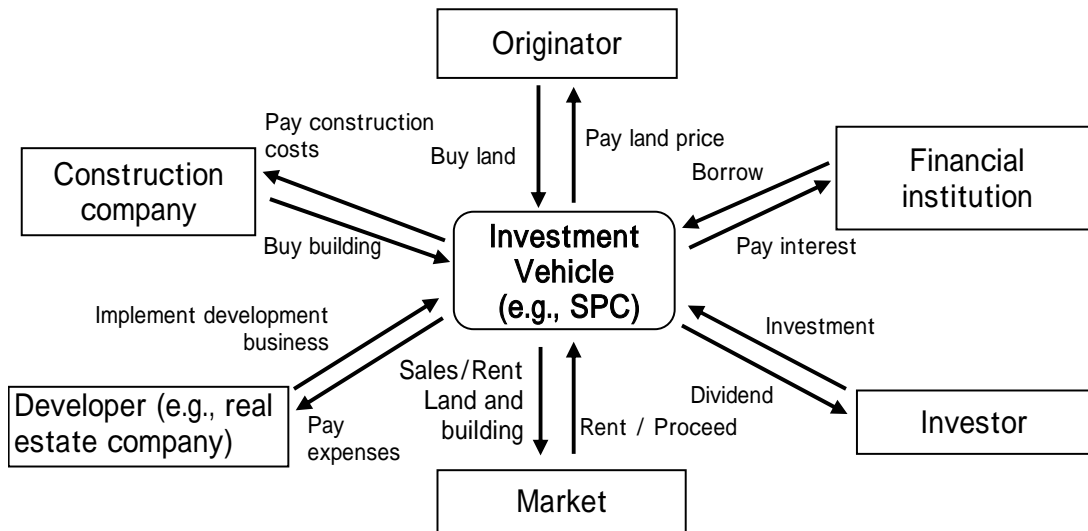
- The pace of securitization of real estate in Japan has increased since 1998. A new method of securitization called “development-oriented securitization of real estate” has emerged to finance future development projects. Many see this new approach as a method that can be used to promote urban development projects.
- A questionnaire survey conducted by RICE among major and medium-sized construction companies indicated that two-thirds of them are considering real estate development: Of those, 30% replied that they would use securitization, while 60% said that they would think about using the method.
- Development-oriented securitization offers promising business opportunities for construction companies if issues such as clarification and distribution of risks, strengthening of management base, and reduction of costs associated with securitization are addressed.

Trends of development-oriented securitization (FY2001-FY2003)



Basic scheme of development-oriented securitization

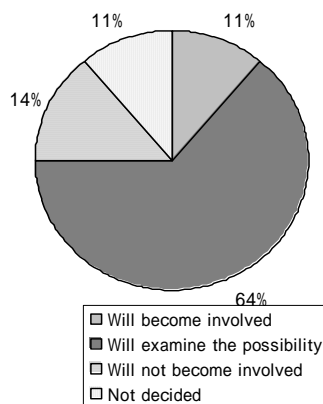
Investors in new development projects expect future cash flows. This enables a special-purpose company “SPC” (which is often a developer) to collect capital from an early stage in the development.



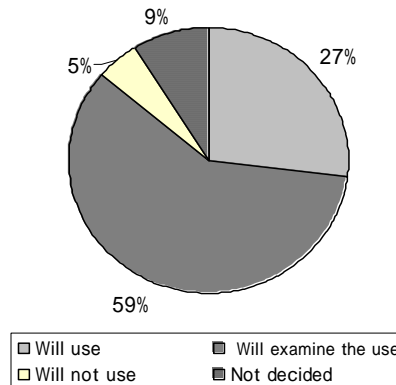
Real estate securitization and construction companies

RICE conducted a questionnaire survey among 59 major and medium-sized companies concerning their future plans regarding real estate securitization regardless of their experience in real estate development or securitization. The results are as follows:

(Policies on real estate development)



(Policies on use of securitization)



3.3 Issues in Employment in the Construction Industry

- Trends in the number of construction workers and the amount of construction investment have been similar with a 1-2 year time lag. While the amount of construction investment has declined drastically in recent years, the decline in the number of construction workers has been moderate, resulting in an oversupply of workers.
- Construction investment decreased by over 40% from the peak year in three regions (Tohoku, Kanto and Kinki) while the decrease in the number of construction workers was 10 to 12%. Employment adjustment is likely to accelerate.
- The number of workers aged between 15 and 29 decreased 29.1% from 1.51 million to 1.07 million. Their ratio to total workers also decreased, from 22.0% to 17.7%. On the other hand, the proportion of workers aged 50 over now constitute over 40% of all construction workers, indicating a “graying” of the industry.
- The decline in investment and the oversupply of workers are short-term challenges facing the construction industry. Over the long term the labor population as a whole will decrease due to the low birthrate and the graying of the Japanese population. This trend will have a considerable effect on the construction industry, known to be a “3K” (Japanese acronym for “fatiguing”, “dirty” and “dangerous”) industry. Many skilled workers will retire, creating a serious shortage.

Trends in the number of construction workers, total construction investment, and per-capita construction investment (decrease from the peak year)

| | Number of construction workers (annual average, in 10 thousand) | | | Amount of construction investment (nominal, in 100 million yen) | | | Per capita amount of construction investment (in million yen) | | | | | |
|----------|--|------|----------------------|--|--------|----------------------|---|-------|----------------------|-------|-------|-------|
| | Peak year | 2003 | Decrease rate (%) | Peak year | 2003 | Decrease rate (%) | Peak year | 2003 | Decrease rate (%) | | | |
| Nation | (1997) | 685 | 604 | -11.8 | (1992) | 839,708 | 538,500 | -35.9 | (1990) | 13.85 | 8.92 | -35.6 |
| Hokkaido | (1997) | 35 | 30 | -14.3 | (1996) | 49,171 | 32,300 | -34.3 | (1990) | 15.22 | 10.77 | -29.2 |
| Tohoku | (1998) | 63 | 55 | -12.7 | (1996) | 76,944 | 45,500 | -40.9 | (1990) | 12.69 | 8.27 | -34.8 |
| Kanto | (1997) | 224 | 199 | -11.2 | (1992) | 314,318 | 174,800 | -44.4 | (1991) | 15.90 | 8.78 | -44.8 |
| Hokuriku | (1996) | 37 | 31 | -16.2 | (1996) | 49,032 | 29,600 | -39.6 | (1996) | 13.25 | 9.55 | -27.9 |
| Chubu | (2000) | 77 | 71 | -7.8 | (1996) | 93,133 | 71,900 | -22.8 | (1990) | 14.64 | 10.13 | -30.8 |
| Kinki | (1997) | 97 | 87 | -10.3 | (1996) | 129,086 | 72,900 | -43.5 | (1992) | 14.04 | 8.38 | -40.3 |
| Chugoku | (1997) | 47 | 39 | -17.0 | (1996) | 53,217 | 34,400 | -35.4 | (1992) | 12.74 | 8.82 | -30.8 |
| Shikoku | (1997) | 25 | 19 | -24.0 | (1996) | 27,997 | 17,600 | -37.1 | (1994) | 12.99 | 9.26 | -28.7 |
| Kyusyu | (1999) | 81 | 74 | -8.6 | (1994) | 84,470 | 59,500 | -29.6 | (1993) | 11.02 | 8.04 | -27.0 |

Notes:

1. The number of construction workers is based on the calendar year (Data from the Ministry of Internal Affairs and Communications). Total construction investment is based on the fiscal year (Data from the Ministry of Land, Infrastructure and Transport). Figures in parenthesis are for the peak year or peak fiscal year.

Percentage of young and senior workers out of all workers

| | Workers aged 15-29 | Workers aged 50 and over |
|------------------------|--------------------|--------------------------|
| Construction industry | 17.7% | 40.6% |
| Manufacturing industry | 18.4% | 36.8% |
| All industries | 20.9% | 37.2% |

3.4 Better Corporate Management and Use of Information Technology (IT)

- Construction companies should establish systems to utilize IT to improve business profitability.
- The businesses of smaller construction companies are often unstructured. They tend not have established business rules. Companies active in business improvement have established rules for business operations and are successfully utilizing IT.
- Redundancy and inefficiency can be reduced by visualizing business processes using manuals and charts and by standardizing businesses. Effective use of IT helps to increase business efficiency.
- Management leadership and the training of personnel are the keys for smaller companies to successfully utilize IT. The government and the construction industry as a whole should support these companies by offering knowledge and know-how.

Business improvement and IT

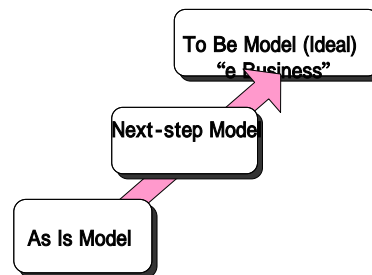
- Construction companies should be structurally reformed to improve their businesses on a continuous basis to meet environmental changes and maintain profitability.
- Although IT is an indispensable business tool, the introduction of IT tools must be accompanied by business improvement to achieve real gains.
- The workings of each business process, the relationship between the processes, and the integrity of the processes should be reviewed to maximize corporate profits.

Business improvement: issues and challenges

- Small- and medium-sized enterprises (SMEs) tend to be not structured and they tend to lack rules standardized across the company. They should set up business rules and improve business processes by using ISO and other standards.
- A survey on SMEs indicates that companies aggressively implementing cost management tend to have established rules and systems to monitor operations and processes. Companies utilizing IT to systematize the management of ISO documents, daily reports and other routine jobs replied that IT was very effective in increasing efficiency and productivity.

Business improvement utilizing IT

- Visualize business processes by charts and documents to reduce waste and inefficiency. Standardize businesses, increase “standardized jobs” and introduce IT. Jobs difficult to standardize can be supported by groupware and knowledge management tools. (An example of business improvement by a major construction company: Establish a system of “information database” that an employee can refer to on site to make decision and maintain work flow.)
- With the established corporate vision in mind, prepare an “As Is Model” to visually examine the status quo of the company, then a “To Be Model” that shows the ideals of the company. Then create a “Next-step Model” indicating an immediate goal of the company. Businesses can be continuously improved by creating a road map with appropriate models.
- Leadership of the management and personnel training is indispensable for SMEs in utilizing IT. The government and the construction industry should support SMEs by offer knowledge and know-how.

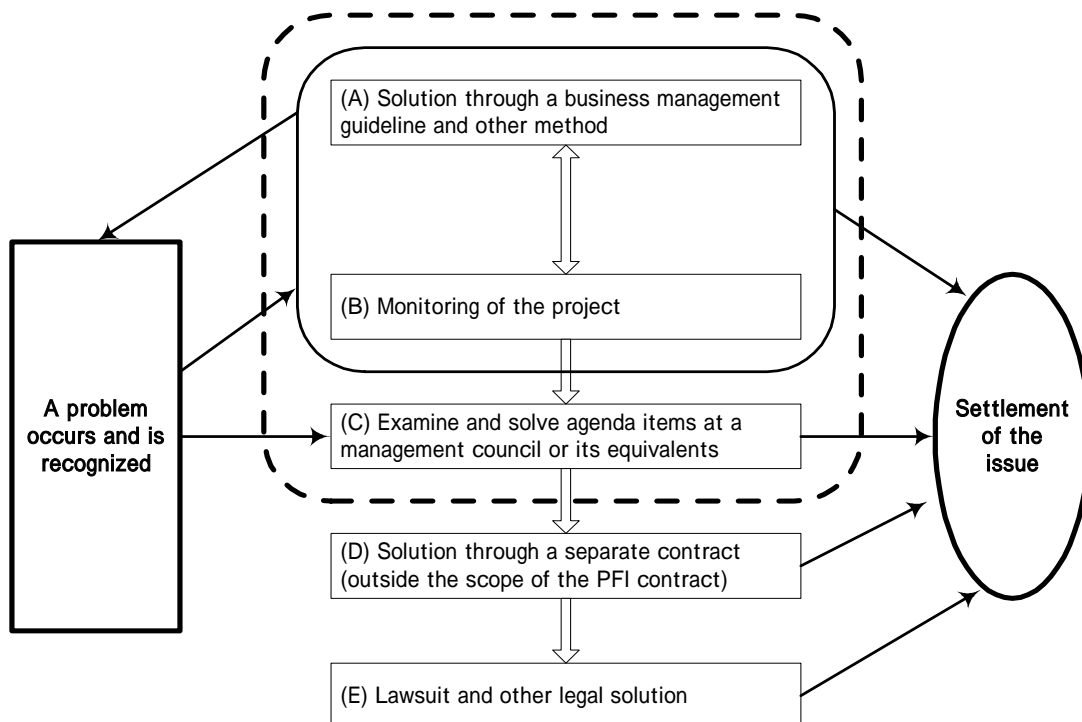


3.5 Public Finance Initiative (PFI): Progress and Future Directions

- PFI projects to date have mostly been successful. Business management guidelines and management councils are used as execution-phase problem-solving methods.
- Present problem-solving process should be improved by learning from the experiences of previous PFI projects. PFI mechanisms can be further refined by clarifying potential risks that may cause great problems that can not be solved by existing decision-making and problem-solving methods, or which may hamper good public-private partnership. (These problems so far are not apparent in PFI projects conducted in Japan.)

PFI at present

In PFI projects conducted to date, problems have been mostly solved on an execution phase through the process shown in the chart. So far, the process has worked well, and there have been no cases in which a great risk has become apparent.



Improvement of the problem-solving process

- A) Solution through a business management guideline and other method
- Establish a business management guideline that would make the handover from the predecessor easy. (Note: It is customary for Japanese government officials (and corporate employees too, though less frequently in many cases) to be transferred to

different sections and positions after serving for a few years. A smooth transfer of management control is thus important.)

- B) Monitoring of the project
 - Public and private sectors consult and decide on what to monitor
- C) Examine and solve agenda items at a management council
 - Utilize IT to efficiently examine and solve agenda items

Factors that may affect PFI project management

- A) Initial contract may be outdated because of social changes
 - Two solutions: firstly, avoid setting a long-term project period; secondly, include a clause in the PFI project contract specifying that the procurer and the contractor, after a certain period of time, will consult over the contract clauses and make necessary changes thereby setting a long-term project period.
- B) Demand risk cannot be hedged in a project that includes a financially independent business
 - This is the case where a private profit-making facility is annexed to a public facility. One solution is to limit the proportion of profit-making business to limit their influence on the public sector as a whole. The public sector can agree with the private sector on the collection of penalty charges. In this way, the business can be continued using facilities built by the PFI project, even if the PFI project is cancelled.
- C) Most Japanese PFI projects rely on corporate groups based on a representative company; SPCs are not “major players”
 - PFI projects in Japan have developed having private corporations’ groups as the partner of the public sector. Future contracts with SPCs should be emphasized to apply the PFI method to larger and more complicated projects and ensure PFI refinancing.

Chapter 4 Housing and Natural Disasters

4.1 Housing stock: Issues and Challenges

- Japan's housing stock is quantitatively sufficient: There are 15% more houses than the number of households. The focus of housing development has shifted from numerical expansion to better use.
- Many issues, related to qualitative improvement, maintenance and repair, hamper utilization of housing stock.
- The supply of housing, and the management and utilization of housing stock can be reviewed and changed to meet structural changes of society and the needs of residents. There are new business opportunities in this process, which, if adequately met, can improve our living environment.

Mid- to long-term forecast of housing starts

RICE reviewed its forecast study of construction investment announced in the previous edition of "Construction Economy Report" (No. 43) based on new statistics ("Preliminary report of 2003 housing and land survey of Japan"). The revised estimate, reflecting the most recent trends in the number of households and housing rehabilitation, suggests that the number of housing starts will continue to decline.

(in thousand)

| | Total no. of housing starts | Owner-occupied | | | | | For rent | | |
|-------------|-----------------------------|----------------|---------------|----------------------------|-------------|-------|----------|-----------------|----|
| | | | Custom -built | Built-for-sale | | | For rent | Company housing | |
| | | | | Detached/ Semi-detached | Condominium | | | | |
| 2001 ~ 2005 | 5,810 | 3,520 | 1,853 | 1,667 | 630 | 1,038 | 2,290 | 2,246 | 44 |
| 2006 ~ 2010 | 5,366 | 3,339 | 1,900 | 1,438 | 550 | 888 | 2,027 | 1,970 | 57 |
| 2011 ~ 2015 | 4,661 | 2,989 | 1,651 | 1,338 | 501 | 837 | 1,673 | 1,625 | 47 |
| 2016 ~ 2020 | 3,835 | 2,526 | 1,355 | 1,172 | 431 | 741 | 1,308 | 1,271 | 37 |

2003 trends

- Increasing vacancy rates: from 9% in 1993 to 11% in 2003
- Longer cycles of rebuilding: both detached and apartments/condominiums
- More single and senior citizen households: in 2003, 27% and 17% of the total households, respectively

Housing issues

- Over half of the houses nationwide are above the targeted housing standard. Substandard houses are concentrated in major cities and their suburbs.
- Ten years have passed since the Great Hanshin-Awaji Earthquake where many of

the victims died because they were buried under old wooden houses. Progress to seismic preparation, however, is slow: only 2.6% of houses built before 1980 (when the new seismic standard was introduced) have been retrofitted.

- Dwellers are not satisfied with dwellings' short life and limited functions. Better coordination between cost and needs is required.
- Ways to utilize vacant houses should be sought to better meet structural changes in society and needs of occupants.

Prospects for the housing market

- Methods of supplying and managing housing should be adjusted to meet the structural changes of society and the needs of dwellers. If solutions to problems are sought and identified in that process, the quality of housing stock will improve and new business opportunities for private businesses will emerge.

4.2 Return to Central Tokyo and Building Conversion

- The population of central Tokyo, that of the central three wards (Chiyoda, Chuo and Minato) in particular, is increasing again: 13% from 1992 to 2004.
- Office buildings are being converted into condominiums. This can address both the housing shortage and the high vacancy rates of offices in central Tokyo.
- Conversion is also effective for urban renewal, although it faces several problems at present.
- This section introduces examples of conversion, the results of a questionnaire survey to illustrate the issues, and takes a look towards the future of the conversion business.

Population increasing again in central Tokyo

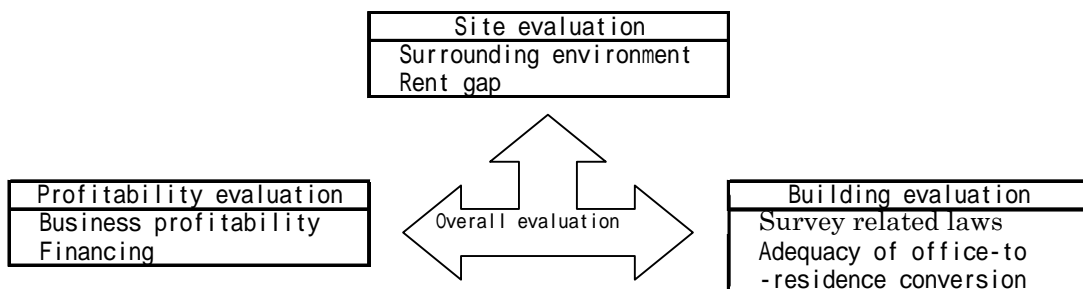
- Due to the land price decline and subsequent massive supply of condominiums, the population of central Tokyo has risen since the late 1990s.
- This is a favorable trend from the viewpoint of solving problems arising from urban structure (e.g., imbalance between jobs and residential locations) and needs to be promoted through policies and support measures.

Conversion of offices to living space

- There is a growing concern about the oversupply of office space and subsequent high vacancy rates and lower rents in Tokyo due to the many large office buildings built in recent years. Many now regard the conversion of offices to residences as a solution to both the office oversupply and housing shortage in central Tokyo.

Evaluating office conversion

- The feasibility of office-to-dwelling conversion should be evaluated comprehensively through site assessment, profitability analysis and building evaluation.



Commitment to office-to-residence conversion (questionnaire survey to construction companies)

- Two-thirds of responding companies (66.6%) consider conversion as a part of their maintenance and repair business. A quarter of respondents (25.0%) replied that conversion is a high-priority operation.
- Answers to the question “what buildings will be converted to what?” are as follows (only major uses, multiple answers allowed).

| Previous use | |
|--------------|-------|
| Office space | 50.0% |
| Schools | 26.5% |

| New use | |
|------------------------------|-------|
| Housing | 44.8% |
| Facility for senior citizens | 37.9% |
| Stores | 10.3% |

Future issues

- Office conversion should be promoted to make effective use of existing stock and achieve urban renewal. This would require: a) the promotion of methods of conversion, b) cost reductions, c) design flexibility and d) deregulation.

4.3 Natural Disasters and Public Investment

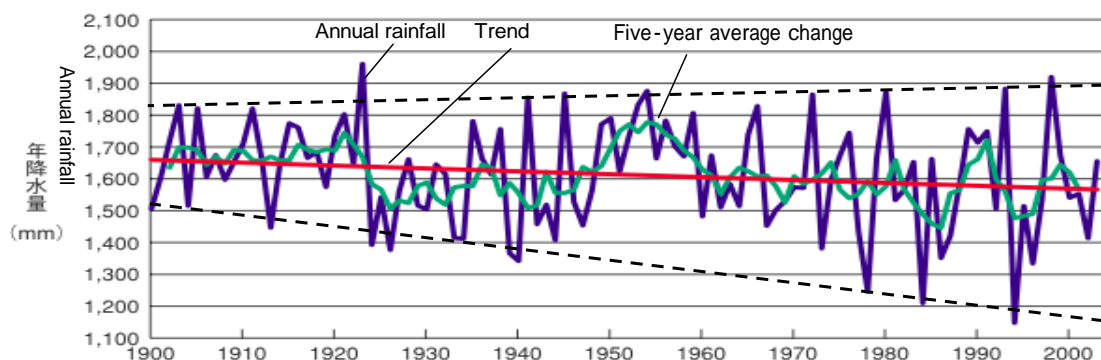
- Japan is vulnerable to natural disasters earthquakes, floods and volcanic eruptions. The risks have been reduced by protective measures implemented in a comprehensive and planned manner. New risks are emerging due to climatic changes and structural changes in society and the economy.
- While continuously improving infrastructure for disaster prevention (including upgrading and better utilizing existing stock), such “nonmaterial” measures are needed as citizen-authority cooperation and better communication.
- Losses should be minimized through risk management.
- In many cities, the demands of the urban sprawl have led to unsafe areas being zoned for residential use. Land use regulations should be reviewed.

Japan is vulnerable to natural disasters

- 1) Volcanoes: 7.1% of the volcanoes in the world (108) are located in Japan.
- 2) Earthquakes: 22.9% of earthquakes of M6.0 or over have occurred in Japan
- 3) Floods: Half of the population and 75% of assets are located in flood-prone areas.

New risks emerging

Planned improvement of counter-disaster measures after WWII has been effective in reducing damages. New risks however are emerging and the level of vulnerability is increasing due to climatic changes, urbanization and population change (fewer children and more senior citizens).



Comprehensive measures required

While continuously improving infrastructure for disaster prevention (including upgrading and better utilizing existing stock), such “nonmaterial” measures are needed as citizen-authority cooperation and better communication.

Application of risk management to disaster

The concept of “risk management,” to control and minimize risk should be applied to

disaster management. More focused preparation should be made based on risk probability and the expected scale of damage.

<Table>

Risk probability and scale of damage

| | | | |
|--------|-------|-------------|----------|
| | | Probability | |
| | | High | Low |
| Damage | Great | α | B |
| | Small | γ | Δ |

| | | |
|----------|--|---|
| | Type of risk | (Measures) |
| α | Risk should be reduced | High priority |
| β | Have risk but: | Risk is a given condition. Companies usually protect themselves with insurance. |
| γ | <ul style="list-style-type: none"> • Investment may be of waste • Cost is too high | |
| δ | (<i>de minimis risk</i>) | Low priority |

Guide relocation of people and assets

Land use should be reviewed in existing built-up areas and where urban sprawl is expected so that people and assets in high-risk areas can be relocated.

Chapter 5 Overseas Trends

5.1 Trends in Overseas Construction Markets

- When construction investment in Japan is equated to 100, the corresponding figures are 197 for the United States, 138 for Western Europe, 6 for Eastern Europe, and 135 for Asia.
- The proportion of construction investment out of total GDP is 10.7% for Japan and 16.9% for Asia. This figure is lower in the United States (8.3%), Western Europe (5.8%) and Eastern Europe (6.6%).
- US construction investment is expected to be a record-high 1.0133 trillion dollars in 2004. Public investment continues to grow, driven by educational facilities that account for about 30% of total public investment.

Construction markets by country and by region in 2003 (nominal values, converted to trillions of yen)

| | Japan ¹ | United States | Western Europe ² | Eastern Europe ³ | Asia ⁴ |
|-------------------------|--------------------|--------------------|-----------------------------|-----------------------------|-------------------|
| GDP | 501.3 (100) | 1,274.0 (254.2) | 1278.9 (255.1) | 47.6 (9.5) | 429.2 (85.6) |
| Construction market | 65.0 (100) | - | 132.9 (204.4) | 4.6 (7.1) | - |
| Proportion to GDP (%) | 13.0 | - | 10.4 | 9.7 | - |
| Construction Investment | 53.9 (100) | 106.2 (191.7) | 74.3 (138.0) | 3.1 (5.8) | 72.5 (134.6) |
| Proportion to GDP (%) | 10.7 | 8.3 | 5.8 | 6.6 | 16.9 |

(Japan = 100)

Notes

1. Data for Japan is fiscal year (FY)-based. The amount of construction investment is an outlook (by the Ministry of Land, Infrastructure and Transport).
2. "Western Europe" consists of 15 countries: Austria, Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Italy, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and UK.
3. "Eastern Europe" consists of 4 countries: Czech Republic, Hungary, Poland and Slovakia.
4. "Asia" includes 12 countries and territories: China, Hong Kong, Taiwan, India, Indonesia, Korea, Malaysia, The Philippines, Singapore, Sri Lanka, Vietnam and Thailand. Construction investment data for China and Hon Kong is as of 2002, for The Philippines, Taiwan and Thailand is as of 2000, and for Indonesia and Vietnam are as of 1998. The amount of orders received for construction work is used instead of construction investment amount for Malaysia.

The GDP growth rate of the US in the third quarter of 2004 was 4.0%, a slight increase from the second quarter (a 3.3% increase). The construction investment forecast of 2004, on the other hand, is a record-high 1.0133 trillion dollars. Public investment is continuing to grow, with educational facilities accounting for about 30% of the overall investment. Sales of second-hand houses reached nearly 7 million units, which stimulated housing price rises. Mortgage interest rates fluctuated, but remained low in 2004. The housing market will continue to be favorable.

Trends in US construction Investment

(Upper column: volume in \$1m, Lower column: increase rate over the previous year in %)

| | 1990 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000r | 2001r | 2002r | 2003r | 2004p | Composition ratio |
|-----------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|-----------|-------------------|
| New investment total | 476,778 | 491,033 | 539,193 | 557,818 | 615,900 | 653,429 | 705,685 | 766,062 | 828,160 | 858,291 | 871,342 | 915,742 | 1,013,311 | 100.0 |
| | -0.2 | 3.0 | 9.8 | 3.5 | 10.4 | 6.1 | 8.0 | 8.6 | 8.1 | 3.6 | 1.5 | 5.1 | 10.7 | |
| Private-sector | 369,300 | 375,073 | 418,999 | 427,885 | 476,638 | 502,734 | 551,383 | 596,331 | 642,633 | 652,496 | 651,706 | 690,019 | 777,057 | 76.7 |
| | -2.6 | 1.6 | 11.7 | 2.1 | 11.4 | 5.5 | 9.7 | 8.2 | 7.8 | 1.5 | -0.1 | 5.9 | 12.6 | |
| Housing | 191,103 | 225,067 | 258,561 | 247,351 | 281,115 | 289,014 | 314,607 | 350,562 | 374,457 | 388,324 | 421,912 | 476,143 | 554,719 | 54.7 |
| | -6.4 | 17.8 | 14.9 | -4.3 | 13.7 | 2.8 | 8.9 | 11.4 | 6.8 | 3.7 | 8.6 | 12.9 | 16.5 | |
| Non-housing, etc. | 143,506 | 150,006 | 160,438 | 180,534 | 195,523 | 213,720 | 236,776 | 245,769 | 268,176 | 264,172 | 229,794 | 213,876 | 222,337 | 21.9 |
| | 2.5 | 4.5 | 7.0 | 12.5 | 8.3 | 9.3 | 10.8 | 3.8 | 9.1 | -1.5 | -13.0 | -6.9 | 4.0 | |
| Public works | 107,478 | 115,960 | 120,193 | 129,933 | 139,263 | 150,695 | 154,302 | 169,732 | 185,529 | 205,797 | 219,636 | 225,724 | 236,254 | 23.3 |
| | 9.5 | 7.9 | 3.7 | 8.1 | 7.2 | 8.2 | 2.4 | 10.0 | 9.3 | 10.9 | 6.7 | 2.8 | 4.7 | |
| Building | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 130,280 | 134,543 | 141,850 | 14.0 |
| | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3.3 | 5.4 | |
| Civil engineering, etc | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 89,356 | 91,181 | 94,404 | 9.3 |
| | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 2.0 | 3.5 | |

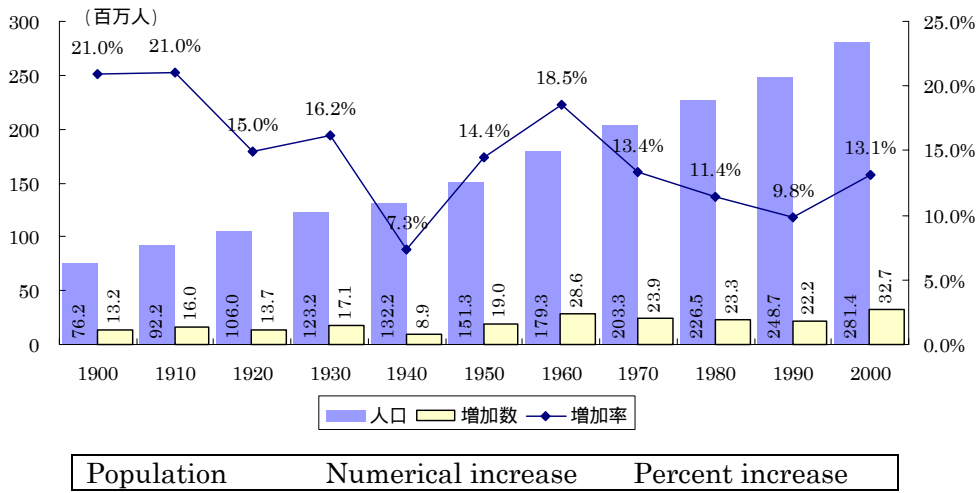
Notes:

1. Compiled based on data from the Department of Commerce.
2. (r): revised, (p): preliminary
3. Figures for 2004 are seasonally adjusted figures as of November converted to annual figures.

5.2 Population Increase and Construction Investment in the United States

- The US population increased from 76.2 million to 281.42 million in the 20th century. It is now the only industrialized country whose population is increasing. Fast-growing states are California, Texas, Florida and others in the South and the West. The population of immigrants, chiefly Hispanics, has risen since the 1980s. There are now about 32 million immigrants, or 11% of the total population.
- Due to internal population growth in, and migration to the West and the South, the mean center of population has moved about 1,600 km west-southwest. Along with the population shift, the number of congressmen assigned to each state has changed (the number of congressmen per state is proportional to each state's population). The population trend is thus an important political factor.
- Construction investment of around 1 trillion dollars is driven by private-sector housing and educational facilities. Both are closely related to population increases and shifts. Investment rises in proportion to the population increase. When we rank four regions in order of the number of housing starts, the number of new and second-hand houses sold, and the population increase, the South is ranked at the top in all of them, followed by the West, the Midwest and the Northeast. The trend in investment into educational facilities is related to the number of students.
- Some people speculate that the US housing market will begin to shrink as the baby boomers retire. In this section we present a different scenario in which minorities become central players and sustain the growth of the private-sector housing market after 2015. If the number of immigrants continues to grow at the present high rate, then the steady growth of the housing market may continue until around 2030.

Trends in the US population, the number of growth and the growth rate
(every 10 years, in millions)



Source : U.S. Census Bureau “Demographic Trends in the 20 Century”

Trends in housing starts, number of houses sold and population increase (1963-2004)

