

# **Construction Economy Report**

**No. 50**

## **The Japanese Economy and Public Investment**

**Social Infrastructure Improvement for Growth  
and the Construction Industry Undergoing Changes**

**May 2008**

**Research Institute of Construction and Economy**

**(RICE)**

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## Chapter 1 Macroeconomics and Construction Investment

### 1.1 Trends in the Japanese economy and construction investment

- The Japanese economy has been stagnant for several years. In 2007 the amended Building Standard Law, with a stricter application for confirmation process, was enacted. This stricter requirement slowed down the confirmation process and reduced the number of building starts. Nevertheless, the effects have since weakened and it is expected that the construction industry and the economy in general will pick up in FY2008. There are, however, factors that may dampen an improvement: the slowing down of the US economy due to the sub-prime mortgage problem, fluctuating stock and exchange markets, and crude oil price rises.
- Construction investment posted its first year-on-year increase in ten years in FY2006. However, as mentioned earlier, private-sector construction investment dropped due to the enactment of the amended Building Standard Law. A 7.5% year-on-year decline is expected for FY2007, but for FY2008 a 6.1% increase is projected due to a recovery in housing construction.

### ● Trends in construction investment (Nominal, FY)

Actual ← | → Tentative | → Forecast

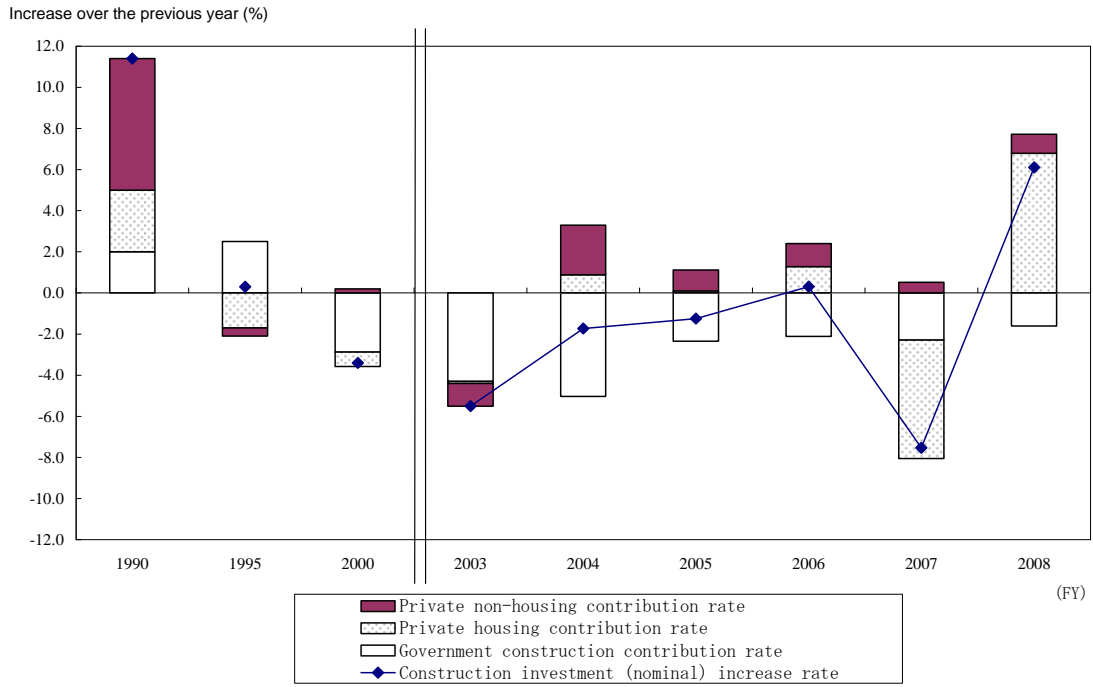
FY	1990	1995	2000	2003	2004	2005	2006	2007	2008
Nominal CI (Increase rate)	81,440 11.4%	79,017 0.3%	66,195 -3.4%	53,707 -5.5%	52,777 -1.7%	52,120 -1.2%	52,280 0.3%	48,340 -7.5%	51,290 6.1%
Nominal government CI (Increase rate) (Contribution rate)	25,748 6.0% 2.0	35,199 5.8% 2.5	29,960 -6.2% -2.9	23,470 -9.4% -4.3	20,768 -11.5% -5.0	19,530 -6.0% -2.3	18,430 -5.6% -2.1	17,230 -6.5% -2.3	16,450 -4.5% -1.6
Nominal private H (Increase rate) (Contribution rate)	25,722 9.3% 3.0	24,313 -5.2% -1.7	20,276 -2.2% -0.7	17,901 -0.3% -0.1	18,375 2.6% 0.9	18,430 0.3% 0.1	19,100 3.6% 1.3	16,090 -15.8% -5.8	19,370 20.4% 6.8
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	12,340 -4.9% -1.1	13,634 10.5% 2.4	14,170 3.9% 1.0	14,750 4.1% 1.1	15,020 1.8% 0.5	15,470 3.0% 0.9
Real CI (Increase rate)	84,045 7.6%	77,727 0.2%	66,195 -3.6%	54,832 -6.1%	53,281 -2.8%	52,030 -2.3%	51,170 -1.7%	46,560 -9.0%	48,720 4.6%

(Units: billion yen. Real figures are based on 2000 prices.)

Notes:

1. CI: construction investment H: housing NH: non-housing
2. Private NH CI = private non-housing construction investment + private civil engineering investment.
3. Data from the "FY2006 Construction Investment Outlook" by the MLIT up to FY2006

● Trends in construction investment (nominal contribution rate, FY)



## **1.2 Structural changes of local public finance influencing public investment**

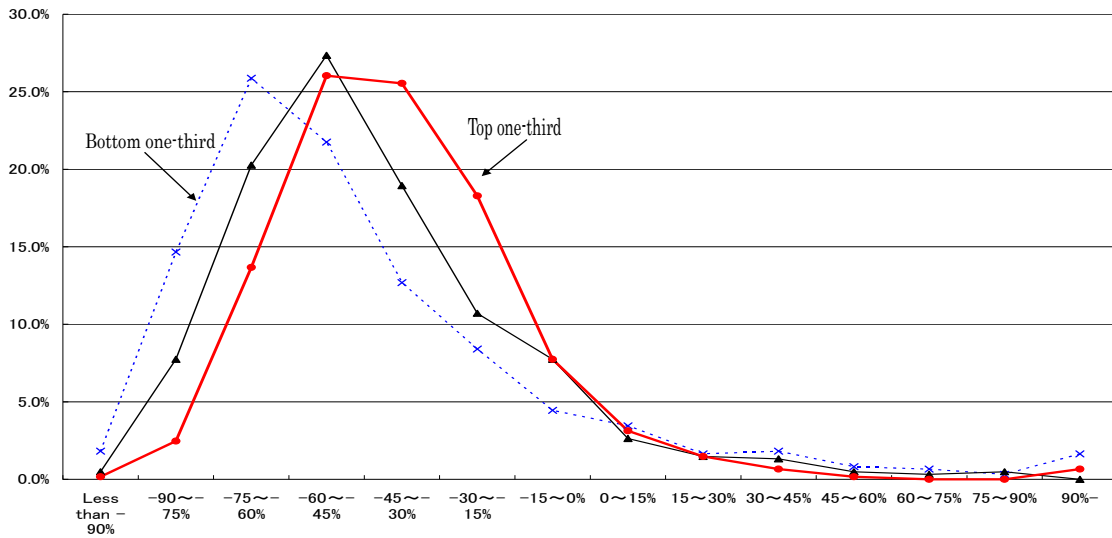
- The total income of local governments in FY2005 fell to 89% of that in FY1999 – the year when income peaked. This was largely due to changes in national government policy, including the abolition of bonds for local improvement and the downsizing of local finance programs. In FY2005 there was a significant reduction in the total amount of local bonds (approx. 61% of that of FY1995), national treasury disbursements (approx. 71% of FY1995) and local allocation tax (approx. 78% of FY2000).
- Accordingly, local governments have been forced to reduce their spending. The budget of public works without state subsidy in FY2005 for prefectures was approx. 44% of that of the peak year of FY1995, and for municipalities, it was approx. 42% of that of the peak year of FY1993. Budget cuts were greater for programs related to the construction and maintenance of welfare and sanitation facilities (24% of the peak year of FY1993 for prefectures, and 37% of the peak year of FY1993 for municipalities) than projects related to construction and maintenance of roads, bridges and streets (54% of the peak year of FY1996 for prefectures, and 51% of FY1993 for municipalities).
- Two factors that force vulnerable municipalities to reduce the budgets of unsubsidized public works are: a) the budget size is too small to allow the juggling of various expenses and, b) fluctuating local income tax revenues (the municipality is forced to reduce the budget for unsubsidized projects to prepare for future revenue shortfalls).
- A questionnaire survey to prefectures in provincial regions has revealed that the greatest concern of the respondents is the increase in expenses for maintenance and repair. Many also pointed out that under the so-called "trinity reform" (the central government reduces subsidies to local governments, while transferring tax revenue sources and a grant-in-aid from tax money to local governments to make them more financially independent) there has so far been insufficient transfer of tax revenue sources from central to local, which forces local governments to reduce public investment.

### ● Financial structure of municipalities and unsubsidized projects

- Municipalities were classified into three groups (big, medium-sized and small) according to a financial index (standard financial size: the average of FYY1996-1998). Changes in the budgets of unsubsidized projects were compared between the top one-third and the bottom one-third of municipalities, categorized according to the size of their operating budgets. An F-test was conducted to see if there was any significant difference between the average rate of change in the two periods of FY1996-1998 and FY2003-2005.

- The results were statistically significant at the one-percent level. This indicates that the smaller the budget, the more vulnerable the municipality is to revenue reductions forcing them to cut back on their own projects.

**Distribution of municipalities according to the percentage increase/decrease in unsubsidized project expenditure (municipalities classified into three groups according to standard financial size)**



Note: Compiled and calculated by RICE based on the FY1996-2005 data from the Ministry of Internal Affairs and Communications. Adjustments have been made for merged municipalities.

### 1.3 Social infrastructure stock and national and regional growth

- Roads and other social infrastructure contribute to the economic development of Japan and its regions. There are many examples where good social infrastructure has attracted businesses and promoted tourism in provincial regions.
- Other countries are more aware of the importance of social infrastructure in the economic growth. Australia for example, formulated “AusLink” (Australia’s first comprehensive land transport program) in 2004, to provide a planning framework and funding for the Australian Government’s investment in land transport infrastructure. AusLink was succeeded by the new government led by Kevin Rudd. The EU has increased the amount of structural funds to finance regional policies of its member states. The amount of investment between 2007 and 2013 was increased to 374.4 billion euros (approx. 595 billion US dollars), or by over 60% from 2000 to 2006.
- RICE commissioned Associate Professor Chisato Asahi of Tokyo Metropolitan University to conduct a positive analysis of the effects of social infrastructure. The results of the analysis indicate that increasing two types of social infrastructure, i.e., that supporting industrial activities and that protecting the nation from floods and other natural disasters, may stimulate the accumulation of human capital and thereby contribute to economic growth. This finding supports the theory that social infrastructure is not only indispensable for economic growth through manufacturing – especially heavy industry – but also for knowledge-based and innovation-driven economic growth.

- Relation between human capital and social infrastructure in economic development
  - Estimate the translog production function to measure gross production of each region by using private-sector capital stock, the number of workers, social infrastructure stock and human capital.

$$\begin{aligned}\log Y_{it} = & a_0 + a_1 \log K_{it} + a_2 \log N_{it} + a_3 \log G_{it} + a_4 \log H_{it} \\ & + \frac{1}{2} a_5 (\log K_{it})^2 + \frac{1}{2} a_6 (\log N_{it})^2 + \frac{1}{2} a_7 (\log G_{it})^2 + \frac{1}{2} a_8 (\log H_{it})^2 \\ & + a_9 \log K_{it} \log N_{it} + a_{10} \log K_{it} \log G_{it} + a_{11} \log N_{it} \log G_{it} \\ & + a_{12} \log K_{it} \log H_{it} + a_{13} \log H_{it} \log G_{it} + a_{14} \log N_{it} \log H_{it} + d_t + c_i + u_{it}\end{aligned}$$

Note: In this logarithmic equation  $i$  is the region,  $t$  is the term,  $Y$  is the regional gross production,  $K$  is the private-sector capital stock,  $N$  is the number of workers,  $G$  is the social infrastructure stock, and  $H$  is human capital.

- The parameter indicating the effect of social infrastructure stock on the marginal productivity of human capital is  $\alpha_{13}$ . If this parameter is positive ( $0 < \alpha$ ) then the amount of production increase accompanying added human capital becomes large when the amount of social infrastructure stock increases (complementary relation). If this parameter is negative ( $\alpha < 0$ ), then the amount of production increase accompanying added human capital becomes small when the amount of social infrastructure stock increases (alternative relation). (Note: Here “social infrastructure stock” and “human capital” are interchangeable.)
- The estimated results suggest that there is a significant complementary relation between the two types social infrastructure, i.e., a) that supporting industrial activities and that protecting the nation from floods and other natural disaster and b) human capital. This indicates that when the stock of social infrastructure is increased it has a greater effect on economic growth through human capital accumulation.

	Social infrastructure as a whole	Social infrastructure for industrial activities	Social infrastructure for land protection
Private capital	Complementary relation (significant at one percent level)	(No significant relation)	(No significant relation)
Number of employees	Alternative relation (significant at one percent level)	Alternative relation (significant at one percent level)	Alternative relation (significant at one percent level)
Human capital	(No significant relation)	Complementary relation (significant at one percent level)	Complementary relation (significant at one percent level)

Notes:

- 1) Social infrastructure for industrial activities: expressways, national highways, ports, airports and industrial water works.
- 2) Social infrastructure for land protection: facilities for controlling floods, landslides, debris flow and for coastal protection.



**2.1 Bid bond**

- The purpose of the bid bond, not yet commonly used in Japan, is to keep inferior and unqualified bidders out of the bidding process by assuring that the successful bidder will enter into the contract and provide the required bonds. Introduction of the bid bond system has been proposed in an interim report by a working group of the Central Council on Construction Contracting Business (March 2006) and the MLIT's guideline on measures for proper bidding and contracting systems of public works (June 2006) to increase the use of general competitive bidding and general evaluation bidding systems.
- The MLIT formulated a bid bond introduction plan in September 2006. According to the plan, the bid guarantee system specified in Article 29 of the Public Accounts Law will be applied, but instead of a bid deposit (in cash) specified in the law, the bidders will be required to submit a bid bond (e.g., bid bond insurance issued by insurance companies, reservation certification of a contract guarantee issued by a financial institution or a surety company, or bid bonds issued by a financial institution).
- Bid bonds have the following advantages: a) Inferior and unqualified companies, including dummy companies can be excluded from bidding; b) under-qualified companies can be excluded by setting a credit line; and c) bid bonds can, to a certain extent, prevent dumping.
- Bid bonds however, are not yet commonly used in this country. A survey on bid bonds required by the Act for Promoting Proper Tendering and Contracting for Public Works shows that 16.7% of national government organizations (3 out of 18 ministries and agencies), and 2.3% of government-affiliated public corporations (3 out of 129 corporations) have introduced bid bonds as of September 1, 2007.
- A questionnaire survey by RICE on local governments of the introduction of bid bonds shows that only 8.5% of prefectures (4 out of 47) and 1.5% of major cities (1 out of 67) have introduced the bid bond system.
- The introduction of bid bonds should be further promoted to encourage fair and competitive bidding. Some surveys have shown that the effects of the introduction of bid bonds have already occurred.

● **Procedures accompanying bid bonds**

<b>Procurer</b>	<b>Contractor</b>	<b>Underwriter</b>
<p>1. Advertisement for bid (Specifies the details of the amount of bid deposit, rate of coverage, and submission deadline)</p> <p>7. Receive bid bonds 8. Screen whether the contractor is qualified to participate in the bidding</p> <p>10. Notify the contractor of the result of the screening</p>	<p>2. Estimate the bid price 3. Apply for the issuance of bid bonds to the underwriter</p> <p>6. Receive bid bonds and submit to the procurer</p> <p>9. Set deadline for any changes to bid bonds</p> <p>11. Submit bids</p>	<p>4. Credit check (also check the contract guarantee) 5. Issue bid bonds</p>
<p><b>In case the successful bidder concludes a contract</b></p>	<p>12. Win the bid 13. Apply to the underwriter for a contract guarantee</p> <p>15. Receive the contract guarantee from the underwriter and submit it to the procurer</p> <p>17. The contract is concluded</p>	<p>14. Issue the contract guarantee</p>
<p>16. Receive the contract guarantee from the contractor</p>		
<p><b>In case the successful bidder fails to conclude a contract</b></p>	<p>12. Wins the bid 13. Refuses to enter the contract</p>	<p>15. Pay the deposit</p> <p>17. Claim for compensation to the contractor</p>
<p>14. Claim damages to the underwriter</p> <p>16. Receives the deposit</p>		
<p><b>Unsuccessful bidders</b></p>		
<p>13. Return submitted bid deposit or bid bonds</p>	<p>12. Fails to win the bid</p>	

Data from the MLIT.

## 2.2 Reforming Japan's bidding and contracting systems

- Public procurers have begun introducing new bidding and contracting systems based on new laws and guidelines, to increase transparency and to enhance fair and open competition.
- RICE conducted a questionnaire survey on the bidding and contracting systems of major local governments on December 1, 2007.
- Two major findings of the survey were: a) larger local governments are ahead of smaller ones in terms of the introduction of general competitive bidding and general evaluation bidding systems; and b) larger local governments are combining the low bid price examination system and the minimum bidding price system to avoid disadvantages associated with extremely low, tactical bidding prices (such as 1-yen bids).

- Introduction rate of general competitive bidding: **99.1%** (including those still testing) out of a total of 114 local governments surveyed
  - Prefectures: **100%** (All 47 prefectures)
  - Major cities (government designated cities, prefectural capitals and other large cities): **66** (out of 67; 62 introduced and the remaining 4 testing)

Note: According to the MLIT survey of September 1 2007, 46.4% of municipalities (government designated cities excluded) have not yet introduced the system. Combined with the results of the RICE survey, it indicates that smaller governments are slower in introducing the general competitive bidding system than larger ones.

- Introduction rate of general evaluation bidding systems: **78.1%** (including those still on a trial basis) of total 114 governments surveyed
  - Prefectures: **100%** (18 introduced and 29 testing)
  - Major cities: **42** (Out of 67; 3 introduced and 39 testing)

Note: According to the above MLIT survey 75.7% of municipalities (government designated cities excluded) have not yet introduced the system. The results of the two surveys indicate that prefectures are ahead of municipalities in introducing the system.

- Measures against low-price bidding (the low bid price examination and the minimum bidding price system)
  - Many are combining the two systems (**42** prefectures and **40** major cities), and all are applying one of the systems.

- Cases of lottery and unsuccessful bidding increasing
  - A lottery is conducted when all submitted bid prices are equal to the lowest bid price. This is due to tougher competition among the bidders and pre-announcement the lowest bid price (and the scheduled price; “scheduled” means the client makes an estimate of the project price and announce it after the bidding)
  - Cases of unsuccessful bidding occurs when all submitted bid prices exceed the scheduled price, when no or a fewer-than-expected number of companies participate in the bidding.

## Chapter 3 Construction Industry

### 3.1 Construction industry and finance

- Relationship banking that does not rely excessively on real estate collateral and personal guarantees is attracting interest in recent years as a smooth and convenient way for private financial institutions to assist small and medium-sized enterprises (SMEs).
- Public financial assistance, through credit guarantee programs and policy finance, is a safety net for SMEs that will help construction companies suffering from temporary cash-flow problems due to a significant drop in construction work in the wake of the enactment of the amended Building Standard Law.
- A questionnaire survey of the construction industry and its financial affairs conducted by RICE has revealed that for more than half of the companies surveyed (particularly smaller ones) their financial situation had worsened in recent five years.
- Survival under these tough conditions depends on whether a company can strengthen its management base, can increase information transparency, can establish stronger relations with financial institutions and thereby utilize relationship banking to raise funds.

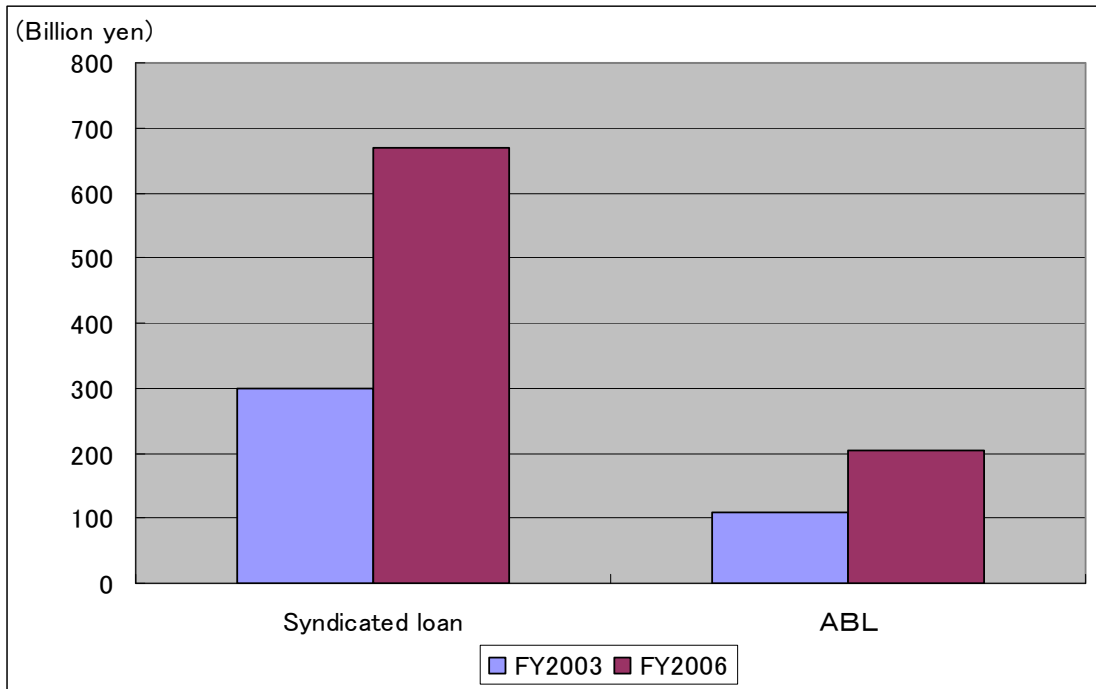
#### ● Examples of relationship banking

- Syndicated loan: An arrangement where multiple financial institutions form a syndicate and lend money to large corporate projects under the same conditions and the same contract.
- Asset Based Lending (ABL): A type of lending secured by assets or accounts receivable. The pledged asset is regularly monitored and a certain percentage of the assessed asset is lent.

#### ● Survey on the financial state of SMEs

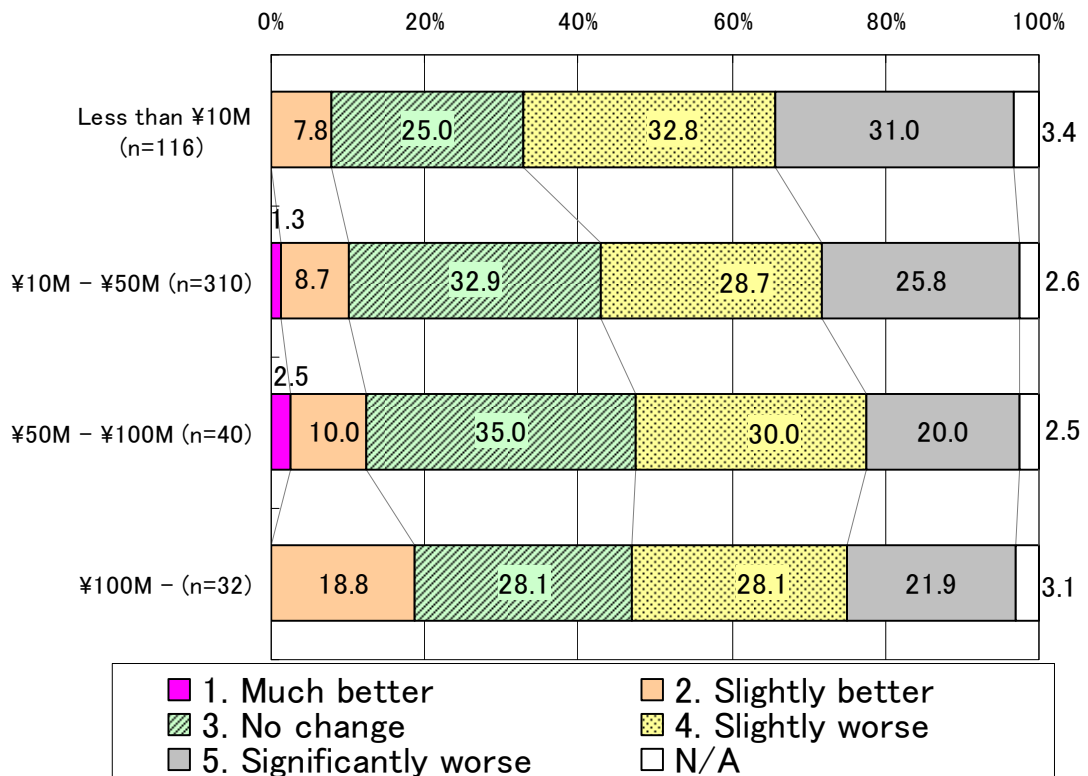
- Many SMEs are suffering from declining orders and revenue.
- Smaller companies, in particular, are more vulnerable – they do not have strong ties with banks like the larger construction companies – due to their lack of credit capability.

**Financing that does not excessively rely on real estate collateral and personal guarantees**



Source: Data from the website of the Financial Services Agency.

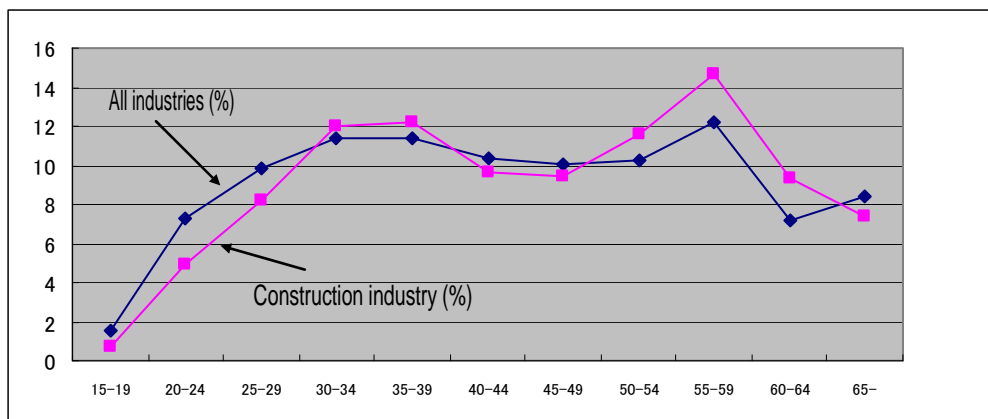
**Financial conditions of the recent five years (by the size of capital)**



### 3.2 Wage structure of construction workers

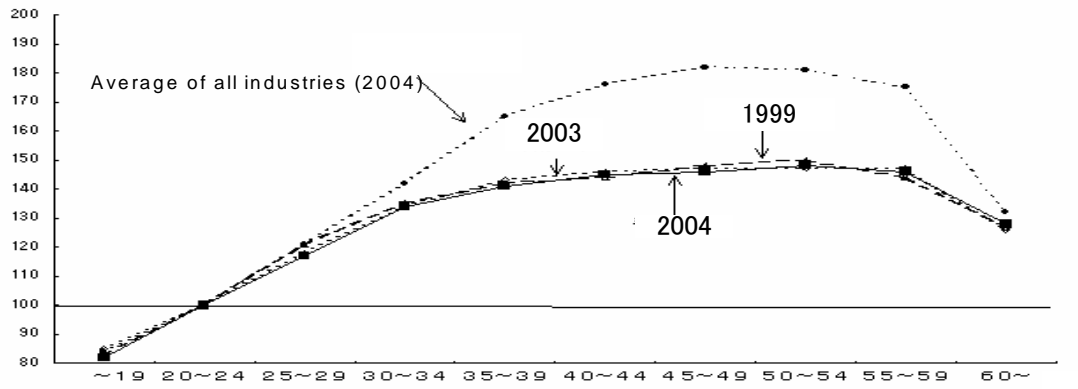
- The shortage of construction workers may worsen as the number of young people entering the construction market is decreasing and the turnover rate of workers is high.
- The supply and demand mechanism has ceased to function properly due to “lowering wages” and “extremely low annual income.”
- “Lowering wages” is one of the structural problems of the construction industry. The industry is subdivided by the type of work and is multi-layered, with general contractors at the top of the pyramid. The seniority-based compensation model (where a worker starts as a junior, then gets promoted to a foreman and eventually to a master builder) which was successful in the past no longer works today where construction investment is shrinking and worker turnover is high.
- “Low annual income” means that wages are low both in absolute amounts and in rate of increase. Unlike full-time white-collar employees, construction workers’ wages do not increase based on career and experience, putting middle-aged workers (whose family and household expenses are at their peaks) at a disadvantage.

#### Age structure of construction workers



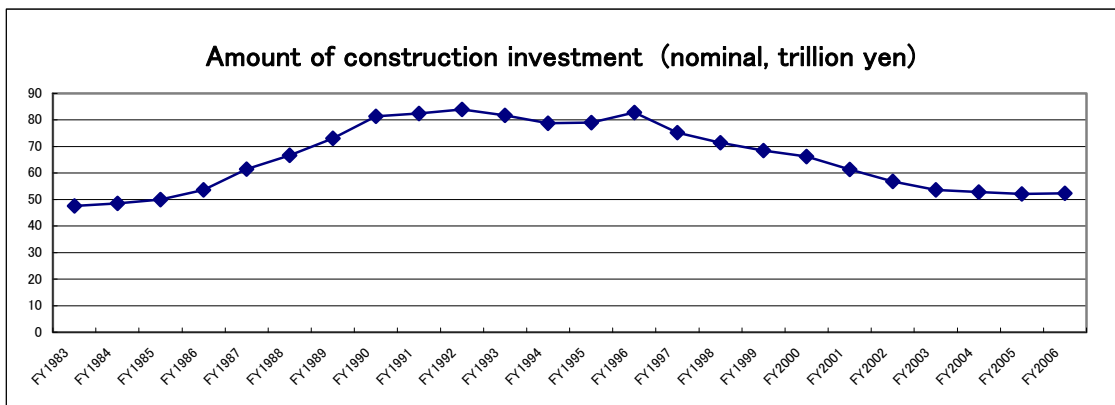
Compiled by RICE, based on data (a workforce survey) from the Ministry of Internal Affairs and Communications. Ages of workers are the average of 2007.

**Trends in age gap (all types of construction workers, 20-24 = 100)**



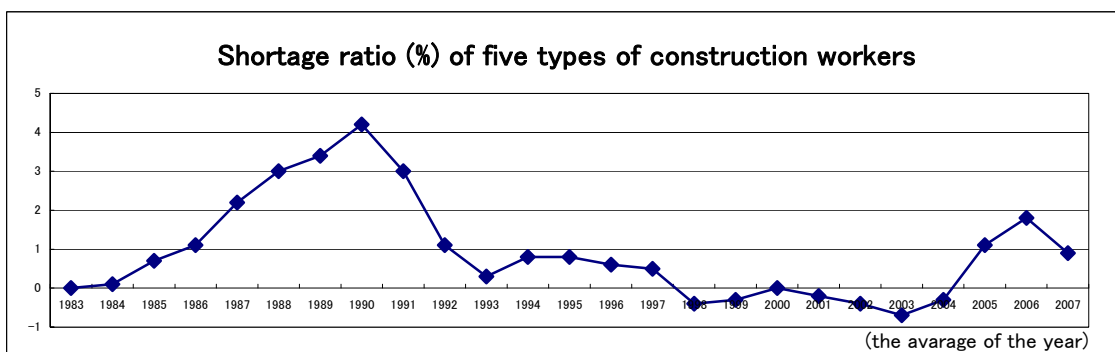
Data from the Ministry of Health, Labour and Welfare (FY2004 survey on wages of outdoor workers by job types).

**Trends in the amount of construction investment (nominal terms)**



Compiled by RICE based on data from the MLIT (outlook of construction investment).

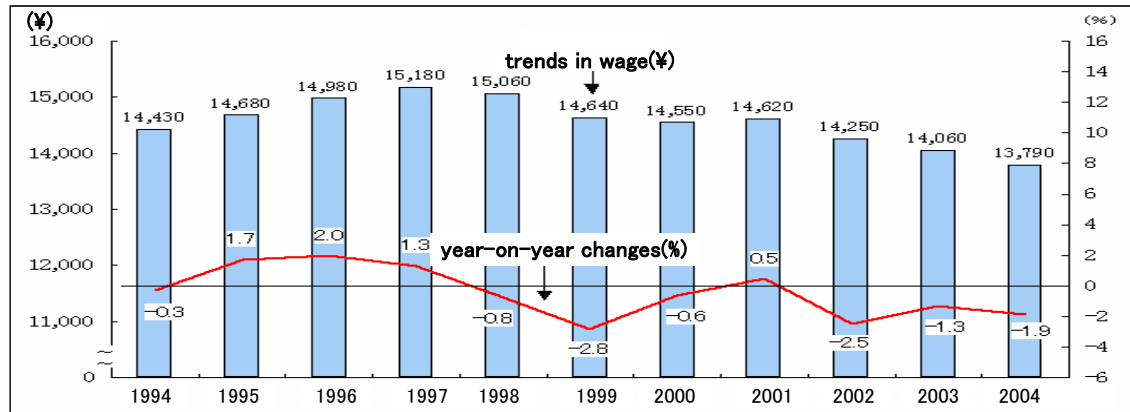
**Trends in the shortage ratio of construction workers**



Compiled by RICE based on data from the MLIT (survey on construction labor supply and demand).

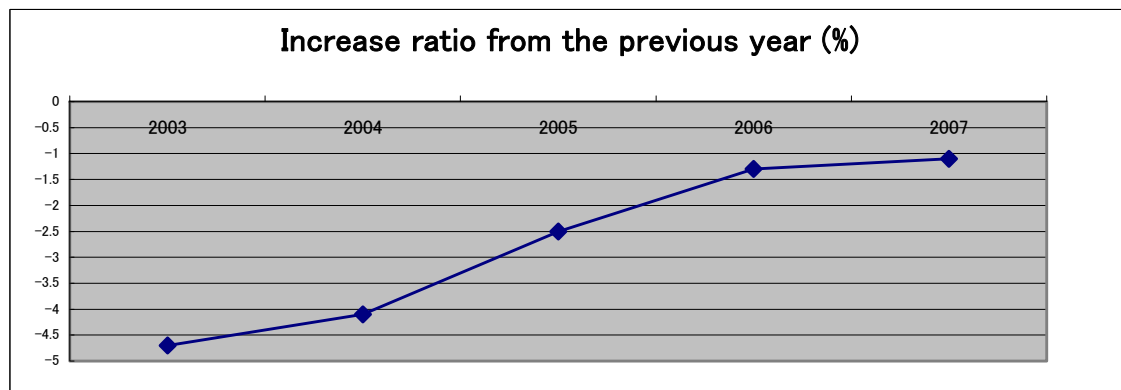


**Trends in wage and year-on-year changes (total of all types of construction workers)**



Wage data from the Ministry of Health, Labour and Welfare (FY2004 survey on wages of outdoor workers by job types).

**Trends in the increase of unit labor costs in public works**

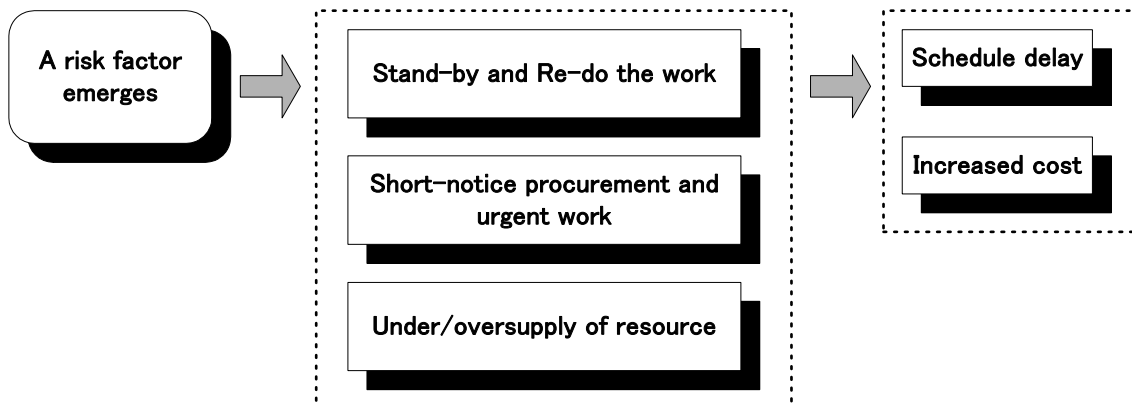


Compiled by RICE based on data from the MLIT(unit labor cost (standard amount) in public works).

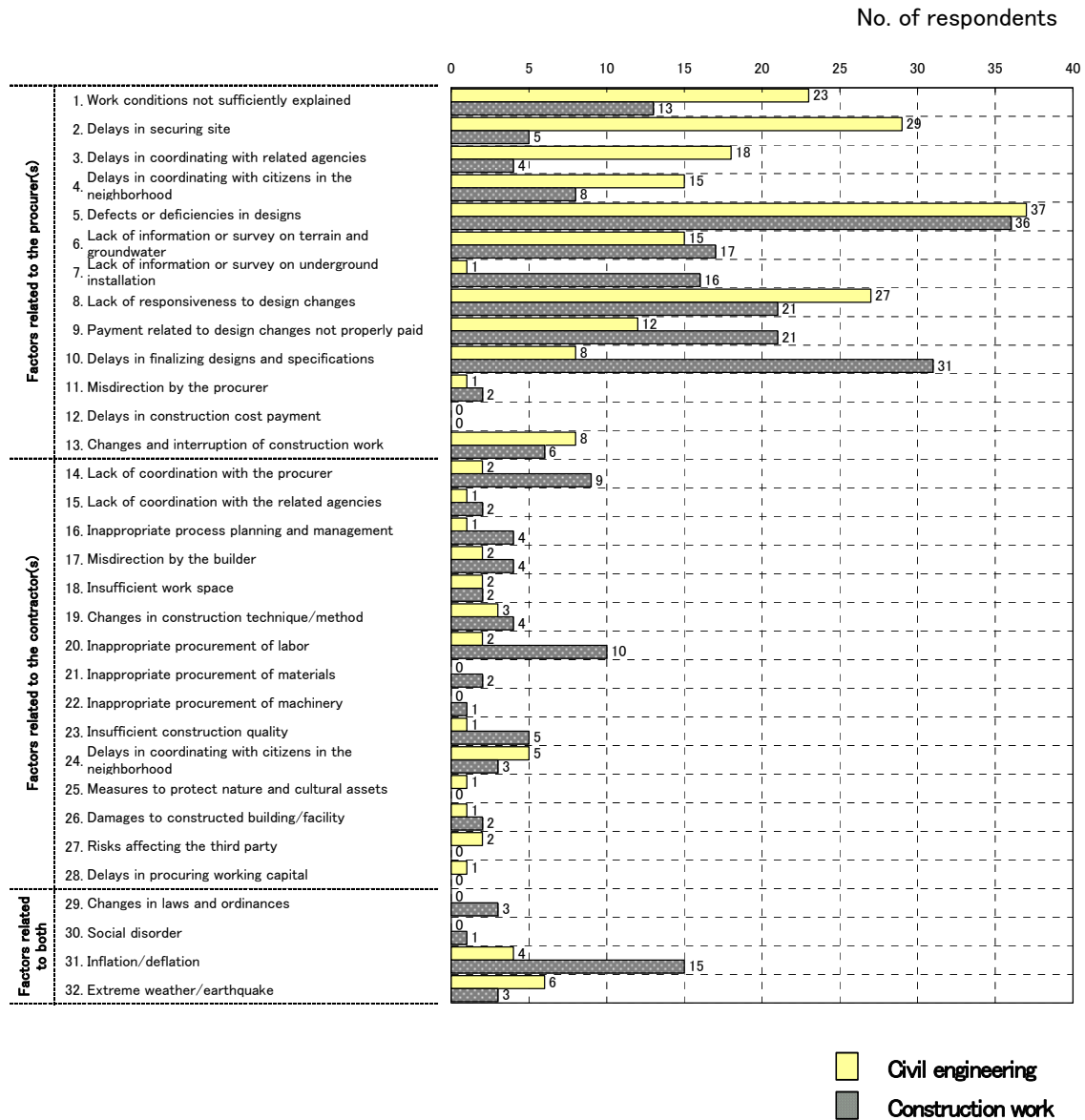
### 3.3 Factors affecting the profitability of construction projects and risk sharing

- The profitability of construction projects is affected by risks such as schedule delays and unexpected cost increases. Risk management is more important than ever in the today's market when tighter cost control is required.
- RICE conducted a questionnaire survey on factors affecting construction profitability. The most frequently mentioned were all procurer(client)-related: "defects or deficiencies in design," "delays in procuring site" and "delays in finalizing designs and specifications."
- As most construction projects do not progress as scheduled, "incomplete contracts" are concluded where the parties renegotiate whenever factors affecting the project arise. Risk-sharing arrangements tend to be unclear in Japan, and contractors are often forced to bear responsibility for the client's errors.
- Clearer arrangements concerning risk, losses and responsibility-sharing between the client and contractor(s) are needed to improve the management of construction companies.

#### Influence of factors affecting profitability



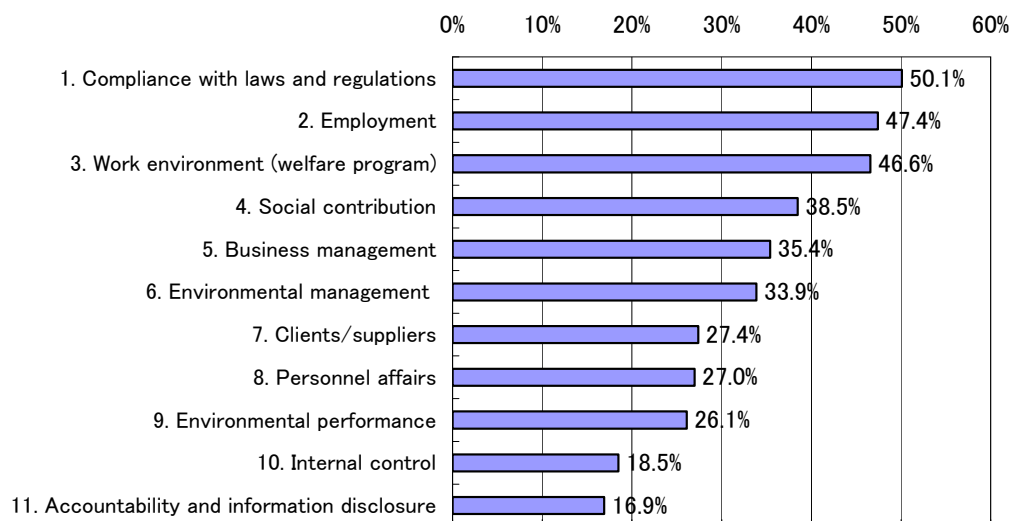
## Factors affecting corporate profitability (questionnaire survey)



### 3.4 Challenges to implementing CSR

- Corporate Social Responsibility (CSR) has become an important issue for businesses in recent years. Though the construction industry is perceived as an industry with greater social responsibility than the other industries, the industry is not necessarily trusted by the public. The industry should promote CSR in management to regain public confidence.
- A questionnaire survey conducted by RICE in August 2007 shows that construction companies have listed “announcement of best practices and guidelines,” “conduct CSR evaluation in bidding,” and “development of database” as ways to promote CSR.
- The quality of corporate management (social value) should be evaluated from various aspects when a construction company promotes CSR management. “Compliance with laws and regulations” is the centerpiece of any CSR. Other high-priority issues are “internal control” and “environmental management” for larger companies, and smaller companies should refer to the priority list and other material on CSR to help them decide what to do.
- The construction industry, with cooperation from various industry groups, should develop a “common platform” for a CSR database to utilize the results of CSR evaluation. If successful, this will be the first such database to be developed by any industry in Japan.

#### ● Indicators of CSR performance of companies (RICE survey)



- CSM measures that companies wish to implement, either themselves or by someone else (RICE survey)

Measures	Percentage (%)
Publish best practices	62
Publish manuals and guidelines	55
Evaluate CSR in bidding	41
Develop databases	23
Introduce advisory and consultation services	23
Give awards, introduce ranking systems	10
Other	7

## Chapter 4 Overseas Construction Markets

### 4.1 Trends in overseas construction markets

- The US economy, which had been fairly steady until the second quarter of 2007, is under threat from the sub-prime lending crisis and its future remains unclear. The expected amount of construction investment in 2007 is 1.1402 trillion dollars, down 5.3% from the previous year. Investment in private housing plummeted by 29.0% from the previous year due to the sub-prime housing loan crisis, whereas private non-housing and public works both record steady increases due to repairs, renovation and rebuilding of aged infrastructure, and the construction of new facilities to increase the nation's international competitiveness.
- West European economies, which peaked in 2006, have started to gradually decline. A notable example is Spain: In 2006 the country recorded the highest level of housing investment among the West European nations, but this started to decline the following year. On the other hand, the economies of the Middle and Eastern European countries are steadily growing. High growth in construction investment can be expected in these regions, stimulated in part by the EU structural funds.
- Many countries in Asia and Oceania continue to enjoy a high GDP growth rate (particularly high in China and India, recording over 8% annual growth) and increases in construction investment. The Australian resources industry is booming as global demand for raw materials grows. As infrastructure to transport these raw materials needs to be improved, construction investment is expected to increase in this area.

## **4.2 R&D activities by global construction companies**

- Of the top 20 construction companies worldwide (ENR ranking), four companies (Hochtief, Bouygues, Skanska and Kajima) and Arup (a leading international design firm) were selected for a comparison of R&D activities and competitiveness to see if Japanese construction companies can learn lessons from them.
- The European construction companies are cooperating with EU organizations, academic institutions and other companies, and have developed extensive networks within the industry. Private construction companies, however, are not actively involved in in-house R&D activities or in the development of element technologies.
- Japanese construction companies on the other hand, spend an enormous amount of money on in-house R&D utilizing developed technologies (e.g., construction materials). They are not, however, enthusiastic about networking within the industry.
- Although construction materials and other elemental technologies can add value to projects, Japanese construction companies are not enthusiastic about networking, due to the local nature of the construction industry. In the age of globalization, they should start looking outside their corporate and national boundaries and start thinking about networking and sharing outcomes of R&D within global society.