

**Development Bank of Japan
Research Report
No. 50**

**Corporate Capital Spending Behavior and
Innovation Efforts:
Findings of Survey on Capital Spending Behavior
(Conducted in November 2004)**

March 2005

**Economic and Industrial Research Department
Development Bank of Japan**

This report was originally published in Japanese as *Chosa* No. 76
in February 2005.

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Corporate Capital Spending Behavior and Innovation Efforts: Findings of Survey on Capital Spending Behavior (Conducted in November 2004)

Summary

1. Aims

Corporate capital spending is gaining momentum. DBJ's Survey on Planned Capital Spending for Fiscal Years 2004 and 2005 indicates that initially planned domestic capital spending for the current fiscal year will be revised upwards. It also predicts brisk capital spending for the next fiscal year, particularly in manufacturing. As compared with similar cases in the past, the current increase in capital spending is marked by accelerated retirement of equipment and continued reduction in interest-bearing liabilities. Arguments for bringing industrial activities back to Japan have stimulated interest in the relationship between domestic and overseas capital spending. Attention has also focused on R&D as a source of corporate competitiveness as well as on strategies for using the resulting intellectual property.

In this context, the DBJ conducted a survey on corporate capital spending behavior and innovation efforts for the 3,638 firms covered by the Survey on Planned Capital Spending for Fiscal Years 2004 and 2005 (conducted in November 2004), in order to understand corporations' attitude toward capital spending and to predict the trend in the coming years.

2. Outlook for Capital Spending in Fiscal Years 2004 and 2005

For the current fiscal year, 20% of the firms envisage revising their initial domestic capital spending plans upward, backed by buoyant demand; fewer firms expect to revise them downward. As regards the next fiscal year, capital spending will remain similar to this year in both manufacturing and non-manufacturing. In the manufacturing sector, the number of firms that will increase spending exceeds those planning

cutbacks. Many of the firms that expect to reduce spending will do so mainly due to scheduling considerations. Thus, capital spending will remain positive in FY2005, led by the manufacturing sector.

3. Decision-Making on Capital Spending

The majority of firms responded that investment projects with higher quantitative values are given priority in decision-making. Although they exceed the firms that also seriously consider quantitative factors, their share fell about 10% on two years earlier. This implies that the recovery in corporate profits is spurring investments that are not directly linked to short-term profit, such as strategic long-term investments and investments for environmental conservation. 70% of firms said that they emphasize payback period when quantitatively assessing individual investments. Thus, corporate investment is still oriented toward certainty.

4. Retirement and Vintage of Equipment

20% of the firms have accelerated equipment retirement (including disposal) since two or three years ago, exceeding by 10% the number of firms that prefer passive retirement, a trend that is more pronounced in the manufacturing sector. The accelerated retirement may be explained by the increase in unnecessary equipment as a result of the selection and concentration of businesses and active replacement of existing equipment on the back of buoyant profits. The majority of firms consider the current level of vintage as appropriate for major domestic plants. The number of firms planning to rejuvenate their equipment is almost the same as that which are allowing for further aging. Thus, capital spending is unlikely to experience short-term fluctuation from the vintage perspective.

5. Relationship between Overseas and Domestic Capital Spending

In the medium term, most of the firms plan to maintain or increase the current level of capital spending both in Japan and overseas. The relationship between overseas and domestic capital spending can be identified by focusing on the firms that responded to questions regarding both categories of capital spending. Over 80% of the firms that plan to increase capital spending overseas are considering increasing or maintaining domestic spending. Likewise, most of the firms that expect to increase domestic capital spending will maintain or increase spending overseas. Thus, there is almost no trade-off between domestic and overseas capital spending.

As regards the selection of locations for domestic new plants, the survey found that manufacturers emphasize resources (available sites, labor force, etc.) while non-manufacturers attach more importance to market (demand). Easy access and proximity to existing facilities are valued by manufacturers and non-manufacturers alike.

Asked about the purposes of overseas capital spending, most manufacturers cited production in consuming areas for all regions of the world. Other major purposes include development of sales and R&D facilities in North America and Europe, as well as development of production facilities in Asia for export to third countries and Japan. In China, investment will be mainly for re-export to Japan rather than to third countries, pointing to the importance of China in terms of developing local markets and re-exporting to Japan.

6. Conditions of Financial Activities

About 60% of the respondent firms plan to reduce interest-bearing liabilities in the quarters ahead. Indeed, almost 70% of the firms are narrowing their investment projects, giving priority to reducing interest-bearing liabilities for improving their financial position. The trend indicates that firms are still selective, even though they have reached the stage of investment expansion. Future trends in capital spending will depend on the progress in corporate efforts to re-

duce interest-bearing liabilities, as 40% of the firms responded that they will increase domestic capital spending when interest-bearing liabilities have declined to optimum levels. However, more than a quarter of the firms are still cautious about future risks, and intend to keep curtailing such liabilities even after they have fallen to reasonable levels.

Some 60% of the firms set a specific equity ratio as a benchmark of sound financial position. In most of the cases, the ratio is around 50% for manufacturing and 30% for non-manufacturing.

7. Importance of Innovation

The current growth of capital spending is supported by investment in new products and technologies. Any projection of future capital spending should consider corporate efforts for innovation, so the survey also covers innovation efforts by manufacturers.

Almost half of the responding firms consider that product life cycles have become shorter, citing diversified market needs and intensified competition as primary causes. Innovation has therefore become crucial for a firm to achieve sustained growth. Timely marketing of new products that meet market needs is one major challenge, along with the development of original products that allow differentiation.

8. Management of R&D Expenditures

Asked about budgetary control on R&D expenditures, only 40% of the firms responded that they manage the total R&D expenditure. Moreover, the survey found that the majority of the firms do not quantitatively evaluate R&D efficiency. Appropriate indicators should be developed to measure and improve the efficiency of R&D. Almost 80% of the firms that have quantitative indicators to measure efficiency also use indicators to evaluate the relationship between profits and R&D expenditure. Other indicators include the relationships between the number of patents, royalty income, the sales of new products and the number of commercialized developments on the one hand, and R&D expenditures on the other.

9. Utilization of External Resources for New Business Development

29% of the respondent firms actively utilize external resources in developing new businesses. Active outsourcing for new business development is expected to increase in the years ahead, as 36% of the firms plan to actively use external resources in the future. By category of partner, most firms responded that they now work, and will continue to do so, with Japanese universities, thus indicating high expectations for those domestic institutions. Only a few percent of the firms expect active partnerships with overseas universities or venture companies both now and in the future. As product life cycles shorten and the speed of R&D becomes more crucial, Japanese manufacturers are seeking to increase the speed and quality of product development through outsourcing.

10. Strategy on Intellectual Property

With regard to intellectual property management, 70% of the respondent firms seek active protec-

tion of core technologies through patents, while over 20% expect to increase licensing fee income. This trend is commonly observed both in the materials and processing & assembly sub-sectors. Elsewhere, manufacturers in the materials sub-sector give priority to the effective use of external patents, while processing & assembly firms give priority to putting their technologies and know-how into a “black box.” Regarding non-core technologies, about half of the firms retain them for future purposes such as protecting property rights; not many firms intend to use them actively for gaining profits.

Although almost 80% of the firms recognize the value of their intellectual property, it is often considered only in terms of the cost of administering and maintaining the patents. As intellectual property becomes increasingly important, the survey results indicate that Japanese firms need to improve their management of intellectual property.

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Introduction

Corporate capital spending is gaining momentum. DBJ's Survey on Planned Capital Spending for Fiscal Years 2004 and 2005 indicates that initially planned domestic capital spending for the current fiscal year will be revised upwards. It also predicts brisk capital spending for the next fiscal year, particularly in manufacturing. As compared with similar cases in the past, the current increase in capital spending is marked by accelerated retirement of equipment and continued reduction in interest-bearing liabilities. Arguments for bringing industrial activities back to

Japan have stimulated interest in the relationship between domestic and overseas capital spending. Attention has also focused on R&D as a source of corporate competitiveness as well as on strategies for using the resulting intellectual property.

In this context, the DBJ conducted a survey on corporate capital spending behavior and innovation efforts for the 3,638 firms covered by the Survey on Planned Capital Spending for Fiscal Years 2004 and 2005 (conducted in November 2004), in order to understand corporations' attitude toward capital spending and to predict the trend in the coming years.

While mainly analyzing the results of the present survey, this report also includes some supplementary interpretations, taking account of information obtained from other sources.

I Outline

1. Coverage

The 3,638 firms covered by the Survey on Planned Capital Spending for Fiscal Years 2004 and 2005¹ (hereinafter referred to as the “principal survey,” which targets all private firms in Japan’s major industries capitalized at ¥1 billion or more, excluding agriculture, forestry, finance, insurance and medicine).

2. Date of Survey

November 12, 2004. Most of the responses to the questionnaire were obtained in November (the same as the principal survey).

3. Survey Method

The survey was conducted by questionnaire (sent to individual firms, followed up by telephone interviews when necessary).

4. Survey Items

- (1) Outlook for domestic capital spending (for the current and next fiscal years)
- (2) Decision-making on capital spending
- (3) Retirement and vintage of equipment
- (4) Relationship between overseas and domestic capital spending
- (5) Conditions of financial activities
- (6) Efforts for innovation (for manufacturers only)
 - Changes in product life cycles and underlying factors
 - Management of R&D expenditure
 - Utilization of external resources for new business development
 - Strategy on intellectual property

5. Responses

Responses were obtained as follows.

	No. of Firms Targeted	No. of Valid Responses	Proportion of Valid Responses
Total	3,638	1,866	51.3%
Manufacturing	1,706	774	45.4%
Non-manufacturing	1,932	1,092	56.5%

¹ See DBJ Research Report No.49 (available at <http://www.dbj.go.jp/english/public/research.html>).

<Reference> Data on Firms Responding to the Present Survey

A. Trends in Capital Spending of Respondent Firms

	No. of Firms	Capital Spending (¥ billion)		Change (%)	Change in Nov. 2004 (principal) Survey (%)
		FY2003	FY2004	FY2004	FY2004
		Actual	Planned	Planned	Planned
Total	1,763	13,219.4	14,354.3	8.6	8.4
Manufacturing	725	4,211.6	5,078.1	20.6	21.7
Non-manufacturing	1,038	9,007.8	9,276.2	3.0	2.2

Note: Of the 1,866 firms (774 manufacturers and 1,092 non-manufacturers) that gave valid responses to the present survey, this table excludes the 10 firms (three manufacturers and seven non-manufacturers) that did not give valid responses to the planned capital spending survey conducted in November 2004, as well as the 93 firms (46 manufacturers and 47 non-manufacturers) that did not give valid responses to the planned capital spending survey conducted in June 2004.

B. Coverage of the Present Survey as % of Firms Targeted by the Principal Survey

	No. of Firms	Amount of Capital Spending
Total	67.9	70.5
Manufacturing	65.0	68.6
Non-manufacturing	70.1	71.6

Notes: 1. Of the 1,866 firms (774 manufacturers and 1,092 non-manufacturers) that gave valid responses to the present survey, this table excludes the 10 firms (three manufacturers and seven non-manufacturers) that did not give valid responses to the planned capital spending survey conducted in November 2004.
2. The amount of capital spending represents planned figures for FY2004 based on the principal business classification.

C. Trends in R&D Investment of Respondent Firms

	No. of Firms	R&D Investment (¥ billion)		Change (%)	Change in Nov. 2004 (principal) Survey (%)
		FY2003	FY2004	FY2004	FY2004
		Actual	Planned	Planned	Planned
Total	580	3,242.9	3,420.9	5.5	5.1

Note: Of the 774 manufacturers that gave valid responses to the present survey, this table excludes the 102 firms that did not give valid responses to the R&D expenditure survey conducted in November 2004, as well as the 92 firms that did not give valid responses to the R&D expenditure survey conducted in June 2004.

D. Coverage of the Present Survey as % of Firms Targeted by the Principal Survey

	No. of Firms	Amount of R&D Investment
Total	79.6	69.4

Notes: 1. Of the 774 manufacturers that gave valid responses to the present survey, this table excludes the 102 firms that did not give valid responses to the R&D expenditure survey conducted in November 2004.
2. The amount of R&D expenditures represents the planned figure for FY2004 based on the principal business classification.

II Survey Results

1. Outlook for Capital Spending in Fiscal Years 2004 and 2005

(Questions asked)

I. Outlook for capital spending	
Q1 As compared with the initial plan, your (domestic) capital spending for the current fiscal year will be:	<input type="text"/>
1. revised upwards. 2. revised downwards. 3. almost unchanged.	
Q2 As compared with the plan for the current year, your (domestic) capital spending for the next fiscal year will:	<input type="text"/>
1. increase. 2. decrease. 3. stay almost unchanged.	
Q3 [For those who chose 1 or 2 in Q1 or Q2] What is the reason(s) for such change (choose one or two items for each question)?	Reason(s) for Q1
1. Profit outlook (upward/downward revision)	<input type="text"/>
2. Demand trend (increase/decrease more than expected, etc.)	<input type="text"/>
3. Supply trend (perceived shortage/surplus in equipment)	
4. Equipment price trend (decline/rise in unit prices for capital spending)	
5. Efforts for cutbacks on capital spending cost (change in construction method and other self-help efforts excluding the unit price factor)	
6. Financial impact (increase in investment fund through improved rating/avoidance of adverse effect on rating, etc.)	Reason(s) for Q2
7. Change in management method to ensure profitability (raising hurdle rate, changing valuation method, etc.)	<input type="text"/>
8. Others (please specify) _____	<input type="text"/>

(1) Outlook for capital spending in FY2004

Asked about any revision to the initial plan of (domestic) capital spending for the current fiscal year (Figure 1-1), more firms responded that they had revised the plan upwards (21%) rather than downwards (17%). 60% of the firms indicated little change from the initial plan. By industrial

sector, a higher percentage of firms have made an upward revision in the manufacturing sector, thus confirming that the current recovery in capital spending is led by manufacturers. By industry, the share of firms reporting an upward revision is largest in non-ferrous metals (43%), followed by transport equipment (41%) and ce-

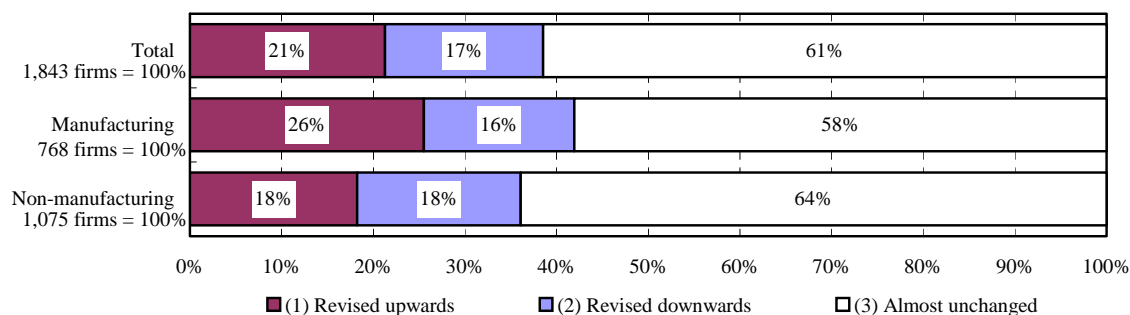


Figure 1-1. As Compared with the Initial Plan, (domestic) Capital Spending for the Current Fiscal Year will be:

ment, ceramics & glass (36%). In contrast, the largest share of firms reporting a downward revision belongs to pulp & paper (32%), followed by petroleum (26%) and telecommunications & information (24%).

As factors behind upward revision (Figure 1-2), the majority of firms (54%) reported “demand trend (demand increasing more than expected),” followed by “supply trend (perceived shortage in equipment)” with 23%, “others (scheduling factors, etc.)”² with 23% and “profit outlook (upward revision to expected profit)” with 19%. On the other hand, “efforts for cutbacks on capital spending cost” (37%) is the primary factor behind downward revision (Figure 1-3), followed by “profit outlook (downward revision to expected profit)” with 27%, “demand trend (demand decreasing more than expected)” with 25% and “others (scheduling factors, etc.)” with 21%. The finding reveals that profit and demand trends are the key in projecting future developments of capital spending, as they represent major factors in both upward and downward

revisions. “Efforts for cutbacks on capital spending cost,” one of the factors behind downward revision, may be considered positively, for it will result in the same performance (as in previous projects) with smaller investments. Scheduling considerations are not negative factors, either. Thus, there is no need to be pessimistic about any downward revisions as long as they result from such factors.

By sector, “demand trend” is the most significant factor behind upward revision in both manufacturing and non-manufacturing. However, this is followed by “supply trend” in the manufacturing sector and by “others (scheduling factors, etc.)” in the non-manufacturing sector. As regards downward revision, “efforts for cutbacks on capital spending cost” represents the primary factor in both sectors, followed by “demand trend” in manufacturing and by “profit outlook (downward revision to expected profit)” in non-manufacturing.

Looking at significant factors behind upward revision in major industries, “demand

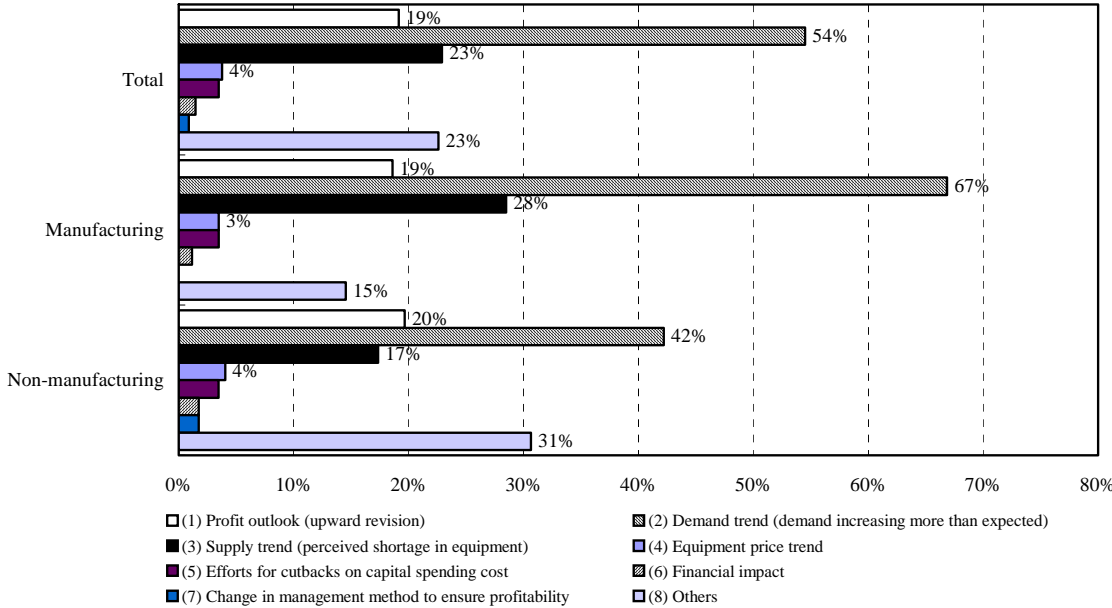


Figure 1-2. Factors Behind Upward Revision

Note: Since multiple choices are allowed, figures for individual items do not add up to the total.

² The questionnaire requests the firms choosing “others” to specify the reason. Most of the replies refer to scheduling factors such as the timing of major projects and periodic repairs (inspections).

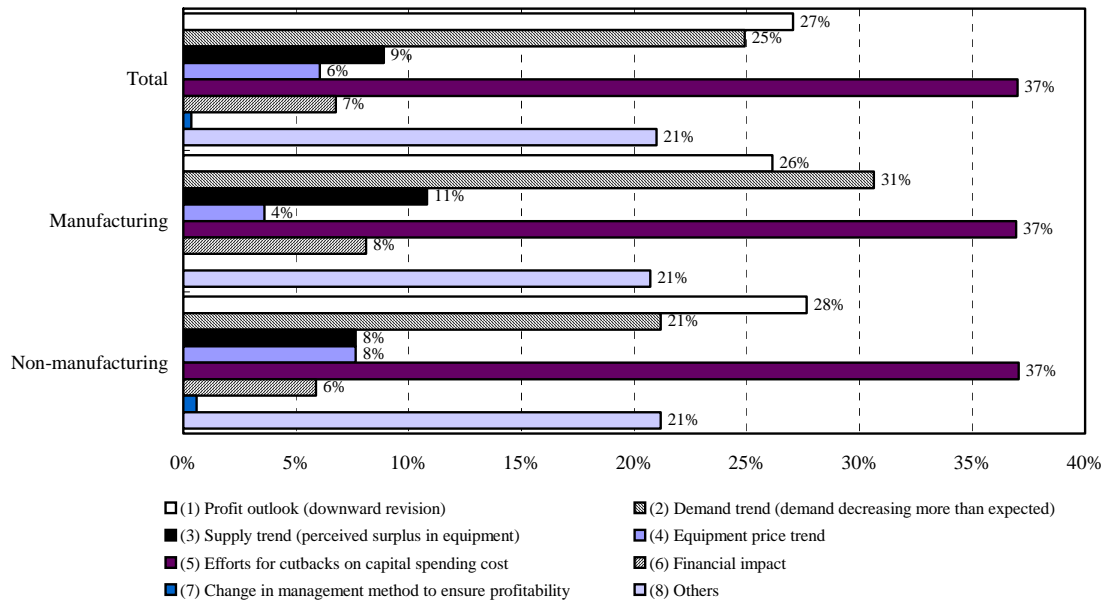


Figure 1-3. Factors Behind Downward Revision

Note: Since multiple choices are allowed, figures for individual items do not add up to the total.

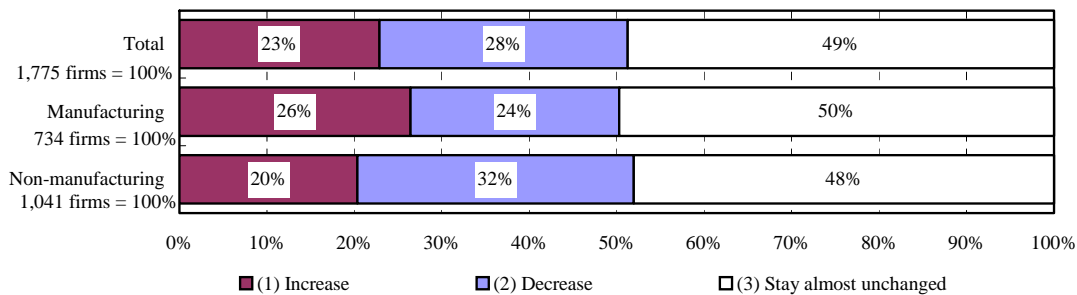


Figure 1-4. As Compared with the Plan for the Current Year, Your (Domestic) Capital Spending for the Next Fiscal Year will:

trend” has a substantial share in electric machinery (89%), transport equipment (84%), iron & steel (82%), cement, ceramics & glass (75%) and general machinery (75%). A high percentage of firms cites “supply trend” in iron & steel (64%) and cement, ceramics & glass (42%), while “profit outlook” has a large share in construction (35%).

(2) Outlook for capital spending in FY2005

Half of the firms in both the manufacturing and non-manufacturing sectors responded that their (domestic) capital spending will “stay almost unchanged” in the next fiscal year (Figure 1-4). In manufacturing, more firms expect an increase” (26%) rather than a decrease (24%),

while “decrease” (32%) exceeds “increase” (20%) in non-manufacturing. Although it is difficult to interpret the “almost unchanged” response, this might be considered rather positively at least for the manufacturing sector, as it will follow two consecutive years of double-digit increase³. Thus, capital spending will remain positive in the manufacturing sector, but no significant spillover effect is expected in the non-manufacturing sector. The percentage of the

³ According to the Survey on Planned Capital Spending for Fiscal Years 2004 and 2005 (conducted in November 2004), capital spending (planned) for FY2004 in the manufacturing sector will increase 22.3% over the actual figure for FY2003, the second consecutive year of double-digit growth (following a 11.3% increase in FY2003 on a year earlier).

firms expecting an increase after subtracting the percentage of those expecting a decrease is highest in industries such as leasing (+25 percentage points), general machinery (+14), petroleum (+10), iron & steel (+8), cement, ceramics & glass (+6), precision machinery (+4), chemicals (+4) and transport equipment (+3).

The firms that chose “increase” or “decrease” were also asked about relevant factors. As factors behind expected increase (Figure 1-5), the largest number of manufacturers cited “demand trend,” while “others (scheduling factors, etc.)” has the biggest share in the non-manufacturing sector. In both sectors, however, other major factors include “supply trend” and “profit outlook.” As for factors behind expected decrease (Figure 1-6), “others (scheduling factors, etc.)” has the largest share in both the manufacturing and non-manufacturing sectors, followed by “demand trend” and “efforts for cutbacks on capital spending cost.” Among the top four factors behind expected decrease, there is still no need for pessimism about scheduling factors and efforts for cutbacks on capital spending cost,

as they do not directly indicate a deterioration of investor sentiment in the next fiscal year. Here again, capital spending will largely depend on demand trend and profit outlook, as they are cited as key factors behind both expected increase and decrease.

Looking at factors behind expected increase in major industries, “demand trend” has a substantial share in electric machinery (74%), transport equipment (74%), general machinery (62%) and cement, ceramics & glass (60%). A high percentage of firms cite “others (scheduling factors, etc.)” in electric power & gas (75%) and telecommunications & information (55%), while “supply trend” has a large share in transport equipment (47%) and cement, ceramics & glass (40%). As regards factors behind expected decrease, “others (scheduling factors, etc.)” “demand trend” and “efforts for cutbacks on capital spending cost” have a significant share in food & beverages (64%), general machinery (40%) and “other” manufacturing industries (38%), respectively.

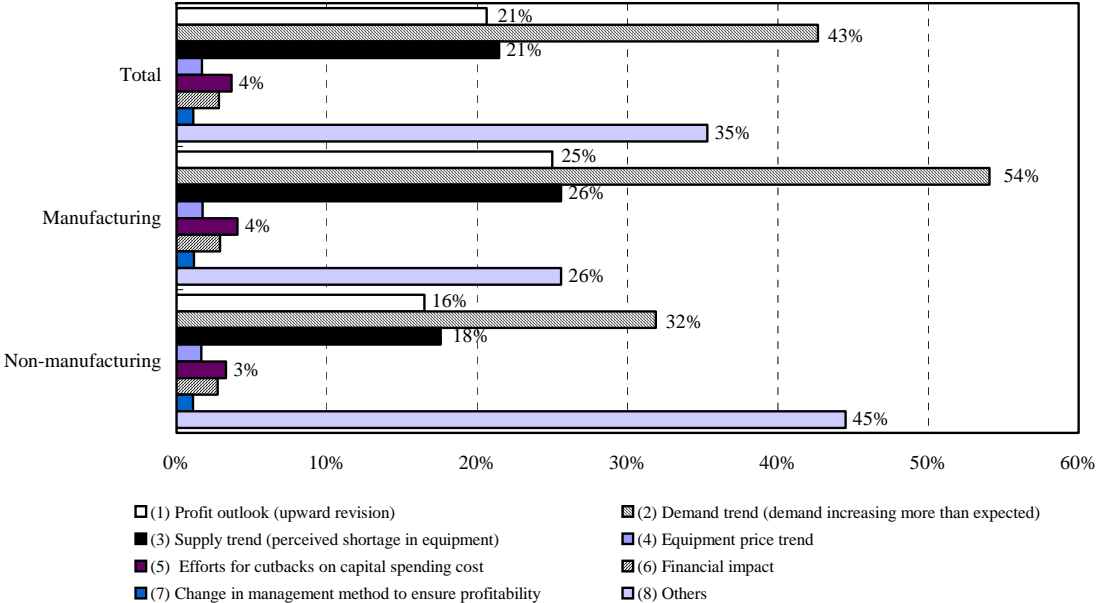


Figure 1-5. Factors Behind Expected Increase

Note: Since multiple choices are allowed, figures for individual items do not add up to the total.

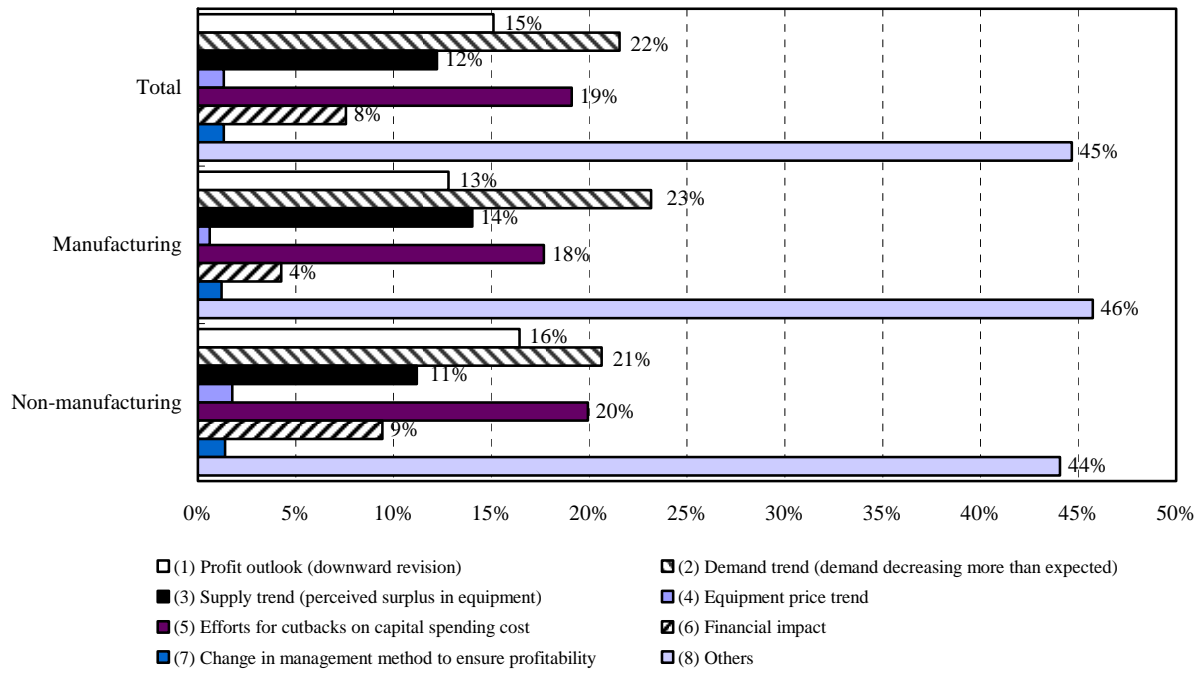


Figure 1-6. Factors Behind Expected Decrease

Note: Since multiple choices are allowed, figures for individual items do not add up to the total.

2. Decision-Making on Capital Spending

(Questions asked)

II. Decision-making on capital spending	
Q4 In making decisions on individual investment projects, you	
1. give priority to those with higher quantitative values (rate of return, payback period, etc.) in principle.	<input type="text"/>
2. also seriously consider unquantifiable factors (qualitative values).	
Q5 As quantitative indicators, you give the highest priority to (choose one or two items):	
1. payback period 2. internal rate of return (IRR) 3. net present value (NPV)	<input type="text"/>
4. return on investment (ROI)	<input type="text"/>
5. Others (please specify) _____	<input type="text"/>

(1) Rationale for decision-making on individual investment projects

Asked about the extent to which quantitative evaluation forms the basis of decision-making on investment projects (Figure 2-1), the majority of firms (56%) responded that investment projects with higher quantitative values are given priority. Although they exceed the firms that also seriously consider quantitative factors, their share

fell about 10% in both sectors on two years earlier, when a similar survey was conducted. This implies that the recovery in corporate profits is spurring investments that are not directly linked to short-term profit, such as strategic long-term investments (in new businesses, new products and R&D) and investments for environmental conservation.

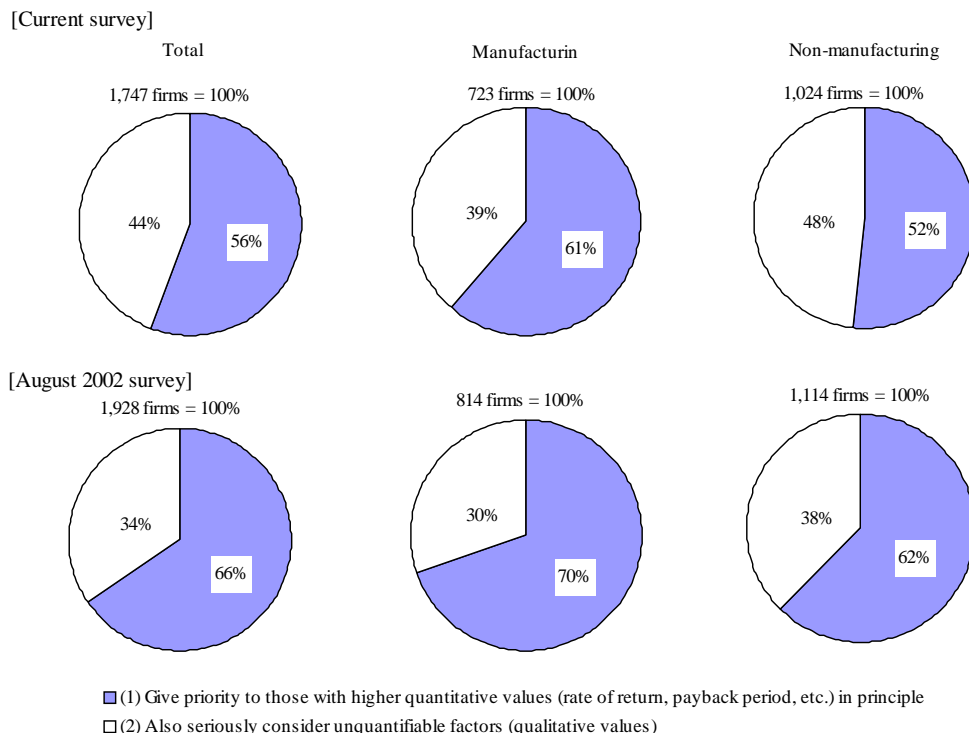


Figure 2-1. In Making Decisions on Individual Investment Projects (On-Going Survey)

By sector, both the current and previous surveys indicate that the percentage of firms giving priority to quantitative evaluation is almost 10% higher in manufacturing than in non-manufacturing, mainly because qualitative evaluation is seriously considered by many non-manufacturers in transportation, electric power & gas and telecommunications & information industries. This may be because firms in those industries often invest, out of public interest, in projects that are not necessarily profitable.

By industry, firms that give priority to quantitative evaluation represent the largest majority in petroleum (86%), followed by iron & steel (84%), leasing (78%), “other” manufacturing (78%), pulp & paper (68%), textiles (68%), transport equipment (67%) and electric machinery (66%).

(2) Preferred quantitative indicators

Asked about the most important indicator in making quantitative assessment of investments (Figure 2-2), 71% of firms cited “payback period,” which is almost the same percentage as recorded in the previous survey two years ago (70%). Thus, corporate investment is still oriented toward certainty. The share of firms citing “return on investment (ROI)” declined from the previous survey to about one third (33%). Although “internal rate of return (IRR)” and “net

present value (NPV)” increased their shares from the previous survey, they only stand at 24% and 12% respectively. This finding is opposite to that expected from finance theory, according to which the share of NPV should be largest. Several factors may explain this:

- As the business environment becomes increasingly uncertain, firms are first and foremost required to make sure that invested capital will be recovered in the short term.
- It is impractical to assess investment profitability with NPV due to technical difficulties involved in making estimates, etc.
- Payback period, a commonly used indicator, is much easier to understand than NPV.

The result shows no significant difference between the manufacturing and non-manufacturing sectors. By industry, the leasing industry has the lowest percentage of firms citing payback period (55%), followed by construction (62%) and non-ferrous metals (64%). The share of ROI is largest in pulp & paper (57%), followed by wholesale & retail (47%), non-ferrous metals (43%), electric machinery (43%) and transport equipment (41%). The shares of IRR and NPV are small in every industry, with 30+% shares only observed in petroleum (IRR: 41%, NPV: 36%), non-ferrous metals (IRR: 36%), leasing (IRR: 36%), services (IRR: 34%) and precision machinery (IRR: 30%).

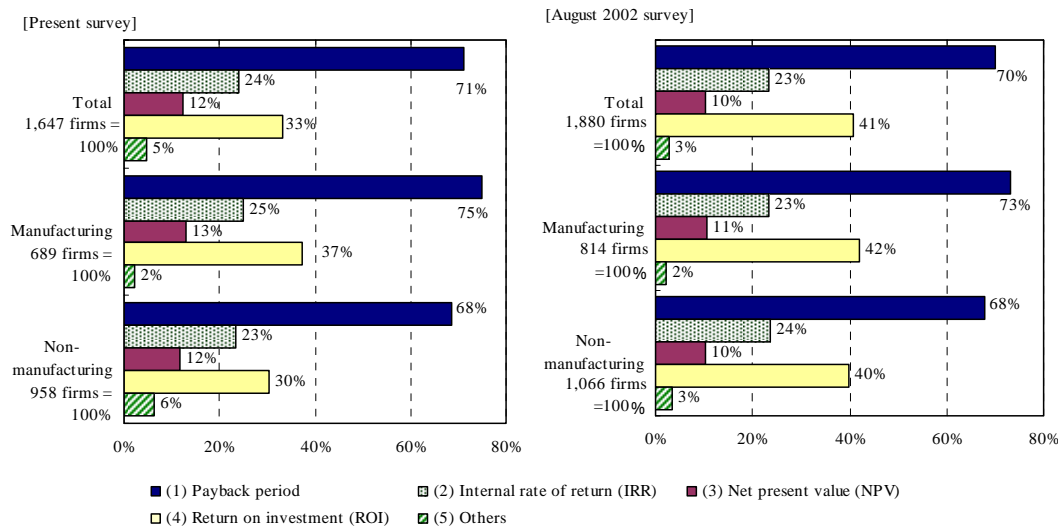


Figure 2-2. Preferred Quantitative Indicators

Note: Since multiple choices are allowed, figures for individual items do not add up to the total.

3. Retirement and Vintage of Equipment

(Questions asked)

<p>III. Retirement and vintage of equipment</p> <p>Q6 In the last two or three years, your attitude toward retirement (including disposal) of equipment has:</p> <p>1. become more active. 2. changed little. 3. become less active.</p>		<input type="text"/>
<p>Q7 [For those who chose <u>1</u> in Q6] What is (are) the reason(s) for active retirement (including disposal) of equipment (choose one or two items)?</p> <p>1. Active renewal of existing equipment has necessitated the disposal of older (aging) assets.</p> <p>2. Improved profit has allowed extraordinary loss to be accounted for.</p> <p>3. Surplus in equipment has been perceived in the business due to reduced demand.</p> <p>4. In the process of business selection and concentration, withdrawal from a business has made some equipment unnecessary.</p> <p>5. Perceived redundancy emerged in equipment as a result of merger, etc.</p> <p>6. Equipment has been retired as part of asset liquidation (sale to a SPC, leaseback, etc.).</p> <p>7. Trading market has developed for secondhand assets.</p> <p>8. Others (please specify) _____</p>		<input type="text"/> <input type="text"/>
<p>Q8 In the last 12 months, the vintage of equipment in your major domestic plants has:</p> <p>1. aged. 2. changed little. 3. rejuvenated.</p>		
<p>Q9 In light of investment-related costs, demerits of narrowing the focus of investment, etc., the vintage of equipment in major domestic plants:</p> <p>1. needs to be rejuvenated. 2. should stay at the current level.</p> <p>3. may be allowed to age a little further.</p>		<input type="text"/>

(1) Attitude towards equipment retirement
 Statistical data in the Gross Capital Stock of Private Enterprises indicates an acceleration of equipment retirement (including disposal) in recent years. The retirement rate was particularly high in FY2003, with the value of retirement exceeding the amount of new investment in the manufacturing sector. In this context, the present survey asked some questions about the change in corporate attitude towards equipment retirement in the last two or three years (Figure 3-1). Almost 20% of the firms (19% to be exact) have become more active in equipment retirement, exceeding by almost 10% the number of firms that have become less active. This trend is more pronounced in the manufacturing sector. By industry, the share of “more active” firms is significant in iron & steel (41%), non-ferrous metals (30%), cement, ceramics & glass (27%) and textiles (25%).

The “more active” firms were also asked about the factors behind such accelerated equipment retirement (Figure 3-2). The principal factor turned out to be “active renewal of existing equipment,” which is cited by almost half of the firms, followed by “business selection and concentration” (32%) and “improved profit” (19%), which has allowed recognition of losses resulting from retirement (disposal). “Perceived redundancy in equipment resulting from merger, etc.” is also a significant factor in manufacturing, whereas a considerable number of non-manufacturers have accelerated equipment retirement “as part of asset liquidation.” These findings imply that firms are disposing of unnecessary assets in the process of reconstructing their business portfolio, while consolidating the basis of their competitiveness by accelerating equipment renewal in core businesses. By industry, a substantial number of firms cited “active

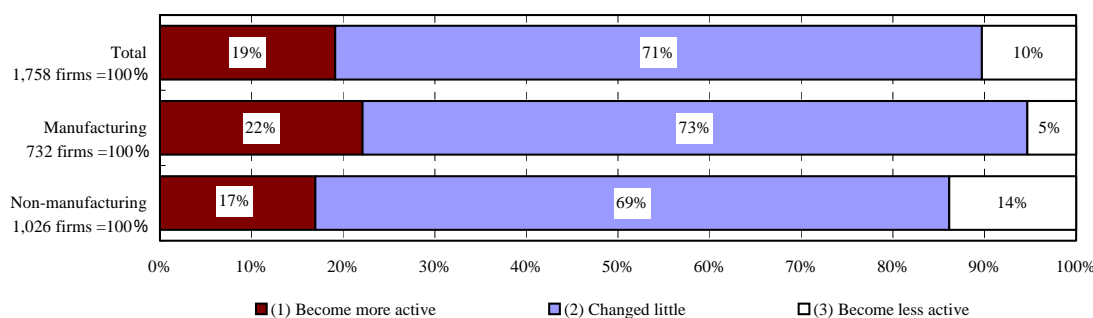


Figure 3-1. In the Last Two or Three Years, Attitude Towards Equipment Retirement (including disposal) has:

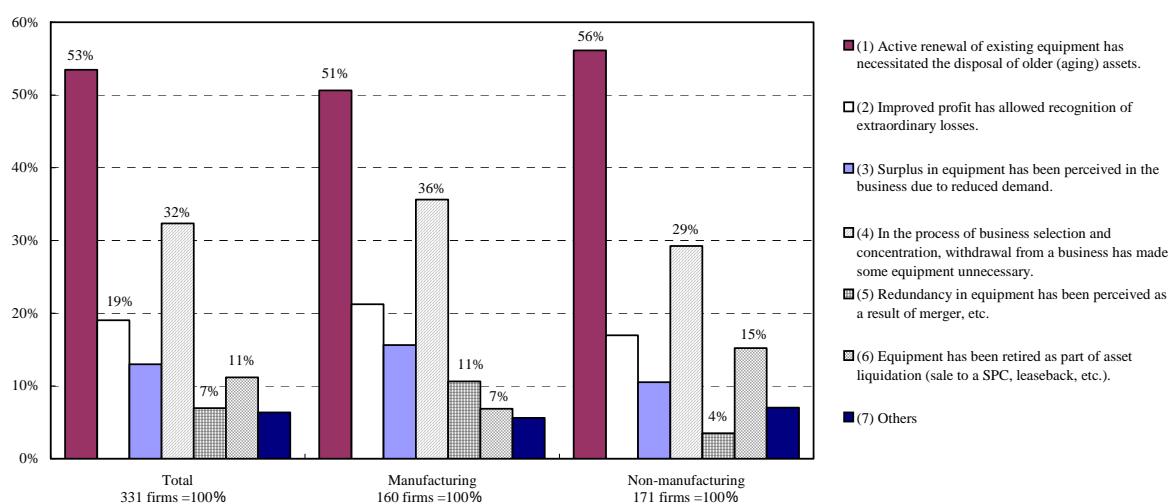


Figure 3-2. Reasons for Accelerated Retirement of Equipment

Notes: 1. Since multiple choices are allowed, figures for individual items do not add up to the total.
 2. “(7) Others” represents the total of the responses “trading market has developed for secondhand assets” and “others.”

renewal of existing equipment” in food and beverages (79%), transport equipment (75%) and general machinery (75%). “Improved profit” has a large share in iron & steel (50%), while “selection and concentration” was most often cited in iron & steel (57%), chemicals (56%), wholesale & retail (44%), construction (43%) and electric machinery (38%). “Asset liquidation” is a popular choice in real estate (28%), construction (22%) and telecommunications & information (19%).

(2) Vintage of equipment

The vintage (average age) of manufacturing equipment based on the FIFO method increased

constantly from 1991, but turned downwards in 2003.⁴ In this context, the survey asked about the change in the vintage of equipment in major domestic plants in the last 12 months (Figure

⁴ In most cases, equipment age as of 1970 in the National Wealth Survey of the former Economic Planning Agency is combined with relevant data in the Gross Capital Stock of Private Enterprises published by the Cabinet Office to calculate the vintage of equipment (i.e. the number of years elapsed since 1970). However, the result of the estimation depends on the method employed, as the benchmark method assumes average retirement for both old and new equipment, while the FIFO method assumes that the oldest equipment is retired first (see DBJ, “Monthly Topics,” No. 078 (Japanese only) for the vintage of manufacturing equipment based on the benchmark method).

3-3). More firms reported “aging” (28%) rather than “rejuvenation” (11%). No marked difference is observed between the manufacturing and non-manufacturing sectors. By industry, the share of “aging” is largest in petroleum (57%), cement, ceramics & glass (45%), textiles (39%) and iron & steel (36%). A considerable percentage of firms reported “rejuvenation” in transport equipment (21%), leasing (20%) and electric machinery (16%).

As regards the optimal level of vintage (Figure 3-4), the majority of firms (58%) consider the current level of vintage as appropriate for major domestic plants. The percentage of

firms planning to rejuvenate their equipment (21%) is almost the same as that which are allowing for further aging (21%). Thus, capital spending is unlikely to experience short-term fluctuation from the vintage perspective. By industry, firms planning to rejuvenate equipment have a considerable share in iron & steel (34%), “other” manufacturing (29%), textiles (29%), general machinery (28%), real estate (28%), food & beverages (27%) and transport equipment (26%), while those allowing for further aging account for a substantial percentage in petroleum (52%), construction (35%), electric power & gas (34%) and cement, ceramics & glass (31%).

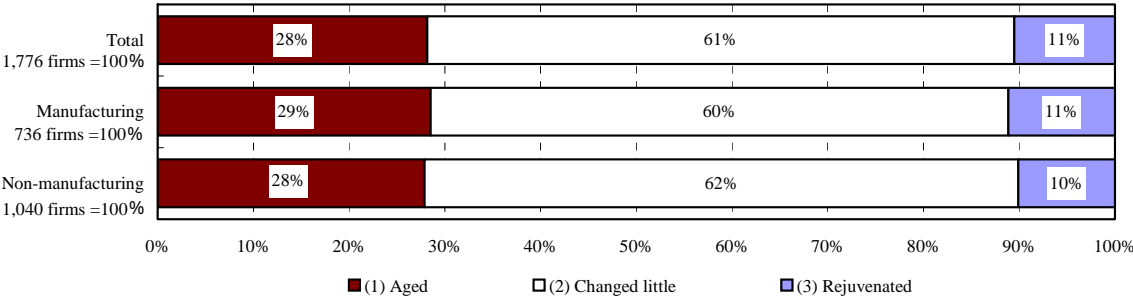


Figure 3-3. Equipment Vintage in Major Domestic Plants in the Last 12 Months:

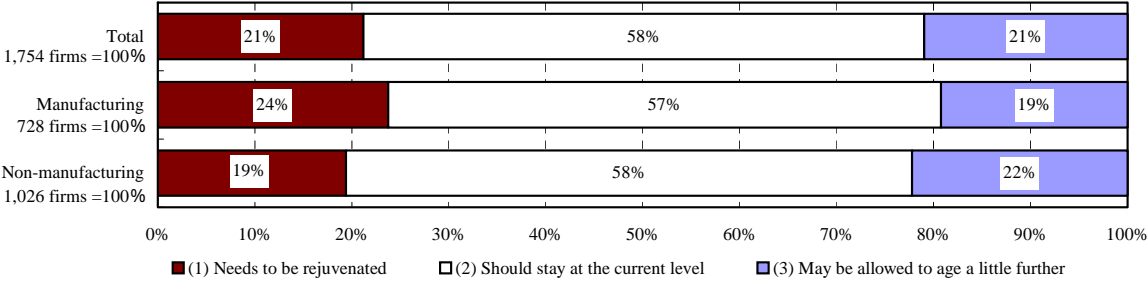


Figure 3-4. In light of Investment-Related Costs, Demerits of Narrowing the Focus of Investment, etc., the Vintage of Equipment in Major Domestic Plants:

4. Relationship between Overseas and Domestic Capital Spending

(Questions asked)

IV. Relationship between overseas and domestic capital spending		Overseas	<input type="checkbox"/>	<input type="checkbox"/>
Q10 As compared with the current level, overseas and domestic spending in the medium term (in three years or so) will:		Domestic	<input type="checkbox"/>	<input type="checkbox"/>
1. increase. 2. stay on a par. 3. decrease.				
Q11 What are the purposes of overseas capital spending? (With regard to major products, please choose one or two items for each region.)				
1. To develop facilities for production in consuming areas	North America	<input type="checkbox"/>	<input type="checkbox"/>	
2. To develop facilities for export to third countries (outside the region)	Europe	<input type="checkbox"/>	<input type="checkbox"/>	
3. To develop facilities for re-export to Japan	China	<input type="checkbox"/>	<input type="checkbox"/>	
4. To develop R&D facilities	Asia excluding China	<input type="checkbox"/>	<input type="checkbox"/>	
5. To develop sales facilities	Other regions	<input type="checkbox"/>	<input type="checkbox"/>	
6. Others (please specify) _____				
Q12 As regards domestic capital spending (on new plants), which factors receive priority in selecting locations? (Please choose up to three items.)				
1. Easy access to transportation network				
2. Local resources (e.g. available sites, labor force)				
3. Proximity to existing facilities				
4. Demand for goods and services in the area				
5. Official support from central and local governments				
6. Partnership with a local academic institution				
7. Availability of support services				<input type="checkbox"/>
8. Quality residential environment				<input type="checkbox"/>
9. Others (please specify) _____				<input type="checkbox"/>

(1) Medium-term domestic and overseas capital spending: possible “re-industrialization”

Although some argue for “re-industrialization” (bringing industrial activities back to Japan) in the manufacturing sector, the long-term trend in domestic and overseas capital spending of manufacturers has rarely shown a substitutive movement, i.e. one increasing to the detriment of the other. Thus, the manufacturing sector as a whole has not really experienced “de-industrialization” or “re-industrialization,” even though there may have been some specific cases. Indeed, an increase in overseas production has never resulted in a matching decrease in domestic production. Rather, a complementary relationship has been observed between domestic and overseas production, with the increase in the latter stimulating exports of capital goods, parts

and other manufactured products.⁵

In order to examine the sustainability of this pattern in the years ahead, the survey asked whether capital spending will increase or decrease in the medium term (in three years or so) (Figure 4-1). 85% of the firms intend to maintain or increase domestic capital spending, with more firms envisaging an increase (22%) rather than a decrease (15%). As regards overseas capital spending, 94% of the firms will increase investment. Particularly in the manufacturing sector, more firms envisage an increase rather than a decrease in both Japan and overseas, as half of the manufacturers (50%) responded that they will increase overseas capital spending. By manufacturing industry, the number of firms expecting an increase exceeds that envisaging a decrease by more than 10 percentage points in iron & steel

⁵ See DBJ, “Monthly Topics,” No. 079 (Japanese only).

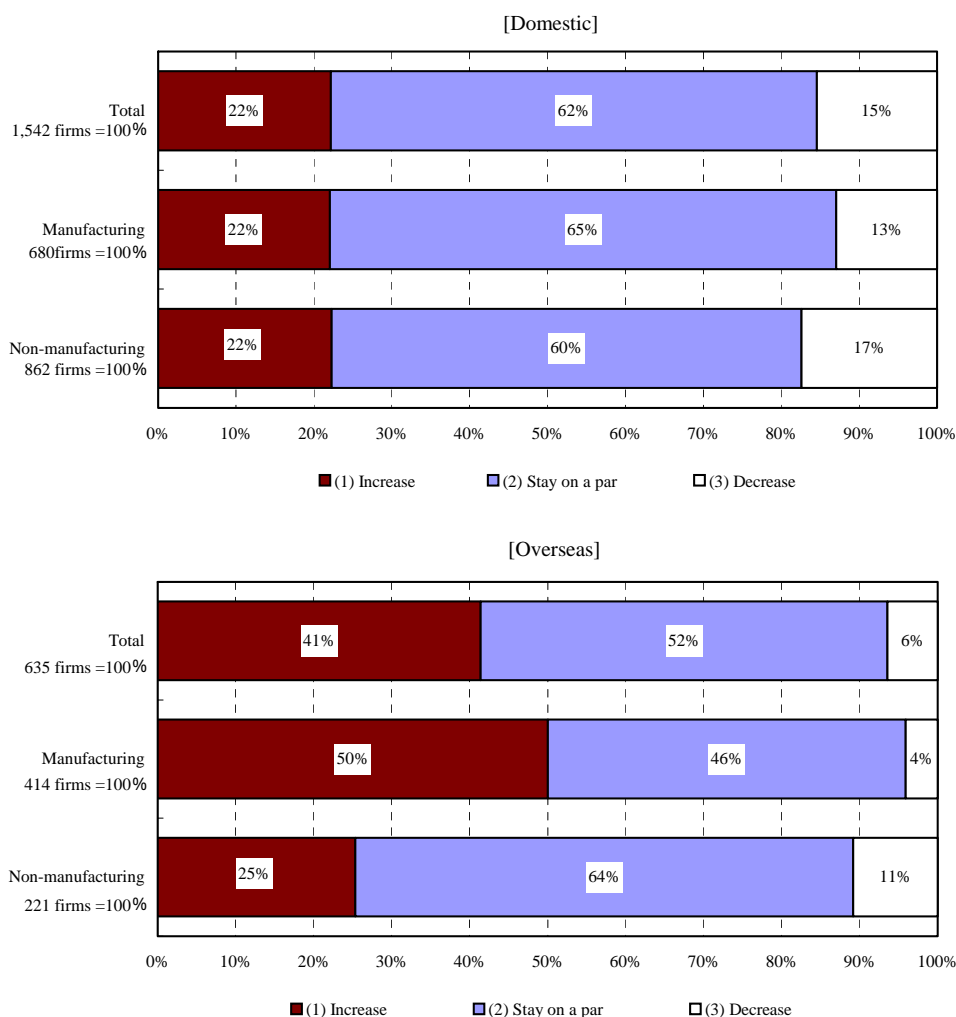


Figure 4-1. As Compared with the Current Level, Medium-term Capital Spending will:

(35% envisaging an increase and 3% envisaging a decrease), food & beverages (26% and 6% respectively), pulp & paper (21% and 5%), electric machinery (22% and 8%), transport equipment (28% and 16%) and general machinery (21% and 10%).

The relationship between overseas and domestic capital spending can be identified by focusing on the 405 manufacturers that responded to questions regarding both categories of capital spending (Figure 4-2). Over 80% of the firms that plan to increase capital spending overseas are considering increasing or maintaining domestic spending. Likewise, most of the firms that expect to increase domestic capital spending will maintain or increase spending overseas. Thus, there is almost no trade-off between domestic

and overseas capital spending. The result shows little difference between the materials and processing & assembly sub-sectors⁶. These findings imply that the traditional complementary relationship between domestic and overseas capital spending is likely to hold steady in the medium term.

It is nonetheless true that an increasing number of domestic plants have been constructed or expanded recently. The DBJ survey conducted

⁶ The two sub-sectors are defined as follows.

- Materials: textiles, pulp & paper, chemicals, cement, ceramics & glass, iron & steel, non-ferrous metals.
- Processing & assembly: food & beverages, general machinery, electric machinery, precision machinery, transport equipment, other manufacturing (printing & publishing, rubber, metal products, others).

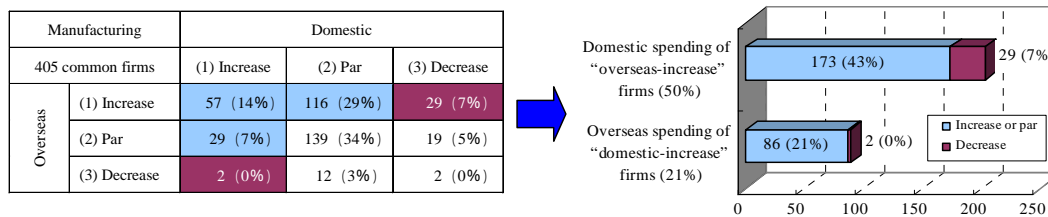


Figure 4-2. Relationship between Domestic and Overseas Capital Spending (Manufacturing)

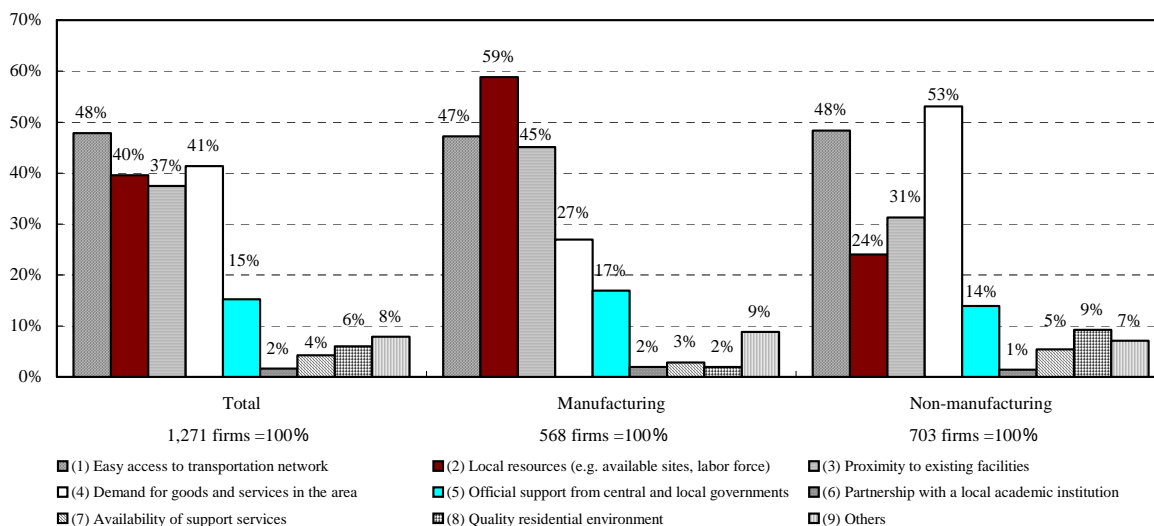


Figure 4-3. As Regards Domestic Capital Spending (on New Plants), which Factors Receive Priority in Selecting Locations?

Note: Since multiple choices are allowed, figures for individual items do not add up to 100%.

in June 2004 found that planned domestic capital spending for FY2004 (initial plan) grew faster (up 16.8%) than overseas spending (up 7.8%), pointing to the relative briskness of domestic investment. This result indicates the redefinition (renewed recognition) of domestic production in the process of building an optimal complementary relationship, rather than active movement toward re-industrialization.⁷

⁷ Bearing in mind that a simplified argument might be misleading, active domestic investment as part of “redefinition” is observed in three types of business, which are oriented towards (1) the integration of development and production, (2) the pursuit of scale and concentration merits, and (3) location in consuming areas. In practice, the optimal complementary relationship varies according to the industry or firm. Furthermore, the optimal solution changes with business environment. No simple dichotomy is assumed, such as high-end products for domestic facilities and lower-end products for overseas facilities.

(2) Factors in selecting locations for domestic new plants

Asked about major factors considered in selecting locations for domestic new plants (Figure 4-3), most of the manufacturers (59%) cited “local resources (available sites, labor force, etc.), but the majority of non-manufacturers (53%) cited “demand for goods and services in the area.” Thus, the survey found that manufacturers emphasize resources (available sites, labor force, etc.) while non-manufacturers attach more importance to market (demand). “Easy access” and “proximity to existing facilities” are valued by manufacturers and non-manufacturers alike. A considerable number of firms also consider the availability of official support from “central and local governments.”

(3) Purposes of overseas capital spending

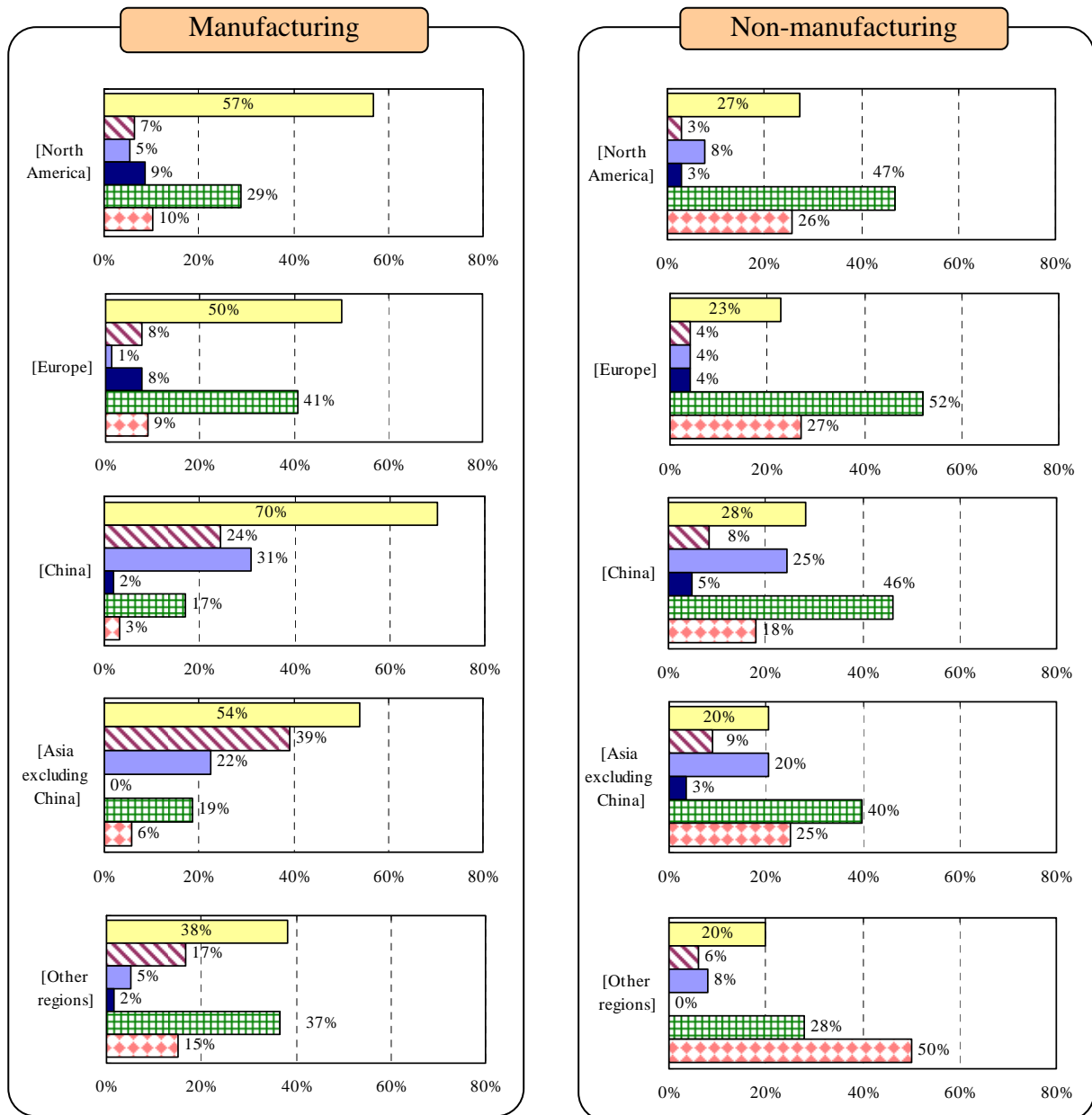
Asked about the purposes of overseas capital spending (Figure 4-4), most manufacturers cited “production in consuming areas” for all regions of the world excluding “other” regions. The result indicates that many firms adopt the policy of “producing where demand exists.” Other purposes vary among regions. Indeed, more firms cited “development of sales and R&D facilities” for North America and Europe than for Asia, while “development of production facilities for export to third countries and Japan” is more important in Asia than in North America and Europe. Particularly in China, more investment is aimed at re-export to Japan rather than export to third countries, pointing to the importance of China in terms of developing local markets and re-exporting to Japan. In contrast, investment purposes do not vary significantly among regions in the non-manufacturing sector. Due to their business characteristics, most non-manufacturers cited “development of sales facilities” for all regions of the world.

A comparison between the two manufacturing sub-sectors (Figure 4-5) indicates that a higher percentage of materials firms cited “development of facilities for production in consuming areas” for every region, while export to Japan and third countries is a more important investment purpose in Asia for processing & assembly firms. This result shows that overseas capital spending in the materials sub-sector is focused on constructing local production facilities to meet the needs of Japanese affiliates already operating in the region. Although production in consuming areas is also the primary purpose of overseas investment in the processing & assembly sub-sector, many firms envisage export to third countries and Japan, as required by their product characteristics.

Focusing on investment of Japanese manufacturers in Asia, more firms cite “export to third countries” than “re-export” to Japan for Asia excluding China. However, the order is reversed for China (although the shares are identical in the materials sub-sector). This may be explained by the timing of initial investment. Many of the production facilities in ASEAN countries have reached a sufficient technological level to be able to supply (final) products to the world market. By comparison, it seems that most plants in China have not reached that level (for example, producing finished goods for local markets while only implementing part of the production process (using cheap labor) for goods sold in Japan).

By industry, the following results were obtained for the manufacturing sector.

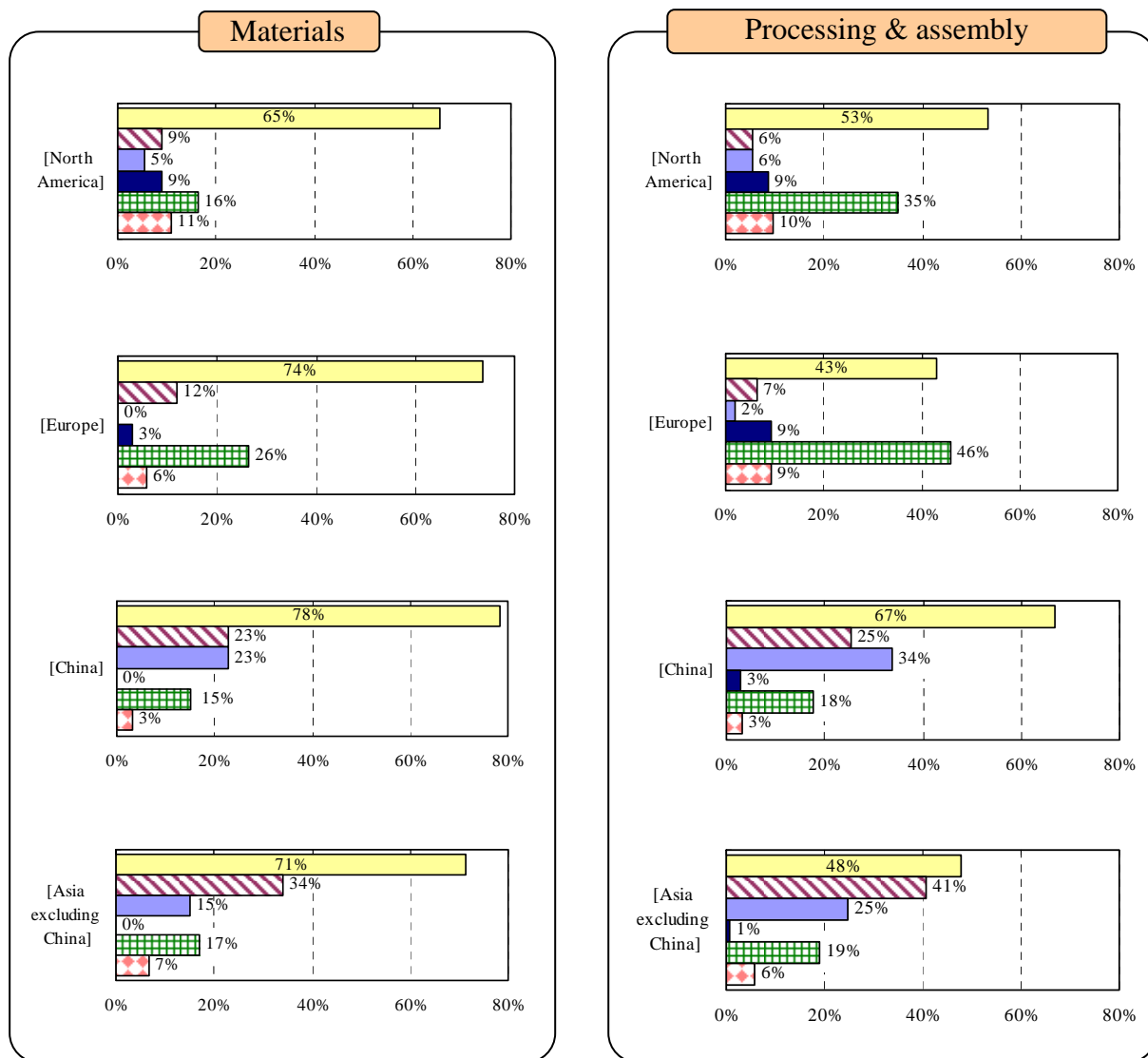
- “R&D” was cited most often in chemicals (19%) and precision machinery (18%) for North America, and in transport equipment (20%) for Europe.
- For China, a substantial share of “re-export to Japan” is observed in textiles (62%), food & beverages (53%), electric machinery (45%) and other manufacturing (42%), while the share of “export to third countries” is important in electric machinery (40%), cement, ceramics & glass (40%), textiles (38%) and precision machinery (33%).
- For Asia excluding China, “export to third countries” has a substantial share in cement, ceramics & glass (55%), electric machinery (50%), precision machinery (50%) and other manufacturing (50%). “Re-export to Japan” is an important investment purpose in “other” manufacturing (40%) and electric machinery (34%).



(1) Development of facilities for production in consuming areas (within the region)
 (2) Development of facilities for export to third countries (outside the region)
 (3) Development of facilities for re-export to Japan
 (4) Development of R&D facilities
 (5) Development of sales facilities
 (6) Others

Figure 4-4. Purposes of Overseas Capital Spending in Manufacturing Sector

Note: Since multiple choices are allowed, figures for individual items do not add up to 100%.



**Figure 4-5. Purposes of Overseas Capital Spending
(Comparison between Materials and Processing & Assembly Sub-Sectors)**

- Notes: 1. Since multiple choices are allowed, figures for individual items do not add up to 100%.
 2. Materials: textiles, pulp & paper, chemicals, cement, ceramics & glass, iron & steel, non-ferrous metals
 Processing & assembly: food & beverages, general machinery, electric machinery, precision machinery, transport equipment, other manufacturing (printing & publishing, rubber, metal products, others)

5. Conditions of Financial Activities

(Questions asked)

V. Conditions of financial activities	
Q13 In your company, interest-bearing liabilities:	
1. are reduced in the current fiscal year and will continue to be reduced in the years ahead.	
2. are expected to decline to optimum levels and reduction will not be necessary in the years ahead.	
3. have already reached optimal levels and do not need to be reduced.	
4. Others (please specify) _____	<input type="text"/>
Q14 [For those choosing 1 in Q13] What is the reason for the reduction in interest-bearing liabilities?	
1. Investment projects are narrowed, with priority given to reducing interest-bearing liabilities for improving financial position.	
2. Although desired investments have been made, high profitability overall has resulted in surplus funds, which are used for repayment of interest-bearing debts.	<input type="text"/>
Q15 When interest-bearing liabilities have declined to optimum levels, how do you plan to spend the money that has been used for reducing liabilities? (Please indicate the current situation if you have already achieved the objective.)	
1. Increase of domestic capital spending	
2. Increase of overseas investment (including investments and loans for affiliates and M&A)	
3. Domestic M&A	
4. Distribution to shareholders including through increased dividends and increased treasury stock	
5. Increase of financial assets	
6. Further reduction of interest-bearing liabilities	
7. Others (please specify) _____	<input type="text"/>
Q16 What do you think is the appropriate level of equity ratio to ensure a sound financial position?	
1. Under 20%	
2. 20-30%	
3. 30-40%	
4. 40-50%	
5. 50-60%	
6. Over 60%	
7. No particular benchmark defined	<input type="text"/>

(1) Reduction in interest-bearing liabilities

Figure 5-1 shows the attitude of firms regarding the reduction of interest-bearing liabilities. At present, 64% of the respondent firms are reducing interest-bearing liabilities, many of which (58% of the total) will continue to reduce them in the years ahead. The percentage of firms planning to continue reduction in the years ahead is higher in manufacturing than in non-manufac-

turing. By industry, a substantial percentage of manufacturers will continue reduction in material industries such as pulp & paper (86%), iron & steel (82%), cement, ceramics & glass (78%) and non-ferrous metals (74%). In the non-manufacturing sector, firms envisaging continued reduction have a large share in construction (66%) and electric power & gas (62%).

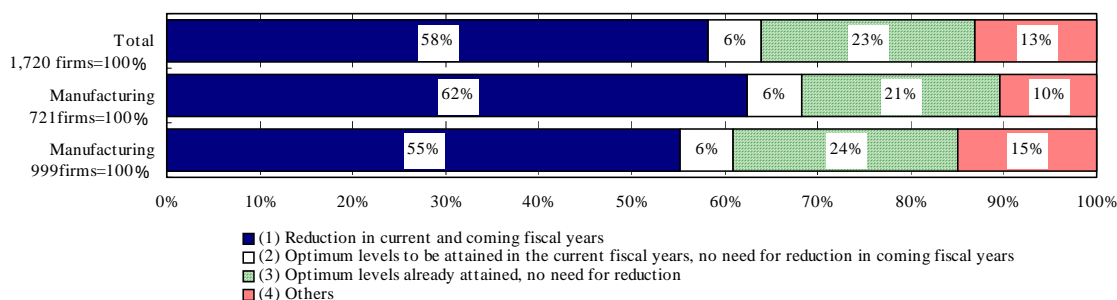


Figure 5-1. Attitude Toward Reducing Interest-Bearing Liabilities

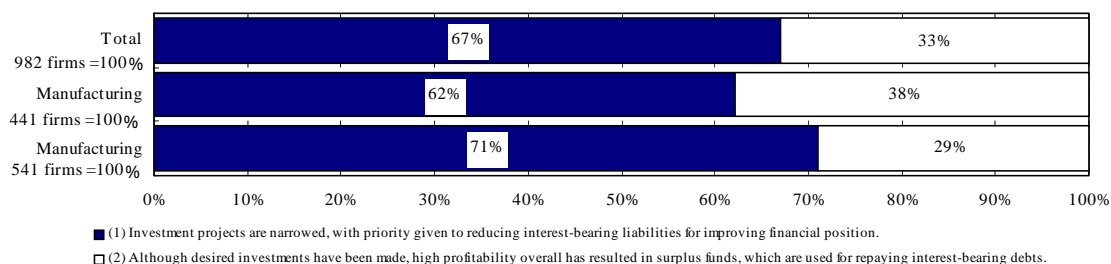


Figure 5-2. Reason for Reducing Interest-Bearing Liabilities

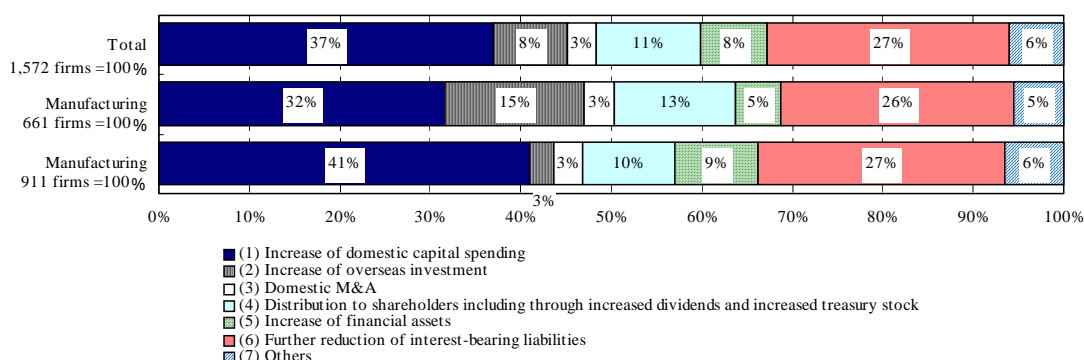


Figure 5-3. Use of Funds After Interest-Bearing Liabilities Have Declined to Optimum Levels

Asked about the reason for the reduction in interest-bearing liabilities (Figure 5-2), 67% of the firms planning to continue reduction responded that they are narrowing their investment projects, giving priority to reducing interest-bearing liabilities for improving their financial position. The trend indicates that firms are still selective, even though they have reached the stage of investment expansion. By industry, investment-selective firms that give priority to reducing interest-bearing liabilities account for a substantial share in manufacturing industries such as petroleum (82%), general machinery (78%), pulp & paper (74%) and non-ferrous metals (70%), as well as in non-manufacturing

industries including construction (89%), electric power & gas (78%) and transportation (77%). On the other hand, firms that are reducing interest-bearing liabilities due to financial surplus are largely concentrated in the manufacturing sector including precision machinery (54%), food & beverages (50%), transport equipment (49%) and chemicals (45%).

(2) Use of financial resources after completing reduction of interest-bearing liabilities
Firms were also asked how they will use the financial resources currently used for reducing interest-bearing liabilities when such liabilities have declined to optimum levels (Figure 5-3).

The result indicates that future trends in capital spending will depend on the progress in corporate efforts to reduce interest-bearing liabilities, as 37% of the firms responded that they will increase domestic capital spending when interest-bearing liabilities have declined to optimum levels. However, more than a quarter of the firms are still cautious about future risks, and intend to keep curtailing such liabilities even after they have fallen to reasonable levels.

Firms planning to redirect funds to domestic capital spending have a substantial share in textiles (40%), petroleum (38%), iron & steel (38%) and non-ferrous metals (38%) for manufacturing industries, as well as leasing (63%), services (53%), wholesale & retail (45%) and real estate (42%) for non-manufacturing industries. In contrast, many firms will continue to curtail interest-bearing debts in materials industries such as pulp & paper (52%), cement, ceramics & glass (41%) and iron & steel (34%) for manufacturing industries, as well as in electric power & gas (36%), transportation (36%), real estate (32%) and construction (32%) for non-manufacturing industries. A relatively high percentage of firms chose distribution to shareholders in petroleum (24%), chemicals (20%), precision machinery (21%) and construction (18%).

(3) Desired level of equity ratio

In order to see how long the reduction of interest-bearing liabilities will continue (i.e. what the optimum levels are for interest-bearing liabilities), the survey asked firms about the level of equity ratio that serves as a benchmark of sound financial position (Figure 5-4). The result shows that some 60% of the firms set a specific equity capital adequacy ratio as their target. The most popular choice turned out to be 50-60% among manufacturers and 30-40% among non-manufacturing firms. Based on this result, the simple average (calculated on the assumption that 25% represents the 20-30% range, 35% represents the 30-40% range and so on) stands at 47% for manufacturing, 44% for non-manufacturing and 45% for all industries (“under 20%” represented by 15% and “over 60%” represented by 65%). According to the Financial Statements Statistics of Corporations by Industry, the average equity ratio (weighted average) stood at 35% in FY2003 for large firms capitalized at ¥1 billion or more. In general, the benchmark ratio is higher in R&D-dependent industries (e.g. electric machinery) and lower in equipment-dependent industries such as leasing, electric power & gas, construction and real estate.

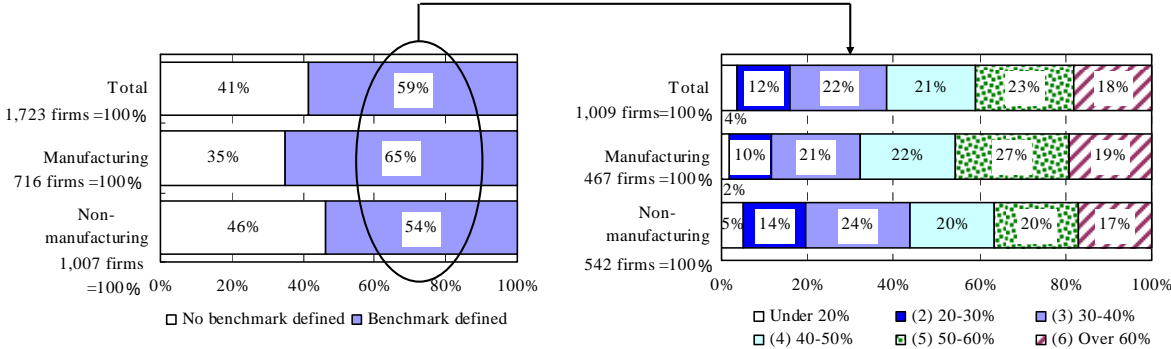


Figure 5-4. Equity Ratio Serving as a Benchmark of Sound Financial Position

6. Efforts for Innovation

In recent years, innovation has become increasingly important for firms to ensure sustained growth. Corporate innovation efforts should also be considered when predicting capital spending in the years ahead, as the current growth of spending is supported by investments in new products and technologies. In this context, the present survey also examined innovation efforts in the manufacturing sector⁸. Manufacturers

were asked questions about changes in product life cycles and underlying factors, as well as challenges facing firms at each stage of intellectual property creation and management, namely the method of budgetary control on R&D expenditure, indicators used for the measurement of R&D efficiency, attitude toward utilizing external resources and strategy on intellectual property (policy for utilization of intellectual property, management method, etc.) (Figure 6-1).

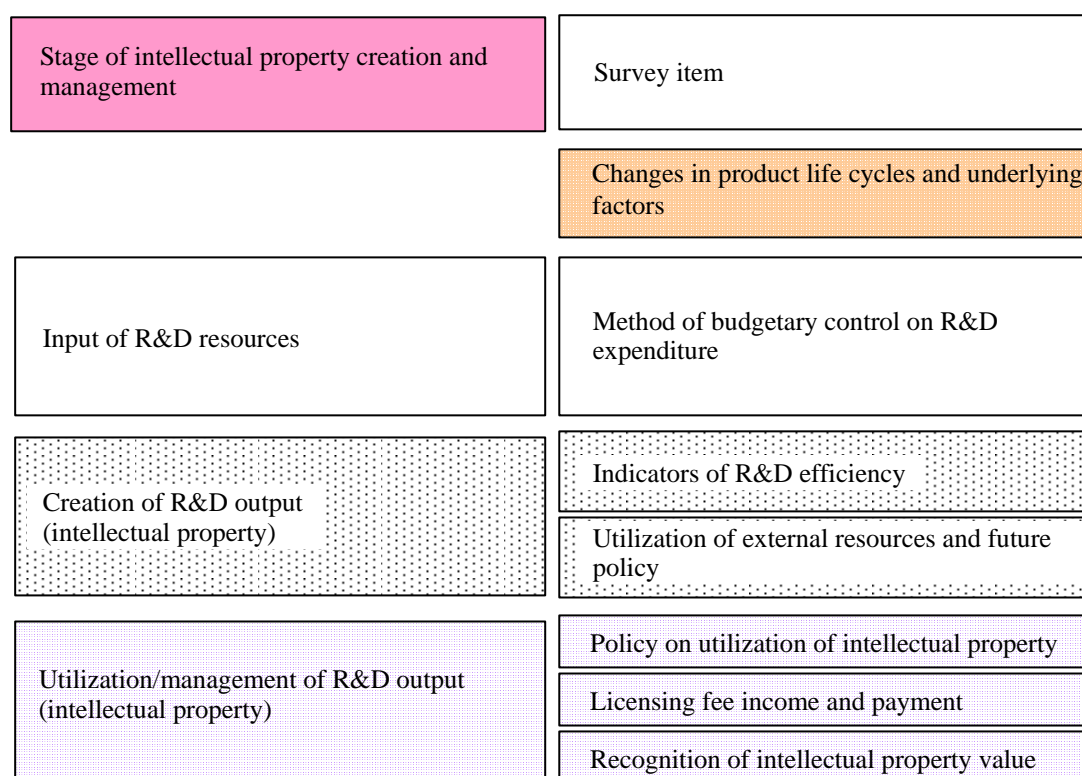


Figure 6-1. Survey Items by Stage of Intellectual Property Creation and Management

⁸ For the purpose of the present analysis, the manufacturing sector is further classified into the materials and processing & assembly sub-sectors, which are defined as follows.

- Materials: textiles, pulp & paper, chemicals, cement, ceramics & glass, iron & steel, non-ferrous metals.
- Processing & assembly: food & beverages, general machinery, electric machinery, precision machinery, transport equipment, other manufacturing (printing & publishing, rubber, metal products, others).

6.1 Changes in Product Life Cycles and Underlying Factors

(Questions asked)

VII. Innovation

Q19 In the last few years, life cycles (profit earning periods after marketing) of your products have:

1. become shorter. 2. become longer. 3. stayed almost unchanged.

Q20 [For those choosing 1 in Q19] What is the reason for the shortening of product life cycles?

1. Diversification of market needs

2. Intensified competition (e.g. increase of competitors due to globalization)

3. Catch-up facilitated by the use of IT

4. Unsatisfactory protection of intellectual property (impact of illegal copies overseas and counterfeits)

5. Intellectual property protected but based on easily circumvented patents

6. Others (please specify) _____

Asked about changes in product life cycles (in the last few years) (Figure 6-2), almost half of the firms consider that product life cycles have become shorter, with only 4% responding that they have become longer. Most of the firms reporting shortened life cycles cited diversified market needs and intensified competition as primary causes. The result indicates that timely marketing of new products that meet diversified market needs has become a major challenge, along with the development of original products that allow differentiation.

By industry, the share of firms reporting shortened product cycles is highest in food & beverages (67%), followed by electric machinery (65%) and textiles (54%) and lowest in petroleum (8%), followed by iron & steel (19%) and pulp & paper (29%). Thus, the shortening of product life cycles is more significant in industries producing end-use items.

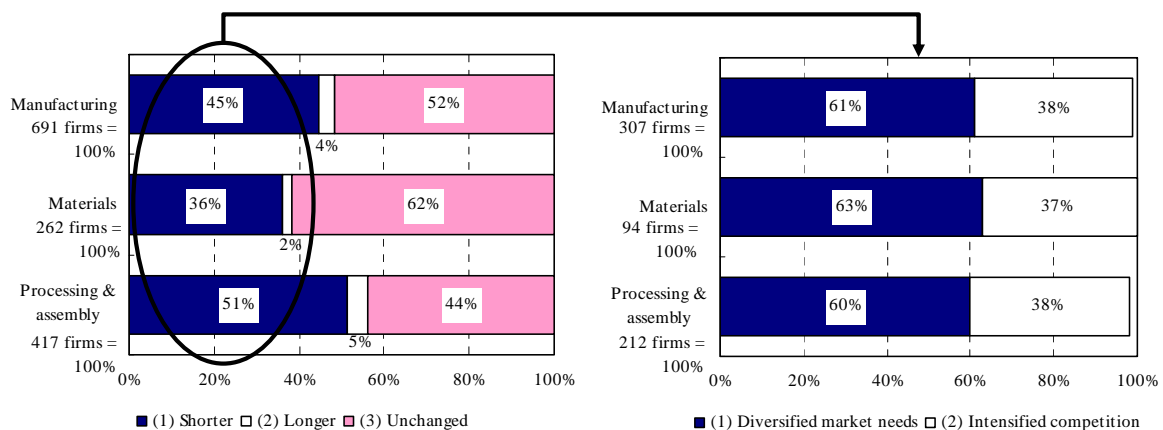


Figure 6-2. Changes in Product Life Cycles and Underlying Factors

6.2 Management of R&D Expenditure

(Questions asked)

VI. Management of R&D expenditure	
Q17 Budgetary control on R&D expenditure is based on:	
1. a certain percentage of sales.	
2. a certain portion of profits (linked to profit level).	
3. no particular indicator (scrutiny of individual projects only).	
4. Other indicators (please specify) _____	<input type="text"/>
Q18 What kind of indicator is used company-wide to measure R&D efficiency?	
1. Relationship between profits and R&D expenditure (e.g. operating profit in the recent five years/R&D expenditure in the preceding five years)	
2. Relationship between the number of patents and R&D expenditure (or R&D staff) (e.g. patent applications per person)	
3. Relationship between royalty income and R&D expenditure	
4. Other quantitative indicators (please specify) _____	<input type="text"/>
5. No quantitative indicator used	

(1) Budgetary control on R&D expenditure

Asked about budgetary control on R&D expenditure (Figure 6-3), only 40% of the firms responded that they manage the total R&D expenditure, which indicates that the majority of firms have not introduced total amount control. Many of the firms that manage the total R&D expenditure do so in terms of a certain percentage of sales, with less than 10% of the total using a certain portion of profit. The result shows no marked difference between the materials and processing & assembly sub-sectors. However, a certain portion of profit is used more often as an

indicator to manage the total R&D expenditure in processing & assembly industries such as electric machinery (14%) and precision machinery (12%). The finding that the majority of firms do not manage the total R&D expenditure may be because spending on R&D (particularly the development segment) in individual divisions tends to fluctuate at their discretion, as an increasing number of firms adopt the divisional form of organizational structure.

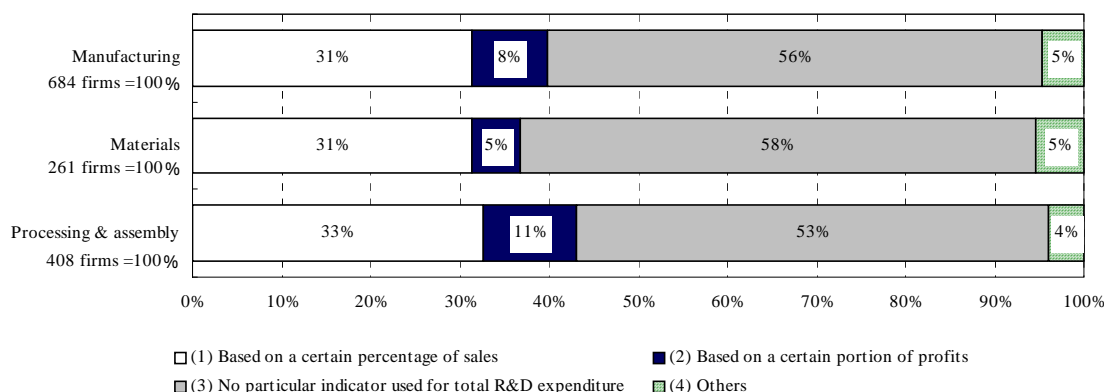


Figure 6-3. Budgetary Control on R&D Expenditure

(2) Efficiency of R&D

As regards indicators used for the measurement of R&D efficiency (Figure 6-4), the survey found that the majority of firms do not quantitatively evaluate efficiency, as only 42% of the firms said that they use some kind of indicator. Almost 80% of the firms that quantitatively evaluate efficiency (30% of the total) use the relationship between profits and R&D expenditure as an indicator. Other indicators include the relationships between R&D expenditure on the one hand, and the number of patents, royalty income (both listed in the questionnaire), the sales of new products (as an absolute amount or percentage of total sales) and the number of commercialized developments (as a percentage of the number of newly developed products or research themes) on the other. By industry, a significant percentage of firms (47%) cited the relationship between profits and R&D expenditure in electric machinery.

Japanese firms may have been able to conduct R&D activities from a sufficiently long-term perspective without worrying about their

efficiency. As mentioned earlier, however, the current business conditions including diversified market needs and intensified competition on a global scale will compel firms to pay far more attention to R&D efficiency, as they face mounting pressure to show improved performance, including through the disclosure of quarterly financial statements. Firms need to start by developing an appropriate indicator to measure efficiency, if they are to conduct more efficient R&D activities. Even firms using some kind of efficiency indicator should examine its relevance, to say nothing of those firms which do not make quantitative measurements at all. For example, the relationship between profits and R&D expenditure is influenced by changes in business environment (changing competitive advantage as against other companies, superiority or inferiority of the firm's own business model, etc.) as well as by R&D efficiency. Failure to distinguish between those two factors might lead to an erroneous judgment that R&D efficiency is declining, when actually it is not.

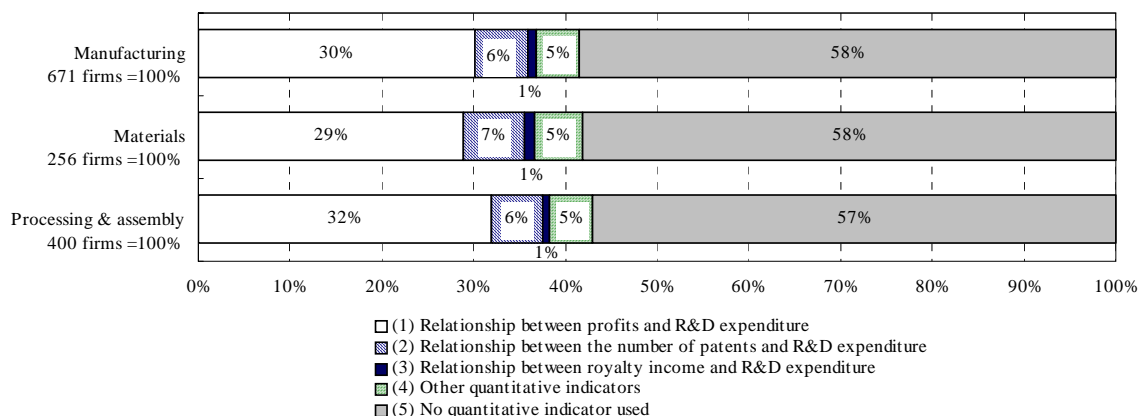


Figure 6-4. Measure of R&D Efficiency

6.3 Utilization of External Resources for New Business Development

(Question asked)

Q21 In developing new businesses, external resources are/will be (write a number in each box):			
1. utilized actively.		Present	Future
2. utilized somewhat.	Japanese universities		
3. utilized little.	Overseas universities		
	Public research institutions other than universities		
	Private corporations		
	Venture companies		

Cooperation with external entities is becoming increasingly important in the process of innovation. As life cycles shorten and the speed of innovation becomes more crucial, external cooperation may represent an effective time-saving measure. Also, the sources of innovation have been shifting from traditional industries and research areas to inter-industrial and interdisciplinary areas, making external cooperation an advantageous policy in terms of complementarity and business interface. In this context, the survey asked about the utilization of external resources for new business development (Figure 6-5). At present, 29% of the respondent firms actively utilize external resources in developing new businesses. Active partnership for new business development is expected to increase in the years ahead, as 36% of the firms plan to actively use external resources in the future. By industry, active partnership is observed in precision machinery (from 52% at present and 60% in the future), chemicals (38% and 49% respectively), electric machinery (35% and 38%), cement, ceramics & glass (34% and 45%) and iron & steel (30% and 40%). (Those industries represent the top four

both at present and in the future).

By category of partner (Figure 6-6), most firms report active cooperation with Japanese universities both at present (19%) and in the future (28%), followed by cooperation with private corporations and public research institutions. Only a few percent of the firms expect active partnerships with overseas universities or venture companies both now (about 3%) and in the future (6-7%). Since each firm cast only one “vote” regardless of its size, the result does not precisely reflect the flow of funds from large firms to external entities. Nonetheless, the finding indicates high expectations of Japanese firms for partnerships with domestic universities. Although the share of cooperation with overseas universities is generally low, it is still considerable in some industries including precision machinery (16%) and chemicals (7%). (40% of firms in those two industries have some kind of partnership with an overseas university including through “limited” cooperation.) It seems that cooperation with overseas universities is an attractive choice in those areas. The same is true for partnerships with venture companies, with relatively active

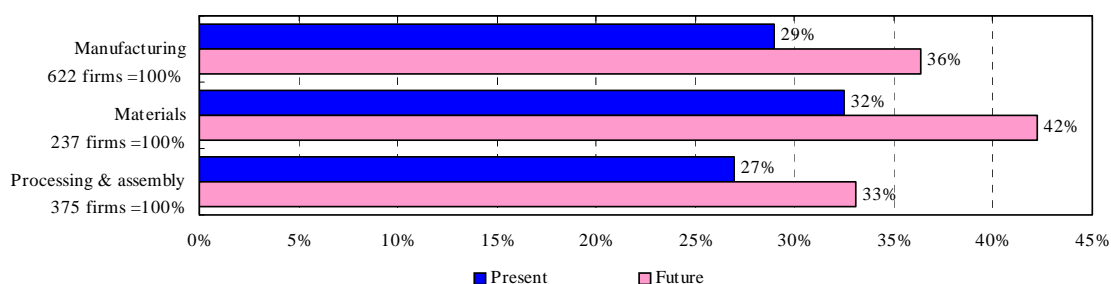


Figure 6-5. Share of Firms Reporting Active Utilization of Any External Resources for New Business Development

cooperation being envisaged in food & beverages (7% at present and 9% in the future), cement, ceramics & glass (4% and 9% respectively) and precision machinery (8% and 16%).

Figure 6-7 shows the change in the share of “active utilization” between the present and the future. Although the share increases for every

category of partner, the fastest growth of cooperation is expected with Japanese universities.

Thus, Japanese manufacturers are seeking to increase the speed and quality of product development through increasingly active partnership with other entities, as product life cycles shorten and the speed of R&D becomes more crucial.

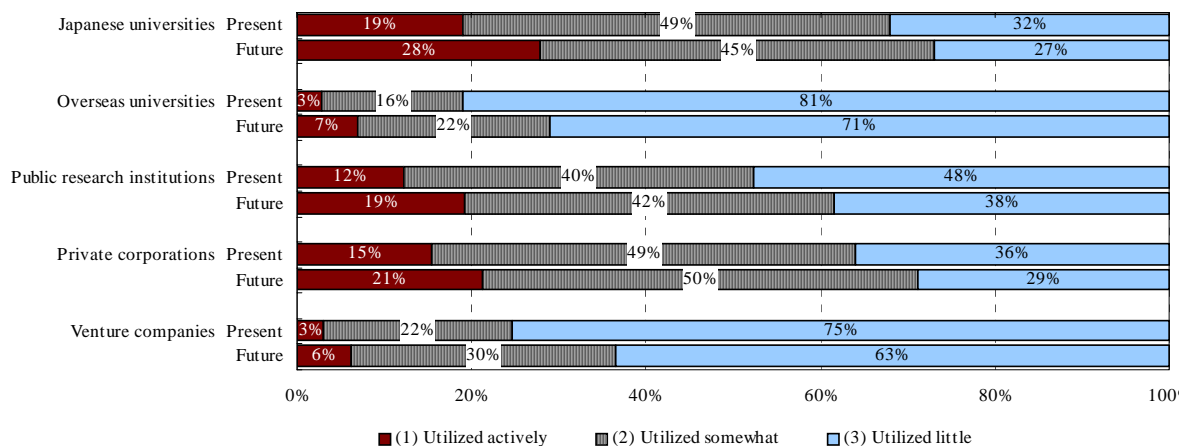


Figure 6-6. Utilization of External Resources for New Business Development (Planned)

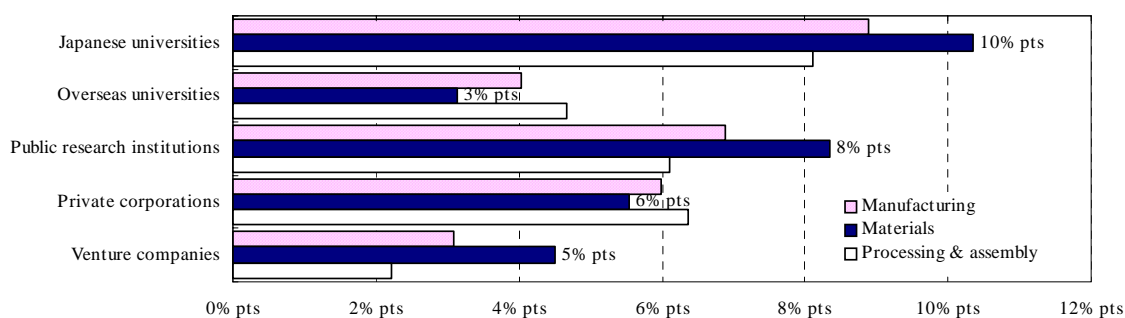


Figure 6-7. Change in the Share of Firms Reporting Active Utilization (Between Present and Future)

6.4 Strategy on Intellectual Property

(Questions asked)

VIII. Intellectual property		
Q22 Your intellectual property management will be centered on: (core technologies: please choose one or two items)		
1. increasing licensing fee income.	1 - 5 {	
2. active protection through patents.		
3. putting their technologies and know-how into a "black box."		
4. expansion of cross-licensing.		
5. effective use of external patents.		
(non-core technologies: please choose one or two items)		
6. gaining profits through disposal or licensing.	6 - 9 {	
7. using as assets for cross-licensing.		
8. commercialization in alliance with another firm.		
9. retaining for future purposes such as protecting property rights.		
Q23 What is the position of your licensing fee account (fee income – payment)?		
1. In the black		
2. In the red		
3. Mostly balanced		
4. No data available or no licensing contracts entered into		
Q24 To what extent do you recognize the value of your intellectual property (please choose one of the first four items and up to two of the last four items)?		
1. Individual management	1 - 4 {	
2. Business-unit-based management		
3. Company-wide management		
4. Not identified		
5. Identification of patent administration and maintenance cost		5 - 8 {
6. Management of aggregate total cost (including R&D expenditure and patent administration and maintenance cost)		
7. Management of license fee income		
8. Identification of the present value of future cash flow generated by new businesses using the patents		

(1) Intellectual property management policy

If the creation of intellectual property through quality R&D activities is one major pillar of corporate innovation, another pillar is the maximization of profits through effective use and management of intellectual property thus created. Asked about the main policies of intellectual property management (Figure 6-8), the highest percentage (69%) of the respondent firms cited active protection of core technologies through patents, while over 23% seek to increase licensing fee income. This trend is commonly observed

both in the materials and processing & assembly sub-sectors. Elsewhere, manufacturers in the materials sub-sector give priority to the effective use of external patents, while processing & assembly firms attach more importance to putting their technologies and know-how into a "black box."

Regarding non-core technologies (Figure 6-9), about half of the firms in both sub-sectors retain them for future purposes such as protecting property rights. Apparently, not many firms intend to use them actively for gaining profits.

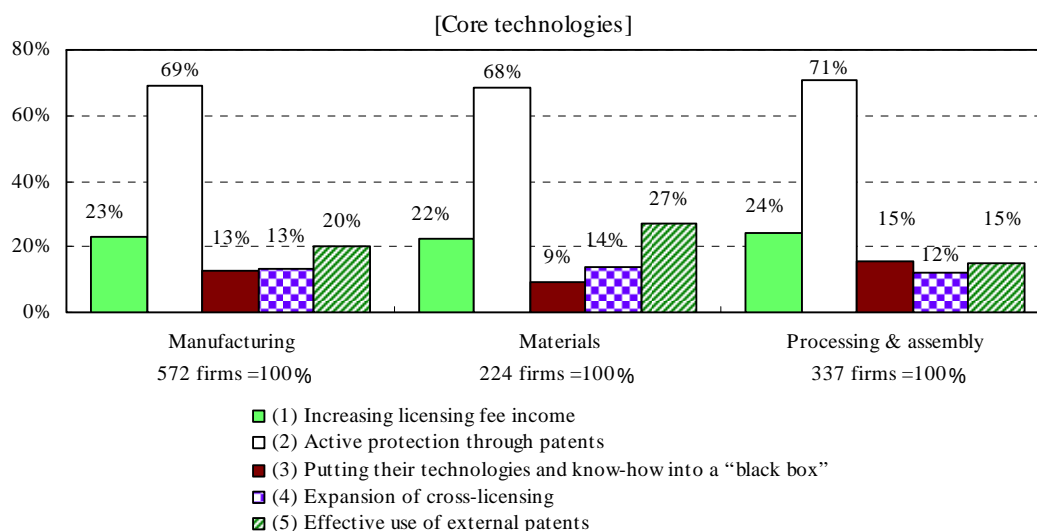


Figure 6-8. Intellectual Property Management will be Centered on:

Note: Since multiple choices are allowed, figures for individual items do not add up to 100%.

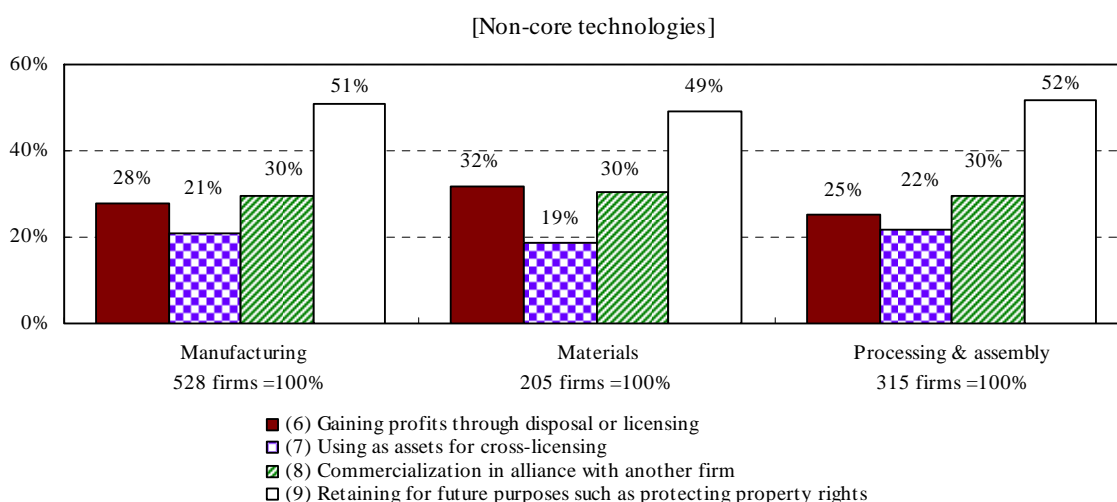


Figure 6-9. Intellectual Property Management will be Centered on:

Note: Since multiple choices are allowed, figures for individual items do not add up to 100%.

Also, “gaining profits through disposal or licensing,” “using as assets for cross-licensing” and “commercialization in alliance with another firm” were each cited by 20-30% of the firms in both the materials and processing & assembly sub-sectors.

By industry, “active protection through licensing” was cited for core technologies by a substantial number of firms in general machinery (80%), “other” manufacturing (78%), iron &

steel (77%) and non-ferrous metals (77%), whereas “increasing licensing fee income” accounts for a considerable percentage in transport equipment (39%), electric machinery (28%) and textiles (27%). “Effective use of external patents” is a popular choice among firms in pulp & paper (43%), precision machinery (39%) and chemicals (29%). Many firms chose “putting their technologies and know-how into a ‘black box’” in electric machinery (27%), non-ferrous

metals (23%) and food & beverages (18%). As for non-core technologies, the percentage of companies choosing to retain them “for future purposes such as protecting property rights” is higher in textiles (67%), “other” manufacturing (59%), food & beverages (59%) and iron & steel (56%), while it is lower in chemicals (41%), transport equipment (47%) and electric machinery (47%). The difference between industries may be explained by the extent of obsolescence of intellectual property (patents, etc.) and the weight of patents in developing new products.

(2) Position of licensing fee account

As regards licensing fee income and payment (Figures 6-10 and 6-11), the majority of firms are aware of their balance, which tends to be in the black for materials manufacturers and in the red for processing & assembly manufacturers.

(3) Recognition of intellectual property value

Although almost 80% of the firms recognize the value of their intellectual property, it is often considered only in terms of the cost of administering and maintaining the patents, based upon “individual management” or “company-wide management.” On the other hand, few firms recognize the intrinsic value of intellectual property in terms of costs and benefits for each business. This finding indicates that intellectual property is not sufficiently managed in Japan, given its im

portance in maintaining and strengthening competitiveness as well as in properly evaluating the value of the firm. As proper recognition of the intrinsic value of intellectual property is essential for strategic purposes, the result implies that Japanese firms need to improve their management of intellectual property.

By industry, a substantial percentage of firms cited “individual management” as a means of recognizing the value of intellectual property in precision machinery (52%), “other” manufacturing (42%), transport equipment (39%) and chemicals (34%). Many firms cited “business-unit-based management” in petroleum (33%), iron & steel (24%) and cement ceramics & glass (23%), while “company-wide management” is a popular choice among firms in industries such as petroleum (50%), textiles (50%) and electric machinery (44%). As regards the content of such recognition, “management of aggregate total cost” has a large share in precision machinery (60%), general machinery (32%) and electric machinery (32%), whereas a considerable percentage of firms cited “management of licensing fee” in transport equipment (47%), general machinery (44%), pulp & paper (42%) and chemical (41%). In contrast, “identification of the present value of future cash flow generated by new businesses using the patents” was only cited by 5% of the firms at most (electric machinery).

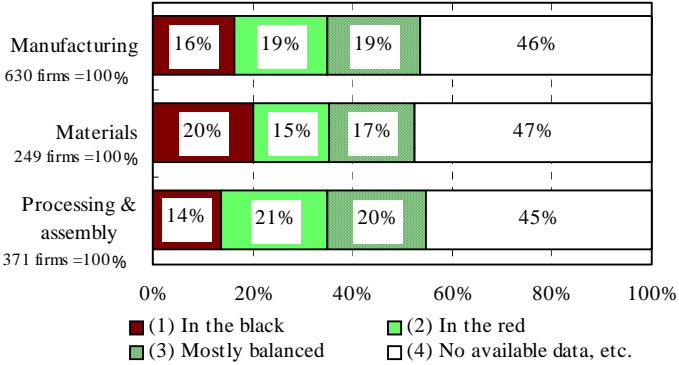


Figure 6-10. Position of Licensing Fee Account

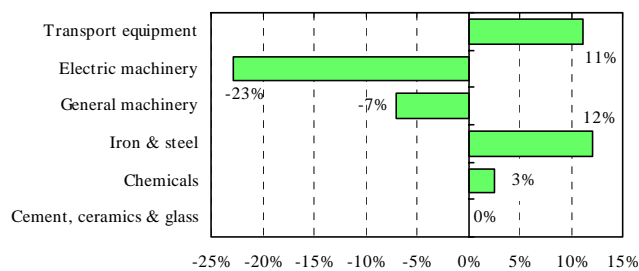


Figure 6-11. Trends in Major Industries
(share of firms in the black – share of firms in the red)

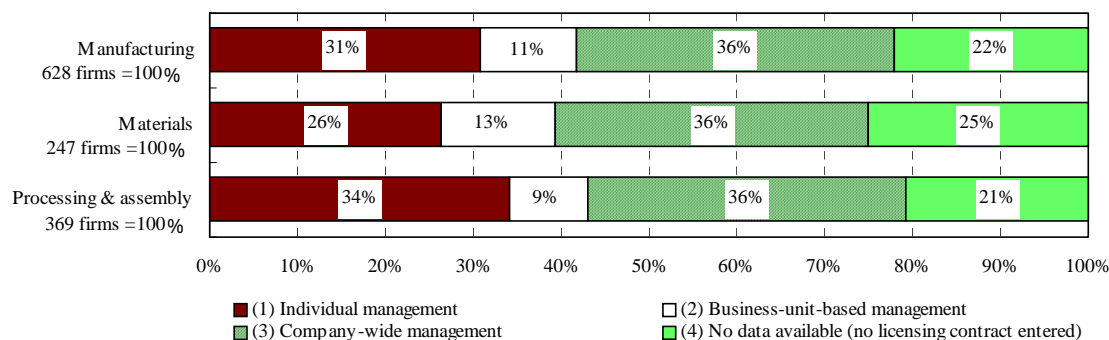


Figure 6-12. Recognition of Intellectual Property Value

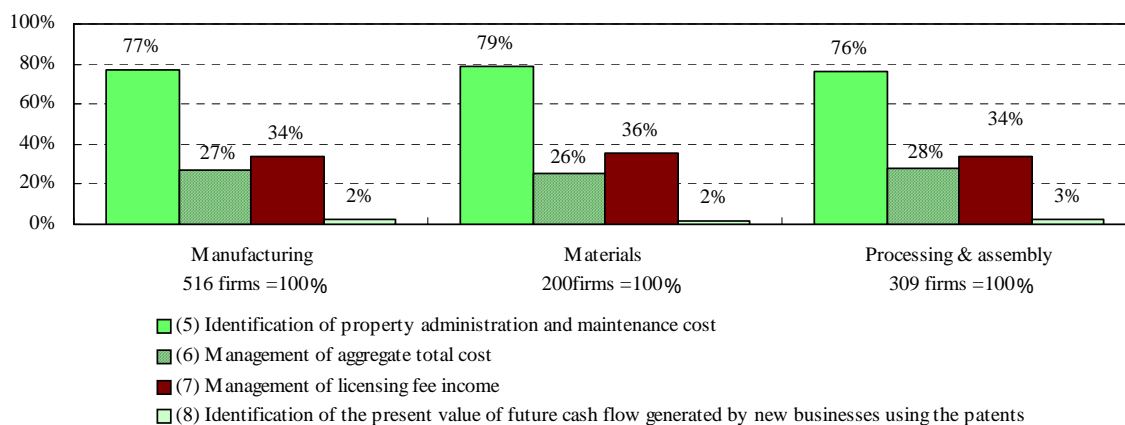


Figure 6-13. Content of Intellectual Property Management

Note: Since multiple choices are allowed, figures for individual items do not add up to 100%.

Table 6-1. Recognition of Intellectual Property Value
(matrix based on Figures 6-12 and 6-13)

	[Number of firms]			
Manufacturing	(5)	(6)	(7)	(8)
(1)	135	50	64	6
(2)	41	19	23	3
(3)	164	55	64	3
(4)	55	15	25	1

Note: For the description of (1)-(4) and (5)-(9), see the legends in Figures 6-12 and 6-13 respectively.

Industrial Classification Table (November 2004 Survey)

Sector/industry	Minor classification	Notes (former Japan Standard Industrial Classification, etc.)
Manufacturing		Japan Standard Industrial Classification (hereinafter referred to as "Standard") Division F
[1] Food & beverages	(1) Livestock product (2) Flour milling, sugar processing & edible oils (3) Beer & liquors (4) Other food & beverages	Standard Major groups 12 and 13 Meat products, dairy products Grain cleaning & polishing, flour milling, fodders, sugar processing, vegetable oils, animal oils, edible oil & fat processing (margarine, etc.) Alcoholic beverages Seafood products, canned fruits & vegetables, seasonings, bakery & confectionery products, soft drinks, manufactured ice, tobacco
[2] Textiles	(1) Chemical fibers (2) Spinning mills (3) Other textiles	Standard Major groups 14 and 15, and Item 204 Rayon, acetate, synthetic fibers Man-made staple fiber, cotton, wool, silk, hemp, others Woven fabrics, scouring, bleaching, dyeing, finishing, raw silk, twisting yarns, bulky yarns, knit fabrics, netting, rope, lace, carpets, finished textiles
[3] Paper & pulp		Pulp, paper, paper products, paper containers (corrugated paper boxes, etc.), synthetic paper, cellophane
[4] Printing & publishing		Newspaper, publishing, printing, bookbinding
[5] Chemicals	(1) Inorganic chemicals (2) Organic chemicals (3) Pharmaceuticals (4) Miscellaneous chemicals	Standard Major group 20 (except Item 204) Soda, compressed & liquefied gas, sulfuric acid, carbide, inorganic pigments, salt Naphtha-cracking center, synthetic resins, synthetic rubber, olefin derivatives, methane derivatives, fermentation industry, coal tar, synthetic dyes Ammonium sulfate & urea, chemical fertilizers, fatty acids, glycerin, soaps, surface-active agents, paints, printing ink, explosives, agricultural chemicals, perfumes & fragrances, cosmetics, toothpaste, adhesives, photosensitive materials
[6] Petroleum		Crude petroleum & distillate processing, oil depots, petroleum terminals
[7] Rubber		Natural & synthetic rubber products (tires, tubes, belts, rubber-coated fabric, etc.)
[8] Cement, ceramics & glass	(1) Cement (2) Glass (3) Miscellaneous cement, ceramics & glass	Standard Major group 25 Cement, blocks, fresh concrete, foam concrete Flat glass, glass containers, scientific glass instruments, glass fiber, glass processing materials Ceramics, refractories, carbon, graphite, structural clay, abrasives, aggregate, enamel
[9] Iron & steel	(1) Ordinary steel (2) Special steel (3) Miscellaneous iron & steel	Standard Major group 26 Iron & steel manufacture and secondary products Tool steel, structural steel, etc. Cast & forged steel, pig iron & castings, ferro-alloys, shirring
[10] Non-ferrous metals	(1) Refining of non-ferrous metals (2) Rolling of non-ferrous metals (3) Electric wire & cables (4) Miscellaneous non-ferrous metals	Standard Major group 27 Refining of copper, lead, zinc & aluminum, refining of nuclear fuel, refining of precious metals, nickel & titanium Rolling of copper, lead and aluminum Naked electric wire, electric insulated wire, cables Non-ferrous metal castings, die castings, nuclear fuel processing
[11] Metal products		Steel tower, steel bridge, tin cans, plated sheet, edge tools, hand tools, hardware, heating apparatus & plumbing supplies, fabricated construction-use metal products (sash, etc.), bolts & nuts, powder metallurgy products
[12] General machinery	(1) Boilers, engines & turbines (2) Metal working machinery (3) Office, service industry & household machines (4) Industry machinery (5) General machine parts	Standard Major group 29 Boilers, steam engines, turbines, general-use internal combustion engines (except those for automobiles, ships and aircraft) Cutting machines (turning, drilling & pressing machines), metal working machines (power tools, drills, etc.) Office machines (computer, numerical accounting machines, copying machines, typewriters, etc.), sawing machines, hand-operated knitting machines, industrial & commercial refrigerating machines Spinning machinery, weaving machinery, knitting machinery, dyeing & finishing machinery and parts thereof, cultivators, grain threshing machines, hoeing machines, bulldozers, tractors road rollers, electrolytic cells, distilling apparatus, heat exchangers, drying machines, food processing machinery, woodworking machinery, printing & bookbinding machinery, plastic working machinery, pulp & paper industry machinery, pumps, compressors, elevators, conveyors, gears, chains, oil hydraulic equipment Fire extinguishing equipment & apparatus thereof, valves, bearings, piston rings, molds & dies

[13] Electric machinery	(1) Electronic equipment	Standard Major group 30 Electronic computers, telephone equipment, telephone switchboard, broadcasters, traffic signals, fire warning systems, washing machines, radio & television set receivers, audio equipment, X-ray equipment
	(2) Electrical equipment	Generators, transformers, switching devices, ammeters, electrical welding equipment
[14] Precision machinery	(3) Electronic parts & devices	Semiconductor devices, integrated circuits, vacuum tubes, batteries Quantity gauges, measuring instruments, analytical instruments, medical instruments, optical instruments, lenses, cameras, watches & clocks, eyeglasses
[15] Transport equipment	(1) Automobiles	Standard Major group 31
	(i) Four-wheeled vehicles	
	(ii) Motorcycles	
	(iii) Bodies & parts	Automobile engines & parts thereof, clutch axles, radiators, brakes, oil filters, transmissions, etc.
	(2) Shipbuilding	Shipbuilding, marine engines
	(3) Aircraft manufacture	Aircraft & engines thereof
	(4) Miscellaneous transport equipment	Locomotives, electric trains & parts thereof, bicycles, lifts, carts
[16] Other manufacturing		Sawing & planing, plywood, wooden furniture, plastic products (except synthetic paper), leather products, furniture & fixtures (wooden & metal), lubricating oils, asphalt, coke, briquettes, precious metals, musical instruments, toys, lead pencils, lacquer ware, umbrellas
Non-manufacturing		
[1] Fisheries		Standard Division C: catching or collecting of marine animals and plants, aquaculture
[2] Mining		Standard Division D Mining, coal cleaning, natural gasoline production, etc.
	(1) Coal, crude petroleum & natural gas	
	(2) Metal & non-metal mining	Mining, quarrying, extraction, beneficiation, processing for quality improvement
[3] Construction		Standard Division E: construction work by contractor, equipment installation work, paving work, dredging work, etc.
[4] Wholesale & retail		Standard Division I General merchandise wholesale, specialized wholesale
	(1) Wholesale	Department stores, supermarkets, eating & drinking places, miscellaneous retail trade
	(2) Retail	Land development (except that for subdivision), real estate lessors, house & room lessors (except land and buildings for subdivision)
[5] Real estate		
[6] Transportation		
	(1) Railways	Ordinary railways, monorails, trolley bus, cable railways, rope-ways
	(2) Road passenger transport	Bus, taxi, contracted motor passenger transport
	(3) Road freight transport	Motor trucking, etc.
	(4) Water transport	Oceangoing & inland water transport, vessel & ship rental & leasing, coast-wise transport
	(5) Airways	Air transport, aircraft service
	(6) Warehousing & incidental services	Ordinary warehousing (including silos & tanks), refrigerated warehousing, surface timber yard, port transport, road transport facilities, terminal facilities for motor vehicles (bus & truck terminals), container yards, airport terminals, piers & docks, freight forwarding, packing & crating
[7] Electric power & gas		Standard Division G
	(1) Electric power	
	(i) Nine utility companies	Private power generation, co-generation
	(ii) Miscellaneous electric power	
	(2) Gas (including heat supply)	City gas, propane gas distribution, heat supply
[8] Telecommunications & information		Telephones, telegraphs Advertising, research & data processing services
	(1) Communications	
	(2) Information services	
	(3) Broadcasting	
[9] Leasing (including rental)		General goods leasing & rental, office machinery rental (including electronic computers)
[10] Services		
	(1) Hotels	
	(2) Cinemas & amusement	Cinemas, amusement, miscellaneous hobby & recreation services
	(3) Miscellaneous services	Automobile parking, automobile maintenance services, automobile rental, guard services, other services
[11] Other non-manufacturing		

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