Deregulation in the oil industry

Lessons from the US experience for Japan

by

Futoshi Toyoda

B.Sc., Reaction Chemistry
University of Tokyo, Japan
(1985)

M.Sc., Reaction Chemistry
University of Tokyo, Graduate School, Japan
(1987)

Submitted to the Alfred P. Sloan School of Management and the School of Engineering in Partial Fulfillment of the Requirements for the Degree of

Master of Science in Management of Technology

Massachusetts Institute of Technology

May 1996

Signature of the Author _____
Alfred P. Sloan School of Management
May 15, 1996

Certified by _____
Dr. D. Eleanor Westney
Associate Professor of International Management

Certified by _____
Mr. Henry Birdseye Weil
Senior Lecturer

Accepted by _____
Rochelle Weichman
Director, Management of Technology Program

Deregulation in the oil industry
Lessons from the US experience for Japan

by

Futoshi Toyoda

Submitted to the Alfred P. Sloan School of Management and the School of Engineering in Partial Fulfillment of the Requirements for the Degree of Master of Science in Management of Technology at the Massachusetts Institute of Technology

ABSTRACT

The Japanese oil industry has been controlled by the government since the end of World War II. Until recently, Japanese oil companies were only allowed to import petroleum products, such as gasoline, kerosene, and diesel oil. Since April 1996, the Japanese government has deregulated the oil industry. From that time, new laws allow the free import of petroleum products even for non-Japanese companies.

Learning from the US experience of oil companies is the main objective of this thesis. Focus is placed on the contrast between regulation in the 70s and deregulation in the 80s in the US. Even though there are many differences between Japan and the US, many lessons learned here can apply to Japan. The current strategies of US oil companies are also investigated because they are the strategies of companies in a deregulated industry.

This thesis is based on: (1) interviews conducted at four companies; (2) results from two sets of questionnaires regarding corporate strategy and refinery strategy; (3) annual reports, both current and for the era of both regulation and deregulation; and (4) literature.

The difference between a regulated environment and a deregulated environment is the market mechanism. In the regulated world, cost decides the price. In the deregulated world, price decides cost. From the US experience, two conclusions are drawn: (1) the difficulty to change people's attitude to cope with the deregulated world and the importance of preparation and (2) the importance of companies investing to become competitive.

Gasoline deregulation in Europe indicates that an outsider has the potential to change the whole industry. Also, it reveals the importance of native companies becoming competitive before outsiders seize the market.

Current strategies are: (1) to develop cost leadership and (2) to build a flexible organization. Companies are engaged in re-engineering and re-organization and aggressive cost reduction activities.

From this study, it is concluded that Japanese oil companies have: underestimated the difficulties of changing; the importance of investment; and the time required to become competitive. They should focus on their core business and, in order to build strategy, Japanese oil industry should understand their business.

Thesis Supervisor:	D. Eleanor Westney
Title:	Associate Professor of International Management
Thesis Reader:	Henry Birdseye Weil
Title:	Senior Lecturer

TABLE OF CONTENTS

Acknowledgments

I would like to express my gratitude to my thesis advisor, Prof. D. Eleanor Westney, particularly for her guidance and advice for the questionnaires and interviews.

I also would like to thank my thesis reader, Henry Birdseye Weil, for his guidance and advice that were the source of many of the insights for this thesis.

My sincere thanks to :
- Prof. James Utterback, for giving me a lot of suggestions and advice for the industrial analysis section, especially for the five force analysis.
- Mr. Michael C. Lynch, for giving me a lot of ideas and hints about the US oil industry and deregulation. He also introduced me a couple of oil companies for the interviews.
- Mr. Alexander Chelico, for giving me his insight of his Canadian and Japanese oil industry. He also checked my English.

I am also thankful to the US oil companies which accepted my interviews, even though I am just a student. It would be difficult, if not impossible, to gain such access in Japan. I think that this is the difference between deregulated and regulated industries.

I also would like to thank all of the companies and oil refineries which responded to my questionnaires. The response rate was about 30%, which was higher than I expected.

Dedicating this thesis to my wife, Chiaki, would not be enough recognition for the immense support she gave me during this period. Without her support, I could not stay in the US and finish my degree.

Finally, I would like to thank my parents.

05/01/96

Futoshi Toyoda

Chapter 1 Introduction

1.1 Introduction

In Japan, the deregulation of laws pertaining to petroleum products is scheduled to start from April 1996. This is the first deregulation in the Japanese oil industry, and it will have a profound impact on the business environment and the industry.

Under the previous regulations, the only affected commodity price was that of gasoline. The gasoline price in Japan is four times higher than that in the USA. This is because: (1) only Japanese oil companies can import petroleum products; (2) in order to protect Japanese industries, such as petrochemical, steel, and transportation, the government pressured oil companies not to increase the prices of petroleum products other than gasoline; and (3) high tax (about $2.30 per gallon).

The high gasoline prices has eventually triggered deregulation. Deregulation of petroleum products has become the centerpiece of a package of deregulation measures, which was advanced by the Murayama coalition administration.

From April 1996, new entrants, such as trading companies, supermarkets, and the Agriculture Organization, can freely import gasoline and other petroleum products. Prior to the deregulation, gasoline price started decreasing. All the Japanese oil companies are expected to go into a deficit in 1996 as a result.

1.2 Objective of this thesis

Japan is now facing deregulation. How to cope with the deregulated world is the most urgent topic. They understand that they have to do something and they have to change. However, because this is the first opportunity to operate in the deregulated world, they do not understand how they should act.
Learning from the experience of US oil companies is the main objective. I focus on the regulation in the 70s and deregulation in the early 80s in the US. Even though there are many differences between the two countries, I find many lessons which I can apply to Japan.

I have also learned from the current strategy of US oil companies. Even though the environment and company structure are different, their strategy is the strategy of the deregulated world.

1.3 Methodology

An emphasis is made on focusing topics and methodologies which are available only in the USA, since I am studying in the USA. The focus is on the US oil industry. As for the methodology, interviews, questionnaires, annual reports, and literature reviews are used.

In this sense, interviews of the oil companies were very beneficial to me. Although I had no connection with oil companies in the US, they kindly shared their time and insights for my thesis. If I had asked for the same interviews in Japan, no companies would have accepted my offer.

A brief summary of the methodologies follows;

1) Interview

I interviewed four companies. The four companies were selected from following categories.

- US based Major[1]
- European based Major
- Integrated company[2]
- Independent company[3]

I asked the following during the three types of interviews, lasting for 30, 90, and 60 minutes, respectively.

- Vision and strategy of high ranking people in the planning department
- Corporate planning of their subordinate
- Deregulation experience of the people who are familiar with it

[1] Oil Majors include Exxon, Mobil, Chevron, Texaco, BP, Shell, and CFP. First four is US based Majors.
[2] Integrated company means the oil company who engaged both upstream(exploration and production) and downstream(refining and marketing).
[3] Oil company who engages in refining and/or marketing

The content of the interview (presented in the appendix) was sent before the interview. Because of my difficulty with English, I asked permission to tape-record each interview, and later transcribe them. I spent a minimum of two and a half hours and a maximum of seven hours for each company. One company answered my questions with one person. So the number of interviewees was between one and three. The companies were promised that their names would naturally not be identified in the thesis. So, in this thesis, the information gained during the interviews is presented by summary as opposed to written case studies.

2) Questionnaires

Two sets of questionnaires were designed. One was for the corporate planning department, and the other was for the refinery manager. Questionnaires were tested by several people before they were sent to the real respondents. Since previous surveys showed that Japanese and Germany companies responded the least, a Japanese version was prepared with nice letter. I also enclosed self addressed stamped envelopes to expedite the return of the responses.

The percentage of respondents from corporate planning sections was 20% (=23/114). That from the US & Canada was 23% (=20/87), and that from Japan was 11% (=3/27). The low percentage of Japanese respondents shows how closed the industry. North American companies were categorized in two groups: the top 30 companies in terms of revenue (9 companies responding) and others (11 companies). Because of the low response from Japanese company, I use data from Japan for illustrative purposes.

The percentage of respondents from refineries was 29% (=65/225). That from the US & Canada was 29% (=54/185), and that from Japan was 28% (=11/40). These percentages were greater than expected. A response rate of 10-20% is more usual for such surveys. The responding refineries were categorized into the following 3 groupings: (1) North American refineries with 80,000 barrel per day or larger of crude capacity (23 refineries); (2) North American refineries with less than 80,000 barrel per day crude capacity (31 refineries); and (3) Japanese oil refineries (11 refineries).

3) Annual reports

Forty nine US, 5 Canadian, and 6 Japanese companies sent their latest annual reports. One Canadian and 9 Japanese companies sent financial reports or corporate profiles. Also, back issues of annual report were used for the study of strategy change from the 70s in the US.

1.4 Thesis outline

This chapter has provided an introduction, the objective of the thesis, a brief overview of the methodology, and the thesis outline.

Chapter two presents an overview of the petroleum industry. In order to compare the US deregulation in the early 80s, and Japanese prospective deregulation, the US oil industry from 1979 and Japanese oil industry in 1993 are analyzed by using the five force method. After that, the history of regulation in both the USA and Japan is briefly reviewed.

Chapter three presents the deregulation experience. The introduction of price control and product allocation programs and their deregulation are analyzed by using interviews, results from questionnaires, and annual report reviews. In addition to that, the gasoline deregulation in Europe is discussed briefly.

Chapter four presents the strategy of the US oil companies. As they have coped with issues of deregulation and intensifying competition, they provide useful models for Japan. These are analyzed by using interviews, questionnaires, and annual reports.

Finally, chapter five concludes with a discussion of the lessons and applications for the Japanese oil industry.

Chapter-2 The Petroleum Industry

This chapter reviews the background of the industry at the time of deregulation.

In the first part, the US and Japanese oil industry at the time of regulation are analyzed. This part is organized into three sections. In the first section, the US petroleum industry in 1979, just before the complete deregulation in 1981, is overviewed. In the second section, the Japanese petroleum industry in 1993 is overviewed. In the third section, the US oil industry in 1979 and Japanese oil industry in 1993 are analyzed using the Michael E. Porter's five force framework[1].

In the second part, the history of regulation is reviewed. Starting from 1861, US regulation is discussed briefly in the first section. In the second section, the history of Japanese regulation is discussed.

2.1 Industrial Analysis at the time of regulation

Section-1: Overview of US petroleum industry in 1979 [2]

1) Environment

The US oil industry had two major regulations in 1979. One was price regulation, which started from 1973, and the other was product allocation, which had started in 1975. During the 70s, OPEC's power increased. In 1975, Saudi Arabia, Kuwait, and Venezuela nationalized oil properties and all of the oil concessions held by oil companies were taken over. The tenfold increase in price for OPEC oil, starting from late 1973 with the Middle East war and exploding with the Iranian shutdown in 1979, brought stronger efforts to curb oil imports in all major markets. US oil imports fell to 38% of the total consumption in 1979, which was down from 45% in 1977. Also the impact of the recession, particularly on the automobile industry, decreased the demand for gasoline .

---

[1] Porter, M.E., Competitive Strategy, 1980

[2] Standard & Poor's, "Oil --- Basic Analysis", Standard & Poor's Industrial surveys, 1970-1980

[2] Yergin, Daniel, The Prize, 1991

Oil and gas prices were expected to increase even more. It was recognized that fixed oil prices served as disincentives for exploration and development. So, the decontrol of the domestic oil price was started in 1978. It was scheduled to finish October 1981.

2) Supply and demand

Crude oil imports increased to 46% of the total consumption in 1977, which was up from 19% in 1972. From 1972 to 1977, the volume of domestic crude oil decreased by 17% and that of crude oil imports increased by 200%. Due to the slowdown of demand growth, crude oil imports were between 43 and 46% of total demand, from 1977 to 1979.
Gasoline demand peaked in 1978 and was expected to decline by 1% per year over the next two decades.

3) Oil companies

The top 10 oil companies accounted for only 57% of refinery capacity. Even the leading company, Exxon, did not have a 10% share. The average net income per revenue of the top 10 companies was 6.3%. All the top 10 companies were integrated producers: that is, they engaged in exploration, production, refining, and marketing.

Table 2-1-1 : Oil Companies in the USA (Top 10 Revenue)

Company	Revenue	Net Income	Net Income	# of Refinery	Refinery	Refinery Share
	mm$/Y	mm$/Y	% of Revenue		mBPSD	%
1 Exxon	79065	4297	5.4	5	1577	8.9
2 Shell	51904	5283	10.2	8	1151	6.5
3 British Petroleum	48419	3598	7.4	3	452	2.5
4 Mobil	44733	2008	4.5	7	891	5.0
5 Texaco	38356	1059	2.8	12	1059	6.0
6 Standard Oil California	29955	1785	6.0	12	1467	8.2
7 Gulf Oil	23909	1323	5.5	7	912	5.1
8 Standard Oil Indiana	18617	1506	8.1	10	1238	7.0
9 Atlantic Richfield	16231	1166	7.2	4	834	4.7
10 Sun	10660	700	6.6	5	484	2.7
Top 10 total	361849	22725	6.3	73	10065	56.6
Industry Total				312	17791	
Top 10 share (%)				23	57	

Source : S&P's Industrial survey 1980, O&G Journal data book 1980

4) Refining

Construction and modernization of refineries continued to be the way that refineries coped with the demand shift from heavy to light products. The program for reducing the use of lead as an octane boosters[3] in gasoline also accelerated this trend. Oil companies concentrated on improving and upgrading the value of their output. Installation of additional processing equipment, such as catalytic cracking[4] and hydroforming[5] units, was popular. On the other hand, oil demand growth unexpectedly slowed. As a result, existing refinery capacity was considered basically adequate for several years. Refinery utilization was 85% in 1979, which was expected to decline below 80% for the next several years.

5) Future

Because of the temporary gasoline shortage at gas stations and increasing oil prices caused by the oil shock, the demand for synthetic or alternate fuels was expected to grow in the near future.

Price regulation and product allocation programs were expected to be deregulated completely within two years.

Section-2: Overview of the Japanese petroleum industry in 1993[6]

1) Environment

The Japanese refining industry was still recovering from the second oil shock. Crude oil demand was expected to grow slowly at a steady rate which corresponded to the growth in primary energy demand. The share of crude oil in the Japanese primary energy demand was expected to stay at around 50% because of growing difficulties in setting new nuclear power plants and the serious delay in the development of new energy sources.

It was expected that demand for gasoline, kerosene, and diesel oil would grow steadily. However, the demand for fuel oil, especially to be used in power generation, was expected to decrease due to the replacement of fuel oil with liquid petroleum gas (LPG).

---

[3] Lead is used to improve anti-knocking character of gasoline. However, lead is not good for the environment.

[4] Petroleum process which produce gasoline from heavy oil and gas oil.

[5] Petroleum process which removes sulfur from products.

[6] The Japanese National Committee for World Petroleum Congresses, Petroleum Industry in Japan, 1993,1994

2) Supply and Demand

Reflecting economic recovery, demand for consumer products, such as gasoline and kerosene, were expected to grow steadily. Also, naphtha for the petrochemical industry was expected to recover from the sluggish demand. Diesel oil, which was used mainly for powered automotive vehicles, would continue to grow steadily. However, demand for the fuel oil would continue to shrink due to the sluggish demand in the materials industry. For the next five years demand for gasoline, naphtha, kerosene, and diesel oil was expected to grow 2.4,1.5,1.6,2.6 % per year, respectively[7]. Demand for fuel oil would decrease 4.9 % per year.

3) Oil companies

The top 8 Oil Company groups occupy 98% of market share. The top 6 companies occupy about 85%. The leading company, Nippon Oil, has 18% of the market. The average net income per revenue is only 2.6%. It is about 40% that of US companies.

Table 2-1-2 : Oil Company Groups in Japan (Top 8 Market Share)

Company	Revenue	Net Income	Net Income	# of Refinery	Refinery	Market Share
	mm$/Y	mm$/Y	% of Revenue		mBPSD	%
1 Nippon Oil	29753	719.0	2.4	9	940	18.5
2 Idemitsu	18441	160	0.9	7	915	15.7
3 Japan Energy	18413	611	3.3	5	608	13.3
4 Tonen	22724	812	3.6	4	614	13.1
5 Cosmo Oil	14384	388	2.7	4	645	12.8
6 Showa Shell	16739	431	2.6	5	560	11.1
7 Mitsubishi Oil	12993	294	2.3	4	450	9.2
8 General Sekiyu	5361	282	5.3	3	236	4.3
Top 8 total	138808	3697	2.7	41	4968	98.0
Industry Total	141349	3703	2.6	43	5055	
Top 8 share (%)					98.3	98.0

Source : Annual reports & Financial reports 1994, Kaisha-Joho, O&G Journal data book 1994

All the companies are categorized as marketer, refiner, or marketer & refiner. Exploration and production do not play a large role in the Japanese oil industry. Petrochemical production is becoming popular, but most of the profit still comes from the oil business. Most of that profit comes from the gasoline margins. Based on wholesale prices in Japan and given that all refining and sales costs are equal among the petroleum products, the

[7] Natural Resources and Energy Agency of MITI, 1994

gasoline margin is 65 cents per gallon[8]. The margins for jet fuel, kerosene (heating oil), and diesel oil are 6, 6, and 4 cents per gallon, respectively. Oil companies lose money on naphtha and heavy oil sales by 23 and 24 cents per gallon, respectively. These margin imbalances are caused by MITI's guidance to help other industries. The lower price of: naphtha protects the petrochemical industry; heavy oil protects material industries; diesel oil protects the transportation industry; kerosene protects agriculture industry; and jet fuel protects the airline industry. In order to fill the gap, MITI encourages a high gasoline margins. Current differences between the wholesale prices in the Japanese market (without tax) and that in the international market for gasoline, jet fuel, kerosene, diesel oil, naphtha, and heavy oil are 44, 3, 0, -2, -8, and -5 cents per gallon, respectively.

4) Refining

Before the first oil shock in 1973, oil demand increased rapidly. As a result, oil companies increased refining capacity from 2.1 million barrels per day in 1965 to 5.9 million barrels per day in 1975. Utilization reached 90% in 1977. From 1975 to 1981, refining capacity was maintained at the 5.9 million barrels per day level. Utilization ratios were kept at about the 70%. After the second oil shock (1979-81), the utilization ratio dropped to lower than 60%. MITI guided oil companies to reduce refining capacity. Refining capacity was drastically slashed from 5.9 million barrels per day in 1981 to 4.6 million barrels per day in 1989. However, because of the reduction in oil demand, the utilization ratio remained between 60 and 65%. The demand for oil began to increase again from 1986. As a result, the rate of refinery utilization climbed to 80% in 1993. This forced MITI to make its policy change, from encouraging the scrapping of excess capacity to approving a capacity increase. Recently, MITI gave an approval of incremental capacity to the oil refineries who exceeded 80% efficiency. Refining capacity increased by 10% from 1989 to 5.0 million barrels per day. Even though the refining capacity, which is measured by the crude capacity, did not increase, oil companies increased upgrading capacity to cope with the environment problem and to improve the quality of petroleum products. This upgrading of capacities has increased gasoline production capacity and they also lead to excess capacity.

[8] Oil Report, No.716, 1994

Table-2-1-3 : Refinery Utilization in Japan

Year	Capacity mmBPSD	Throughput mmBPSD	Utilization %
1965	2.1	1.4	70
1967	2.3	2.1	90
1969	3.2	2.9	90
1971	4.2	3.6	85
1973	5.4	4.5	83
1975	5.9	4.1	69
1977	5.9	4.3	72
1979	5.9	4.3	72
1981	5.9	3.5	60
1983	5.5	3.3	61
1985	5.0	3.1	62
1987	4.6	2.9	63
1989	4.6	3.2	70
1991	4.7	3.7	79
1993	5.0	4.0	80

Source : MITI [Energy production, demand, and supply statistics]

5) Future

In order to increase the market share, differentiation is the trend. Oil companies improve gasoline quality above the standard. In addition to 100 RON[9] gasoline containing MTBE[10], benzene-less gasoline is expected to be put on sale[11].

From 1996, the deregulation of oil products will start. Profit for oil companies is expected to decrease dramatically because of the fall of gasoline margins and the difficulty of price increases for other petroleum products, such as naphtha, diesel oil, and kerosene, which are relatively cheaper than gasoline.

Section-3 : Five Force Analysis

In this section, the oil industry is analyzed using Michael E. Porter's five force framework. Porter mentions that analyzing the five competitive forces is a good way to understand an industry. He also mentions that strengths and weaknesses of a company relative to the industry are crucial from a strategic standpoint.

[9] Research Octane Number : the higher this number, the lower the chance of knocking. In the US, they use (RON+MON)/2 instead of RON. 100 RON equals 95 (RON+MON)/2.

[10] Methyl Tertial Buthyl Ether : because it contains oxygen, it improves fuel efficiency.

[11] Matsubara, Michio, "Gasoline", Petrotech, No.17(10), 1994

In this section, both Japanese and US regulated industry are analyzed to understand differences and similarities for further discussion of deregulation, starting from chapter 3.

1) Force-1 ; Threat of Entry

a) Economies of Scale

[USA]

- The oil industry is a typical example of economies-of-scale industry. In oil production, the more you produce, the larger profit you get. Oil refining is the same. Because fixed costs are the same, the higher throughput you operate at, the larger profit you get.
- However, because of the entitlement program[12], there were many small refineries that could make money by subsidies. The average size of the newly added refineries under the entitlement program was about 9000 barrels per day. They lacked the capabilities of cracking and quality upgrading as a rule.
- Scale was also important for logistics, especially the pipe-line business.
- Regarding the scope of the business, all of the top 20 companies were integrated companies. They were engaged in exploration, crude production, refining, and marketing. Because exploration was such a "high risk high return" business and requires huge investments, only large companies could engage in it. Also, oil producing countries generally preferred investments from large oil companies.

[Japan]

- Under the regulations, only refiners can import crude oil and petroleum products. As a result, most of the gasoline is sold by brand name. Among the 11 largest brands, which have a 98% share in Japan, 10 of them are available everywhere in Japan. So, economies of scale are very important. Those 11 brands belong to 8 oil company groups. In the last 10 years, two horizontal mergers, Cosmo Oil and Showa Shell Oil, and one vertical merger, Japan Energy, have taken place. Further horizontal and vertical type mergers are expected.
- Also for the procurement of crude oil, economies of scale are very important.
- Regarding the scope of business, all of the 11 groups are refiners and marketers.

[12] In short, this regulates all the refiners to register when they refine crude oil. Government collects money from domestic crude oil refiner and gives them to the import crude refiners. Government also gives subsidies to small refiners.

b) Product differentiation

[USA]

- As oil is a scale economy industry, barter trade was popular. As a result, the quality of products became exactly the same. Only lubricant oil and coke had quality differentiation. Apart from oil products, many oil companies tried to build car wash facilities to differentiate their service stations.

[Japan]

- The situation is basically the same. Even though oil companies try to differentiate their products, it becomes a commodity very quickly. For example, in 1991, one oil company started selling high octane gasoline with MTBE and it sold well. Then, almost all of the other companies joined this market within a year. Now, some companies have started selling differentiated products, such as benzene-reduced gasoline and high Cetane number[13] diesel oil, by giving up the merit of barter trade. As the technology is not special, everybody can imitate the product. Therefore, there is no differentiation in oil products. Oil is completely a commodity product. However, oil companies keep trying to differentiate their products in some ways.

c) Capital requirements

[USA]

- Oil production was a high risk business. One offshore drilling platform costed $15 million with a 10-15% probability of finding oil. Now, only companies that had both money and technology were allowed to start oil production. For refining, you needed at least several hundred million dollars (1995 money) to build a typical 200,000 BPSD[14] refinery[15].

[Japan]

- The capital requirement is larger in Japan, because everything is expensive. No oil refinery has been built after the second oil shock.

---

[13] This shows whether it is easy to ignite. The higher this number, the easier to ignite. It is the key quality of diesel oil.

[14] barrel per day. 1 barrel = 159 litters = 42 gallons

[15] UOP internal document

d) Access to distribution channels

[USA]

- Transportation, land availability, and huge investment made it difficult to build pipe lines and gasoline stations[16]. However, a company could get distribution channels very easily by M&A[17].

[Japan]

- There is easy access to transportation because trucks and small ships are the main modes of transportation. Regarding retail, most gasoline is sold by the brand name. Because of high land prices and construction fees, it is difficult to build storage tanks and gasoline stations. Hostile M&A is not common in Japan. So, it is difficult to gain access to distribution channels on a large scale. On the other hand, only 15% of Japanese service stations are owned by Japanese oil companies. Most of other 85% are individually owned. So, it is possible to acquire service stations individually.

e) Cost disadvantages independent of scale

[USA]

- Technology in exploration, production, and refining was widely available. So, technology was not a disadvantage for a new entry. However, there were some learning curve effects in the exploration area.
- Under regulation, only small refineries could get cheap crude oil because of subsidies. This was an advantage for a new entrant. However, a favorable location (especially the oil well), refinery, and service station, were difficult to get for a new entrant. Those were large disadvantages.

[Japan]

- Location is the only disadvantage for a new entrant. Technology is not a disadvantage.

f) Government policy in the Regulation Era

[USA]

- There were two market regulations; one was price regulation[18] and the other was product allocation[19]. Those two regulations were introduced for the nation's security and its policy.

---

[16] It is same as service station.
[17] merger and acquisition
[18] It decides crude oil price at the well-head. In order to reduce the impact of oil shock, government decides the domestic crude price relatively lower than international price.

The Entitlement program, which was a part of product allocation, encouraged the new entrant to get into the refining business by providing subsidies. Price regulation of crude oil discouraged domestic exploration and production, because of relatively low domestic crude oil prices.

- Leaded gasoline was expected to be prohibited because of environmental regulations. Environmental regulations caused an increase in the initial investment.

[Japan]

- The market regulation in Japan allows only oil companies to import petroleum products. Importing of petroleum products is prohibited to outsiders. This reduces competition and helps to stabilize the refining margin. Government policy puts a heavy emphasis on protecting Japanese industries and assigned little importance to individual consumers. As a result, the price of gasoline, the only non-industrial product, is relatively high.
- The world's strictest quality standard requires a high initial investment.

g) Summary

[USA]

- The nature of the industry was not good for newcomers. However, the product allocation program encouraged small refiners to enter the business. The price regulation discouraged entry into the exploration, production, and marketing[20] business. Regulation dominated the threat of entry.

[Japan]

- Import regulations prohibit new entries completely.
- Compared to the US, threats of entry, such as distribution channel, expensive investment, and location disadvantage, are stronger.

---

[19] It allows government to allocate oil products in the nation. It also decides the refining margin. So, product's price is regulated by its margin, not by price itself.

[20] "Marketing" represents retail business, especially for gasoline and diesel oil.

Table 2-1-4 : Force-1: Threat of Entry

Item	Country	Condition	<---------->	Condition
Economies of Scale	USA Japan	Small	A J	Large
Product differentiation	USA Japan	Small	A J	Large
Capital requirements	USA Japan	Small	A J	Large
Access to distribution channels	USA Japan	Easy	A J	Difficult
Cost disadvantages independent of scale	USA Japan	Small	A J	Large
Government policy	USA Japan	Attractive	A J	Unattractive
Summary	USA Japan	Strong	A J	Weak

2) Force-2 : Intensity of Rivalry among Existing Competitors

a) Numerous competitors or oligopolistic competition

[USA]

- The industry was not characterized by the same scale of oligopolistic competition as exists in Japan. Exxon, the leading company, had less than 10% of the market share. There were many companies. The activity and strategy of the so-called "Seven Sisters", Exxon, Shell, BP, Mobil, Texaco, Chevron, and Gulf were quite similar, at that time.

[Japan]

- There are six large company groups[21] which together have 85% share. Each company has 11-18 % share. Their activities, assets, and strategy are very similar. There is no clear leading company.

b) Slow industry growth

[USA]

- Oil demand was decreasing. Also, the demand for gasoline consumption was expected to decrease 1% per year for 10 years.

[21] Nippon oil, Idemitsu oil, Japan Energy, Tonen, Cosmo oil, and Showa Shell oil.

[Japan]
- The industry is mature. The demand for oil is expected to grow very slowly. The gasoline demand is expected to grow only 2 to 3% per year. Shares are very keen.

c) High fixed or storage cost

[USA]
- Fixed costs are very high both in production and refining. Because the price of crude oil was kept relatively low by the regulation, the production margins were small. So, in order to make money, companies had to increase production per well. On the other hand, high refining margins lowered the break-even point.

[Japan]
- Because the oil industry is an economies of scale type industry, the fixed cost is very high. However, under the government protection, oil companies lower the break-even point by increasing their gasoline margins.

d) Undifferentiated product or service and low switching costs

[USA]
- Because there was no differentiation, customers could switch easily.

[Japan]
- The same is true in Japan. Price wars and excess service often happen in service stations.

e) Capacity normally augmented in large increments

[USA]
- Because the industry is one of large economies of scale, companies had to build large refining facility in their initial investment. Production and pipe-line businesses were the same.

[Japan]
- It is the same in Japan.

f) Competitors diverse in strategies, origins, "personalities," and relationships to their parent companies

As I pointed out earlier (2-a), competitors were numerous in the US and are roughly equal in size and power in Japan.

g) High strategic stakes

[USA]

- Because the oil became a commodity, strategic stakes were not high.

[Japan]

- Companies tend to follow MITI's strategy only.

h) High exit barriers

[USA]

- Most companies, even though well-diversified, could not exit from the oil industry because oil was their core business. Also, facilities were specialized for the oil business. Given the industry's history, the unions were strong and emotional barriers to exit were very high. However, M&A and spin-offs allowed companies an exit or partial exit strategy.

[Japan]

- In Japan, the government shows resistance to closures because it worries about the unemployment and sluggish regional economies. M&A is not so popular. There is no hostile M&A or TOB[22] in Japan.

i) Government

[USA]

- Under the price control and product allocation, an oil company's activity was partially limited. Companies focused on using regulation to maximize profit, rather than competing with each other.

[Japan]

- Under the regulated environment, companies try to follow government policy, because the government protects them only if they follow.

j) Summary

[USA]

- All of the indicators, such as similar strategy, demand decline, high fixed costs, commodity, tendency to over-capacity, and high exit barriers, could have led to severe competition. However, it was not the case. Most of the US oil companies were based on

[22] Takeover bid

the former Standard Oil Company. So, they had strong but different regional bases in retail and severe competition seldom occurred. Also, regulations limited the oil company's activity. It was not necessary to enter severe competition, because they could easily make money by following the regulation.

[Japan]

- Even though all the indicators show the potentially strong competition, the Japanese oil industry has not experienced severe competition. MITI's strong leadership prevents competition.

Table 2-1-5 : Force-2: Intensity of Rivalry among Existing Competitors

Item	Country	Condition	<---------->	Condition
Competitors' size and power	USA Japan	Equal	A J	Different
Industry growth	USA Japan	Slow	A J	Fast
Fixed cost	USA Japan	High	A J	Low
Product differentiation	USA Japan	Commodity	A J	Specialty
Capacity augmented at one time	USA Japan	Large	A J	Small
Competitor's strategy	USA Japan	Diversify	A J	Similar
Strategic stakes	USA Japan	Large	A J	Small
Exit barriers	USA Japan	High	A J	Low
Government	USA Japan	Unattractive	A J	Attractive
Summary	USA Japan	Unattractive	A J	Attractive

3) Force-3 : Pressure from Substitute Products

a) Substitutes

[USA]

- Because of the increasing oil prices, the development of substitutes was very aggressive. The demands for nuclear, coal, and synthetics were expected to increase, while for crude oil and gas were expected to decline. Percent demand of oil and gas in energy was expected to decline to 44% in 2000 from 72% in 1979.

[Japan]

- Petroleum is used for 58% of the total energy consumption. From 1986, it increased steadily, due to the decline of the use of coal. Compared to the USA, the oil and gas ratio is higher in Japan. Because the safety issues prevent the construction of new nuclear plants, the oil's incremental trend is expected to continue. However, just as electric light replaces kerosene light, there is a possibility of the emergence of strong substitutes.

b) Government

[USA]

- The government played a key role in the promotion of substitutes. Within the US, 93% of fossil fuel reserves are in solid form, such as coal and oil shale, while crude oil reserves account for 4% and natural gas for 3%. The government invested in coal gasification and oil shale projects.

[Japan]

- The change of their nuclear energy promotion policy has increased petroleum consumption. However, current LPG promotion will affect oil demand in the near future.
- From the viewpoint of oil refineries, petroleum product imports are potentially strong substitutes.

c) Summary

[USA]

Because of the high crude oil price, the pressure of substitutes was very strong. The percentage of oil and gas demand was expected to decline sharply.

[Japan]

Because of the resistance for nuclear power, the pressure of substitutes is not so strong right now. The demand for oil is expected to increase slowly.

Table 2-1-6 : Force-3: Pressure from Substitute Products

Item	Country	Condition	<---------->	Condition
Substitutes	USA Japan	Available	A J	Not available
Government	USA Japan	Encourage	A J	Discourage
Summary	USA Japan	High	A J	Low

4) Force-4 : Bargaining Power of Buyers

a) Buyer purchases large volumes relative to seller sales

[USA]

- Consumption for gasoline, kerosene, diesel fuel, and residuals were 37, 7, 17, and 15%, respectively. The oil shortage lowered buyers' power for gasoline and diesel oil. On the other hand, pressure of substitutes, such as LPG and coal, encouraged the bargaining power of buyers. Because they were volume users, their bargaining power were strong.

[Japan]

- Consumption for gasoline, kerosene, diesel fuel, and fuel oil are 21, 13, 18, and 30%, respectively. With the exception of gasoline, there are big buyers in most sectors. They are very strong. As a result, there is almost no profit from them. Margins for gasoline, kerosene, diesel fuel, and fuel oil are 65, 6, 4 , and -24 cents per gallon, respectively.

b) The product, which a buyer purchases from the oil industry, represents a significant fraction of its costs or purchases [23]

[USA]

- There are many indicators for which oil purchases are a very significant proportion of cost. For example, the paper industry spends 10% for the cost of fuel. The truck transportation and air transportation industries spend 10% for their fuel costs. Electric power companies spend 20% for their fuel costs. In the petrochemical industry, the cost of naphtha occupies about 70 to 80% of the total ethylene cost. The petroleum cost was a large portion and therefore buyers expended resources on locating the lower cost suppliers.

[23] Daiwa Research, Deregulation can change the industry, 1994

[Japan]
- Fuel cost ratio is almost the same in Japan. For the heavy users, fuel cost occupies a large portion.

c) The products, which a buyer purchases from the oil industry, are standard or undifferentiated

As discussed earlier in "1)-b) Product differentiation", there is no differentiation.

d) It faces few switching costs

As discussed in "2)-d) The product or service lacks differentiation or switching costs", there is little switching cost. However, buyers may not switch too often, because switching may affect stable supply.

e) It earns low profits

[USA]
- The economy had gone into recession. So, most companies were not so profitable.

[Japan]
- The economy has not recovered from the long recession, yet. The strong Yen and competition with foreign companies shrink a company's profitability. Paper and petrochemical companies can not make much money. Both the profitable and non-profitable buyers are price sensitive.

f) Buyers pose a credible threat of backward integration

[USA]
- Buyers did not want to do so because (1) they needed huge investments, (2) they would need to operate at a huge scale, and (3) products were available at a fair price.

[Japan]
- The regulation prohibits other industries from backward integration. Even deregulated, buyers may not integrate backward, because of the huge investment.

g) Oil product is unimportant to the "quality" of the buyer's products or service

[USA]

- Except for some special products, such as lubricant oils and special coke, most products required only standard quality.

[Japan]

- Because oil products are used as a commodity, special quality is not required, in general. In addition to that, all the products already have higher quality than necessary.

h) Government

[USA]

- Price control enabled buyers to avoid efforts to reduce energy consumption. For example, the relatively low heating oil price let consumers keep rooms warmer than necessary. The artificially low prices increased demand.

[Japan]

- In order to protect some industries, government strongly requests oil companies to provide oil products at a discount. Because of the strong government control, oil companies must follow its direction.

i) Summary

[USA]

- Petroleum products, other than gasoline, were sold to volume customers. For them, quality was not so important and cost had great importance. On the other hand, oil companies had to sell all the petroleum products they refined to increase the utilization rate. For those reasons, buyers were very strong.

[Japan]

- The situation is the same in Japan. Volume users are less profitable industries. They are very sensitive to costs.

Table 2-1-7 : Force-4: Bargaining Power of Buyers

Item	Country	Condition	<---------->	Condition
Volume of purchase	USA Japan	Large	A J	Small
Fraction of buyer's cost	USA Japan	Large	A J	Small
Product differentiation	USA Japan	Commodity	A J	Specialty
Switching cost	USA Japan	Low	A J	High
Buyer's profitability	USA Japan	Low	A J	High
Threat of backward integration	USA Japan	High	A J	Low
Quality importance	USA Japan	Low	A J	High
Government	USA Japan	Increase	A J	Decrease
Summary	USA Japan	Strong	A J	Weak

5) Force-5 : Bargaining Power of Suppliers

a) The supplier is dominated by a few companies and is more concentrated than the oil industry

[USA]

- At that time, the supply of crude oil was controlled by the Organization of Petroleum Exporting Countries (OPEC), which was established in 1960. Nationalization in the 70s empowered OPEC. Oil companies lost oil concessions. By the late 70s, the control of crude oil had shifted from the major oil companies to OPEC.
- Because of the price regulation installed in 1973, domestic crude oil production was discouraged. It declined to 3.0 billion barrels per year in 1979, which was down from 3.5 billion in 1970. On the other hand, crude oil imports increased to 2.4 billion barrels per year in 1979, up 0.5 billion from 1970.

[Japan]

- Japan deeply depended on crude oil supplies from the Middle East countries for a long time, and its source has not changed. However, OPEC has lost its power compared to the

70s. From the mid 80s, crude oil became available in the market. Oil companies got crude oil easily by direct deals and from the market.

b) It is not obliged to contend with other substitute products for sale to the industry

[USA]

- There was no substitute for crude oil. Even though the demand for other energy sources, such as nuclear and synthetics, were expected to increase, they could not replace oil in a short time.

[Japan]

- The safety issue involved in nuclear power forces the country to rely on oil as most of its energy source. So, there is no substitute for oil, especially in the short term.

c) The industry is not an important customer of the supplier group

[USA]

- Because most of the oil producing countries' revenue came from crude oil sales and the USA was volume customer, the USA was important for the supplier group. However, demand exceeded supply at that time.

[Japan]

- Many oil producing countries needed money. Supply exceeded demand. The oil industry was the only customer for the oil producing countries. The oil companies were very important for the supplier.

d) The supplier group's products are differentiated or it has built up switching costs

[USA]

- There are two types of crude oil; sweet and sour[24]. Most of the refineries were built to process sweet crude. In order to process sour crude oil, they need an additional investment. So, sweet crude was favored.
- On the other hand, most of the new supply was sour crude. So, in order to prevent crude shortage, oil companies started investing in coping with sour crude oil.

---

[24] Sweet crude contains relatively low sulfur. On the other hand, sour crude contains large amount of sulfur.

[Japan]

- Japanese refineries are initially designed to process sour crude oil. So, they can process both sour and sweet. No differentiation exists in Japan.

e) The supplier group poses a credible threat of forward integration

[USA]

- Some foreign countries, such as Venezuela and Saudi Arabia, were just seeking to enter the USA market. In order to increase crude production, the distribution channels are very important. However, government policy prevented them from doing so.

[Japan]

- Some Middle-East countries are willing to enter. However, the expensive investment prevents them from forward integration. Forward integration is not a threat.

f) Government / Policy

[USA]

- Through the price control regulation, the government kept the domestic crude price low compared to the international price. This discouraged domestic production and increased crude imports.

[Japan]

- Because of the two oil shock experiences, government is promoting crude oil production by subsidies.
- The joint venture plans between Saudi Arabia and Japan to build a refinery, which was supported by the Japanese government, were found to be not feasible because of the huge capital investment requirement.

g) Summary

[USA]

- The supplier, OPEC, got much stronger at this time. Crude oil was controlled by OPEC. Regulation empowered OPEC because price control discouraged domestic production and increased the crude oil imports.

[Japan]

- Almost 100% of crude oil supplies are imported. Most crude comes from Middle East countries. Thank to the international oil market, oil suppliers become weaker than before.

Table 2-1-8 : Force-5: Bargaining Power of Suppliers

Item	Country	Condition	<---------->	Condition
Number of suppliers	USA Japan	Few	A J	Many
Competition with substitute	USA Japan	Weak	A J	Strong
Importance of Oil industries	USA Japan	Not important	A J	Important
Switching cost to change supplier	USA Japan	High	A J	Low
Threat of forward integration	USA Japan	High	A J	Low
Government policy	USA Japan	Attractive	A J	Unattractive
Summary	USA Japan	Strong	A J	Weak

2.2 History of regulation

Section-1 : History of US regulation [25]

The US petroleum industry started in 1859, when Colonel E.L.Drake applied salt well drilling techniques to petroleum exploration and discovered the first commercial oil well. Since then, the history of oil protection started. First, the history of regulation, including tariffs, until the 1950s, is quickly reviewed, and then the regulation in the 1970s, including price regulation and allocation programs are discussed in detail.

1) Early protectionism : 1861-1909

The first period of oil industry protectionism began during the Civil War, from 1861 to 1865. The North enacted tariffs on crude oil and oil products. Starting from $ 0.10 per gallon, the excise tax increased to $1.00 per gallon in 1865. It was repealed in May 1866, after the organized industry had protested.

By 1880s, oil became one of the four leading export commodities in the United States. A new countervailing tariff provision in the 1894 law allowed a 40 percent tax on crude oil and oil products if the importing country had a similar duty. The Dingly Tariff in 1897 increased the countervailing tax to 100 percent. In 1909, countervailing duties applicable to oil were repealed, and a free trade era had begun. However, anti-trust actions had a major effect on industry structure. In 1911, the court ordered Standard Oil to split into 35 companies.

2) Open trade : 1909-1931

Even though there were wartime regulations, this period was characterized by open trade.

In 1917, federal authorities established a wartime bureaucracy and appointed an oil czar to regulate the pricing, allocation, entry, exit, and end-use decisions of crude oil and oil products. After World War I, from 1914 to 1918, the petroleum wartime regulations and bureaucracy were dismantled.

---

[25] Bradly, Robert L., The Mirage of Oil Protection, 1989
[25] Weiss, Leonard W. & Klass, Michael W., Regulatory Reform What Actually Happened, 1981
[25] Linde, Coby van der, Dynamic International Oil Market, 1991
[25] Yergin, Daniel, The Prize, 1991

With aggressive exploration in Mexico, Venezuela, Colombia, and Peru, leading to major discoveries, US crude imports increased rapidly. In 1920, the imports exceeded the exports. However, in 1923, the exports exceeded the imports again, because of the steady increase of exports and cyclical decline of imports.

Table-2-2-1 : Imports and Exports (1918-1929)

Year	Crude Oil		Refined Products		Total	
	Imports mBPSD	Exports mBPSD	Imports mBPSD	Exports mBPSD	Imports mBPSD	Exports mBPSD
1918	103	16	3	173	107	188
1919	145	17	4	158	148	175
1920	290	25	7	192	297	218
1921	343	26	9	171	353	197
1922	357	30	16	175	373	204
1923	225	48	48	232	273	280
1924	213	50	46	271	258	321
1925	169	37	45	276	214	312
1926	165	42	57	321	223	363
1927	160	43	37	346	197	390
1928	218	52	32	372	250	423
1929	216	72	82	375	298	447

Source : Energy Information Administration, US Department of Energy

3) Control to maintain high oil prices : 1932-49

Led by the Seminole field in Oklahoma, megafields were uncovered in Texas and Oklahoma. Overproduction drove prices down and a quest for stability began. The Great Depression in 1929 and the discovery of the East Texas field in 1930 worsened the situation. The new conservation movement centered around reducing domestic output to create and maintain prices which were necessary to support marginal wells. In 1927, field proration orders were first issued by the Oklahoma Corporation Commission and the Texas Railroad Commission for major fields to limit output to market demand. Accompanying market-demand proration were well spacing minimums, maximum gas-oil ratios, and field shutdown orders. All of them intended to limit output and raise prices. In September 1933, the wellhead-to-pump federal regulation, a formal quota for oil and oil products under the National Recovery Act, was enacted. With the voluntary quota in 1930-31 and the tariff in 1932, this regulation helped to reduce the imports. In May 1935, the quota was annulled to leave the voluntary quota and the tariff as the barriers to imports.

World War II petroleum planning was a repeat of the World War I experience. The price, allocation, and entry/exit regulations were taken. Oil wells were assigned a maximum efficient rate for regulated production. Civilian gasoline and fuel oil were rationed by coupon.

With severely restricted allowance in the oil states, domestic prices were maintained. However, imports were seeping in to replace the restricted domestic supply. The reduction of tariffs starting from 1947 accelerated this trend. In 1948, the US became a net importing nation for the first time since 1922.

Table-2-2-2 : Imports and Exports (1930-1949)

Year	Crude Oil		Refined Products		Total	
	Imports m BPSD	Exports m BPSD	Imports m BPSD	Exports m BPSD	Imports m BPSD	Exports m BPSD
1930	170	65	119	364	289	429
1931	129	70	106	271	236	341
1932	122	75	81	208	204	382
1933	87	100	37	192	124	292
1934	97	113	41	201	138	314
1935	88	141	56	212	144	353
1936	88	137	68	224	156	361
1937	75	184	81	289	157	474
1938	72	212	76	319	149	531
1939	91	197	71	323	162	520
1940	117	141	112	216	229	356
1941	139	91	127	207	266	298
1942	34	93	65	228	99	320
1943	38	113	136	298	174	411
1944	122	94	130	474	252	567
1945	204	90	108	411	311	501
1946	236	116	141	303	377	420
1947	267	127	169	324	437	451
1948	353	109	161	259	514	367
1949	421	91	224	236	645	327

Source : Energy Information Administration, US Department of Energy

4) Discontent and voluntary import restrictions : 1949-58

The period from 1949 to 1958 was difficult for the domestic producers. Inflation, particularly pronounced in the post-World War II and Korean conflict periods, and reduced tariffs in real terms, these contributed to record imports of both crude and products. In order to reduce imports, oil producers voluntary took actions. The Texas Railroad Commission required importers to keep meticulous records of both actual and planned imports. This agreement between the Commission and importers worked well to limit imports. There were no doubt that without this voluntary import restriction, imports would have increased more. This voluntary program became more formal and strong. Imports finally dropped in 1958.

Table-2-2-3 : Imports and Exports (1950-1958)

Year	Crude Oil		Refined Products		Total	
	Imports m BPSD	Exports m BPSD	Imports m BPSD	Exports m BPSD	Imports m BPSD	Exports m BPSD
1950	487	95	363	210	850	305
1951	491	78	354	344	845	422
1952	573	73	380	359	953	432
1953	648	55	386	347	1034	402
1954	656	37	396	318	1052	355
1955	782	32	466	336	1248	368
1956	934	78	502	352	1436	430
1957	1023	138	552	430	1575	568
1958	953	12	747	264	1700	276

Source : Energy Information Administration, US Department of Energy

5) The Mandatory Oil Import Program : 1959-1973

The Mandatory Oil Import Program of 1959 (MOIP), which set strict import quotas, was introduced by President Eisenhower. The program was relatively uniform, but there were many loopholes. So, imports, of both crude oil and refined products, continued increasing. Program revisions in the 1960-65 period succeeded primarily in closing loopholes. However, they were focused more on bringing the program to facing the new realities than to actually reducing imports. It also became very complicated and politicized, and was finally dismantled in 1973. By that time, the overproduction concerns of the proration era were forgotten amid an Arab embargo which created oil product shortages.

Table-2-2-4 : Imports and Exports (1959-1972)

Year	Crude Oil		Refined Products		Total	
	Imports m BPSD	Exports m BPSD	Imports m BPSD	Exports m BPSD	Imports m BPSD	Exports m BPSD
1959	965	7	814	204	1779	211
1960	1015	8	799	193	1814	201
1961	1045	9	872	165	1917	174
1962	1126	5	955	163	2081	168
1963	1131	5	1000	203	2131	208
1964	1198	4	1060	198	2258	202
1965	1238	3	1229	184	2467	187
1966	1225	4	1348	194	2573	198
1967	1128	73	1409	234	2537	307
1968	1291	5	1549	226	2840	231
1969	1409	4	1757	229	3166	233
1970	1324	14	2095	245	3419	259
1971	1681	1	2245	223	3926	224
1972	2222	1	2532	222	4754	223

Source : Energy Information Administration, US Department of Energy

6) Price control and Allocation program and its deregulation: 1974-1986

President Nixon enacted the price control for all industries in order to suppress inflation. It was a temporary program and ended in 1973. However, because of the Arab embargo, price control remained only for the oil. It became permanent. The price ceiling produced the price difference between domestic crude oil and imported crude oil.

Tariffs enacted in 1932 survived for about a four-decade period, with modifications in 1939, 1943, 1952, and 1962. With the termination of the MOIP, tariffs were modified in 1973. This new fee program was complicated and motivated the continuing subsidy to the small refiner.

In order to prevent the panic of oil shortages, allocation programs, which directed who could sell crude oil and products, was introduced in 1975. An entitlement program was a part of it. It was aimed at equalizing the refining margin by subsidies to the imported crude oil refiners. Because of the price control, there was large refining margin difference between the refiners who refined cheap domestic crude oil and the refiners who refined expensive imported crude oil without the subsidy system. So, the crude oil was controlled in terms of price. Oil products were controlled in terms of their margins.

Price control and allocation program were supported by the people who objected to the rapid price increases.

The price control on crude oil discouraged the domestic production and increased imports more and more. The problem was enlarged when the second oil shock pushed up the price again in 1979-1981. Also, oil companies had to hire people who worked on the regulation matters, such as lawyers and accountants. From 1976, both programs began to loosen, but they were not entirely removed until 1981.

While tariffs and quotas were bandied about to reduce imports and foreign oil dependence, US regulation, price controls and the allocation program, or entitlements program, opened the door for imports. And regulations and imports artificially encouraged demand and discouraged domestic supply.

After the deregulation, high price decreased oil demand and encouraged the oil exploration and production. As a result, imports decreased drastically.

Table-2-2-5 : Imports and Exports (1973-1986)

Year	Crude Oil		Refined Products		Total	
	Imports m BPSD	Exports m BPSD	Imports m BPSD	Exports m BPSD	Imports m BPSD	Exports m BPSD
1973	3244	2	3012	229	6256	231
1974	3477	3	2635	218	6112	221
1975	4105	6	1951	204	6056	210
1976	5287	8	2026	215	7313	223
1977	6615	50	2193	193	8808	243
1978	6356	158	2008	204	8364	362
1979	6519	235	1937	236	8456	471
1980	5263	287	1646	258	6909	545
1981	4396	228	1599	367	5995	595
1982	3488	236	1625	579	5113	815
1983	3329	164	1722	575	5051	739
1984	3426	181	2011	541	5437	722
1985	3201	204	1866	577	5067	781
1986	4111	154	1950	618	6061	772

Source : Energy Information Administration, US Department of Energy

Section-2 : History of Japanese regulation [26]

In the 1870s, Japan imported kerosene from Standard Oil. In 1893, Samuel Company also started exporting kerosene to Japan. In 1888, Nippon Oil was established. It was the beginning of Japanese oil industry. World War II changed the oil industry completely. I review regulation after World War II.

1) GHQ control : 1945-1951

The present framework of Japan's petroleum industry was created between 1945 and 1951. The GHQ set up the Petroleum Advisory Group (PAG) in 1945, which consisted of the so-called Majors, such as Standard-Vacuum (Exxon and Mobil), Royal Dutch Shell, Caltex (Chevron and Texaco), Tide Water (Getty) and Union. It ruled the petroleum policy in Japan. From 1946 to 1950, the operation of refineries on the Pacific coast was banned. In 1949, GHQ appointed primary distributors (*motouri*), which could distribute petroleum products to the market, along with refineries for processing domestic crude oil. Eleven Japanese companies and three foreign companies were appointed. Foreign companies, Royal Dutch Shell, Standard-Vacuum, and Caltex got a 72% of the market.

On their way to re-establishing themselves, the Japanese oil companies needed financial resources, modern refining technology, and a stable supply of crude oil. Capital-based alignment with foreign oil companies emerged. Joint-ventures were set up by Standard-Vacuum and Toa Nenryo, Caltex and Nippon Oil, Tide Water and Mitsubishi Oil, Royal Dutch Shell and Showa Oil, and Union and Maruzen Oil. All PAG members started business in Japan.

2) Foreign Exchange Allocation : 1951-1962

In 1951, prior to the San Francisco Peace Treaty, GHQ abolished PAG and transferred its function to the Japanese government. In order to form the "on-shore refining principle", a system in which the petroleum supply should involve refining at the site of consumption, Foreign Exchange Allocation for petroleum imports played an important role. MITI promoted the expansion of refining capacity and restricted product imports. The oil industry followed MITI's policy because oil companies could not buy crude oil without

---

[26] Satoh, Hirao, "Deregulation and Japan's Petroleum Industry", USJP Occasional Paper, 1993
[26] Okabe, Akira, Petroleum, 1986
[26] Resource and Energy Department of MITI, Energy Policy and its Future, 1993
[26] Homma, Makoto, "Japan's Energy Policy and Its Impact on Product Trades", ICEED, 1993

foreign currency. This regulation was also used to protect coal and promote the petrochemical industry. In 1952, MITI, who got authority from GHQ in previous years, deregulated the allocation of petroleum products and price control. Because of MITI's coal protection policy, the heavy oil prices were kept relatively high and oil companies earned a lot of money.

3) Introduction of Petroleum Industry Law: 1962-1973

In 1959, at the General Meeting of GATT held in Tokyo, Japan was urged to liberalize its market so as to become a full partner in the international trading system. Crude oil import was liberalized from October 1962. Government worried about the Majors' control, which had financial strength and huge crude reserves. In order to maintain a stable supply of petroleum products and its "on-shore-refining principle", MITI enacted the Petroleum Industry Law (Law No.128 of 1962 : *Sekiyu Gyouhou*). In essence, the law gave MITI the authority to (1) approve or deny new and expanding refinery installation, (2) coordinate demand and supply, and (3) set standard prices for petroleum products. Permission for additional refinery installations and the coordination of demand and supply were, in principle, executed on the basis of the Petroleum Supply Plan (*Sekiyu Kyokyu Keikaku*) that was prepared in line with the annual five year supply and demand forecasts. In short, allocations of refining throughput, import of petroleum products, and permission to build new refineries or to expand old refineries were decided according to this supply plan. Allocations of refining throughput were related to a companies' market share. So, oil companies had no way to manage it. It caused enormous troubles for refiners. In 1963, Idemitsu Kosan resigned from the Petroleum Association of Japan (PAJ), protesting that MITI's control of production disadvantaged the company. Technically, the Petroleum Industry Law merely required refiners to notify MITI of their production plans. However, the arrangements actually involved getting permissions from MITI, which had the authority to permit new and expanding refinery installations. This production adjustment was implemented by PAJ under MITI's administrative guidance. MITI abolished the adjustments in 1966, owing to growing public criticism, but managed to guide production via other advice of administrative guidance, such as regulation of the construction of new gasoline stations. Idemitsu Kosan re-joined PAJ.

4) Oil crisis strengthens government control: 1973-1986

In October 1973, the Arab embargo led to the first oil crisis. The shortage began with kerosene, whose price rose as it became scarce, and moved on to toilet paper and household detergents. In November 1973, the cabinet enacted an Emergency Petroleum

Countermeasures Policy (*Sekiyu Kinkyu Taisaku Yoko*). Its purpose was to; (1) promote energy conservation, (2) utilize administrative guidance to reduce consumption of petroleum and electricity, (3) control unreasonable price increases and profit taking, and ensure direction of necessary energy supplies to public facilities, (4) enact emergency laws to stabilize the national economy and the people's livelihood when necessary, (5) strengthen measures to control demand and inflation, and (6) stabilize energy supply.

Bureaucrats did not prepare for the crisis, and employed familiar solutions, including price controls. Two petroleum laws were enacted in December 1973, the Emergency Measures Law for the Stabilization of the People's Livelihood (*Kokumin Seikatsu Antei Kinkyu Sochi Ho*), and the Petroleum Supply and Demand Normalization Law (*Sekiyu Jyukyu Tekiseika Ho*). The two laws gave MITI broad powers to target petroleum supply, the import of crude oil and petroleum products, and marketing, to require reports on supplies from wholesalers and retailers, to establish standard prices for designated commodities, and to fine violations. When OPEC reduced supply and raised prices of crude oil, the government set the price of domestic petroleum products to soften the impact on consumers. Prices were set as low as possible, and price hikes were delayed by administrative guidance. Administrative control of prices distorted the normal price mechanism by keeping kerosene (household heating oil) prices low but dramatically increasing gasoline prices. Gasoline became the only profitable product for refineries.
The oil crisis reminded Japanese that they needed their government bureaucracy, and left that bureaucracy with strengthened control over the petroleum industry. Those two emergency laws were used only at the first oil crisis, even though they still exist.

MITI used its licensing powers under the Petroleum Industry Law to limit refiner's profits, in order to provide the lowest possible costs to heavy industry and to enhance Japanese international competitiveness. For the petroleum industry, this strategy meant lost opportunities to become competitive and access to the international oil market. Also government burdened petroleum producers with heavy taxes.

5) Start of Deregulation --- *Tokuseki-ho* and Action Program : 1986-1995

In an effort to defuse foreign criticism, MITI freed the imports of petroleum products, such as gasoline, kerosene, and diesel oil, from 1986 under the Provisional Measures for Importation of Specified Petroleum Refined Products (Law No.95 of 1985: *Tokuseki-ho*). However, the law virtually limited importers of these petroleum products so that only the

companies who owned the oil refining facilities were able to control product quality. It meant that only existing Japanese oil companies could import petroleum products.

In 1987, a five-year Action Program was instituted to deregulate the petroleum industry. The program was completed with reasonable success at the end of March 1992. It included five steps: (1) easing of the approval system for refineries to enable their unrestricted construction and expansion (July 1987), (2) an end to guidance regarding production plans for petroleum products (March 1989), (3) a review of guidance concerning maintenance of kerosene stocks just prior to the kerosene consuming season (September 1989), (4) a gradual phase out of guidance on brand switching by service stations and guidance on construction of service station outside the designated area under the Gasoline Sales and Distribution Business Law (March 1990), and (5) an end to guidance to individual refiners regarding planned volumes of crude for refining, except where stability of oil supply might be jeopardized (March 1992).

Table 2-2-6 : Gasoline Import in Japan

Year	Demand BPSD	Import BPSD	Ratio %
1984	621	0	0.0
1985	632	9	1.4
1986	649	63	9.7
1987	663	70	10.5
1988	684	74	10.8
1989	736	58	7.8
1990	772	37	4.8
1991	795	24	3.1
1992	812	18	2.2
1993	831	8	1.0

Source : MITI

6) Further deregulation : 1996-

Despite the enactment of the *Tokuseki-ho* and a series of deregulation measures in the oil industry, the price of petroleum products did not decline. Now, the gasoline price in Japan is four times higher than that in the USA.

Requests for globalization and liberalization grew from inside and outside of Japan. MITI had decided to abolish the law and to enact a new law which allows newcomers, such as trading companies and the Agriculture Organization, to freely import gasoline and other

petroleum products. There was a huge resistance from Japanese oil companies because it would lead to intense domestic competition. Also the automobile industry feared the cheap poor quality product distribution. However, the abolition of the law became the centerpiece of a package of deregulation measures, being advanced by the Murayama coalition administration.

MITI has decided to abolish *Tokuseki-ho* at the end of March 1996. A new law which allows the import of cheap low quality petroleum products, will become effective from April 1996.

2.3 Summary

In the first part, the industry before the deregulation is analyzed. Compared to the US, Japanese oil companies import very small amounts of products, work in narrow scope (refining and marketing), and make less money. On the other hand, there are some similarities, such as slow or negative demand growth and low refinery utilization.
In short, the Japanese industry is weaker and smaller than that of US.

According to the five force analysis, even though the bargaining power of a buyer is strong, the weak threat of entry and weak intensity of rivalry make the US oil industry attractive. Compared to the US, the Japanese oil industry is much more attractive. In both countries, government policy plays a significant role. US price regulation weakens intensity of rivalry very much. On the other hand, the price allocation program encourages the small refiners to go into the business by giving subsides. In Japan, product import regulation weakens the threat of entry and intensity of rivalry significantly. The reason why Japanese industry is weaker and smaller but more attractive than US industry is government. Government artificially makes the industry attractive.

In the second part, the history of regulation is reviewed. In both countries, the history of the oil industry is the history of regulation. However, US oil companies were given a much freer hand. For example, product import and export were allowed. Also, medium and large companies were operating overseas. On the other hand, the Japanese oil companies are completely controlled by MITI. Even though deregulation was started from 1986, through the action program, government control is much stronger compared to the US in 1979.

It is concluded from this information that Japanese oil industry is the victim of MITI's policy to protect the Japanese industry. In order to promote the material industry, MITI forced the oil industry to lower the price of naphtha, gas oil, and heavy fuel oil. As a tradeoff, MITI promoted the increase in gasoline price to maintain the oil industry's profitability. The high gasoline price were also good for the government because it made money from gasoline tax. As a result, only gasoline prices became relatively high compared to the international price. The oil industry could make money only from gasoline. Its profit position became weak. Also, MITI used oil to promote internationalization of other industries. So, it needed to keep controlling oil. The oil industry was not allowed to become international. They lost the opportunity to become competitive. High cost, no strategy, following the government's suggestions, and low profitability represent the Japanese oil industry very well. They are typical characteristics of a regulated industry.

Now that government is going to stop playing its role it is clear that things will change dramatically.

In the next chapter, the US deregulation analyzed and lessons are drawn from it.

Table 2.3.1 : Comparison table between USA (1979) and Japan (1993)

	USA (1979)	Japan (1993)
Environment		
Power	OPEC	Market
Demand growth	Declining	Very slow increase
Crude Import *1	6,519 mBPSD	4,419 mBPSD
Product Import *1	1,937 mBPSD	480 mBPSD
Oil Industry		
Scope	Up + Down stream	Down stream
Top company's share	8%	18%
Top company's revenue	$ 79 billion / year	$ 30 billion / year
Income per revenue	6.3 %	2.6%
Refinery utilization	85%	80%
Five-Force (attractiveness)*2	Attractive (4)	Very attractive (5)
1) Threat of Entry	Weak (4)	Very weak (5)
2) Intensity of Rivalry	Weak (4)	Very weak (5)
3) Pressure of Substitute	Neutral (3)	Low (4)
4) Buyer's power	Strong (2)	Strong (2)
5) Supplier's power	Neutral (3)	Very weak (5)
6) Government	Not attractive (2)	Attractive (4)
Regulations	Price control Allocation program	Product import

*1 : Source : MITI, US Department of Energy

*2 : Attractiveness is 1-5 scale. 5 = very attractive, 1 = very unattractive.

Chapter-3 Deregulation

The objective of this chapter is to explain the lessons learned from the deregulation of the market.

In the first part, the price control deregulation in the USA is analyzed. Interviews, annual reports, questionnaires, and book reviews are the main sources of information for this part.

In the second part, the gasoline deregulation in Europe is briefly overviewed.

3.1 Price control deregulation in the USA [1]

Section-1: Regulation

There were two regulations in the 70s. In 1971, price regulation was applied to the all industries to suppress the inflation. In 1973, price regulation was removed. However, because of the Arab embargo, price control remained only for oil. In 1975, the allocation program was enforced. This program directed who could sell crude oil and petroleum products. Even though those regulations began to loosen from 1976, they were not entirely removed until 1981.

Under the regulation, the price of domestic crude oil was set lower than the international price. On the other hand, petroleum products were controlled not by price itself, but by the margin. In short, the refiners who processed cheap domestic crude oil had to pay money to refiners who processed expensive import crude oil, in order to equalize the margins. In addition to that, government gave subsidies to small refiners. In production, domestic producers were forced to sell domestic crude oil more cheaply than the international price. Those regulations were supported by the people who objected to the rapid price increase. However, the government kept them too long. Everybody, inside and outside of the oil industry, tried to make money by using regulations.

First, small refiners came into the business. From 1974 to 1979, about 3,000,000 barrels per day of crude capacity was added. Nine hundred thousand barrels per day of crude

[1] Standard & Poor's, "Oil --- Basic Analysis", Standard & Poor's Industrial surveys, 1971-1995

capacity was added by 64 small refineries, averaging 14,000 barrels per day. The average capacity of US refineries was only about 60,000 barrels per day, which was less than half that of the refineries in Western Europe and Japan.

Second, the relatively low domestic crude price discouraged oil companies from exploration and production in the USA. Instead of exploration in the USA, it was better to explore in a foreign countries. Also, under the upward trend of oil price, it was better to keep crude oil under the ground as an inventoried stock, rather than produce it and sell it cheaply. With the import quota system liberalization in 1971, imports increased dramatically. The import ratio of oil consumption increased from 33% in 1972 to 47% in 1977.

Table 3-1-1 : US Import

Year	Consumption mmTon/Y	Domestic mmTon/Y	Import mmTon/Y	Ratio %
1970	14,697	11,278	3,419	23
1971	15,213	11,288	3,925	26
1972	16,367	10,924	5,443	**33**
1973	17,308	11,283	6,025	35
1974	16,653	10,761	5,892	35
1975	16,322	10,476	5,846	36
1976	17,461	10,371	7,090	41
1977	18,431	9,866	8,565	**46**
1978	18,847	10,845	8,002	42
1979	18,513	10,528	7,985	43
1980	17,056	10,691	6,365	37
1981	16,058	10,657	5,401	34
1982	15,296	10,998	4,298	**28**
1983	15,231	10,919	4,312	28
1984	15,726	11,011	4,715	30
1985	15,726	11,440	4,286	27
1986	16,142	10,853	5,289	33

Source : Energy Information Administration, US Department of Energy

Section-2 : Deregulation

1) Market mechanism --- Price & Over-Capacity

During regulation, the artificially low prices created unnecessary demand. Also, it decreased the supply. After the deregulation, crude prices increased to the international

level. The domestic production became profitable. On the other hand, refinery margins dropped sharply. Even though oil demand peaked in 1978, refining capacity increased until 1981. As a result, refinery utilization dropped significantly. From 85-90 % level in the 70s, it dropped below 70%. Also, in order to cope with imported heavy crude oil and to produce unleaded gasoline, refiners invested in cracking capability. This increased light products yield.

Table 3-1-2 : US Refining Capacity

Year	Capacity mBPSD	Throughput mBPSD	Utilization %
1970	12,658	10,870	85.9
1971	13,035	11,199	85.9
1972	13,483	11,728	87.0
1973	14,220	12,431	87.4
1974	14,697	12,133	82.6
1975	14,868	12,902	86.8
1976	15,862	13,922	87.8
1977	16,794	14,982	**89.2**
1978	17,148	15,071	87.9
1979	17,791	14,955	84.1
1980	17,610	13,496	76.6
1981	18,050	12,486	69.2
1982	17,410	11,777	**67.6**
1983	15,865	11,215	70.7
1984	15,144	12,055	79.6
1985	15,183	12,025	79.2

Source : Exxon Corporation

In addition to that, external factors decreased oil demand. High oil prices led to the technological innovation. For example, Japanese automobiles with high fuel efficiency reduced gasoline demand. As a result, the gasoline margin dropped sharply from $8.12 per barrel in 1979 to $2.57 per barrel in 1981.

In the initial reduction of US deregulation, small refiners went out of business immediately. In addition to that, old refineries had to scrap their unprofitable capacity. During 1981 to 1985, 2.7 million barrels per day of capacity was scrapped. This included 58 refineries with 0.9 million barrels per day of capacity, which were built during the regulation period.

Table 3-1-3 : US Refinery Gross Margin

Year	Crude $/Barrel	Product $/Barrel	Gross Margin $/Barrel
1970	3.13	4.16	1.03
1971	3.37	4.45	1.08
1972	3.40	4.40	1.00
1973	3.89	5.32	1.43
1974	6.74	10.04	3.30
1975	7.56	11.35	3.79
1976	8.13	12.37	4.24
1977	8.89	14.00	5.11
1978	8.95	14.16	5.21
1979	12.61	20.79	**8.18**
1980	22.67	30.48	7.81
1981	34.92	37.49	**2.57**
1982	31.72	34.94	3.22
1983	29.34	32.42	3.08
1984	28.95	31.29	2.34
1985	26.59	30.44	3.85
1986	14.66	18.28	3.62
1987	14.45	21.36	6.91

Source : Independent Petroleum Association of America...

Table 3-1-4 : Scraped Refinery

Year	Unit	Built after Jan. 1973		Built before Jan. 1973		Total	Average Capacity
		Straight	Complex	Straight	Complex		
1981	mBPSD	47	24	39	298	407	23
	# of scrap	(6)	(1)	(6)	(5)	(18)	
1982	mBPSD	406	8	115	343	871	19
	# of scrap	(25)	(1)	(15)	(5)	(46)	
1983	mBPSD	113	15	67	454	649	31
	# of scrap	(9)	(1)	(7)	(4)	(21)	
1984	mBPSD	146	131	76	238	591	24
	# of scrap	(8)	(3)	(6)	(8)	(25)	
1985	mBPSD	47	0	25	114	187	17
	# of scrap	(4)	(0)	(3)	(4)	(11)	
Total	mBPSD	**759**	**177**	322	1447	2704	22
	# of scrap	**(52)**	**(6)**	(37)	(26)	(121)	
Average Capacity	mBPSD	15	30	9	56	22	

Source : Energy Information Administration, US Department of Energy

Note : 1) Upper row shows total crude capacity scraped (BPSD)
2) Lower row shows number of refinery scrapped
3) Straight means "Straight run refinery", whose downstream capacity is less than crude capacity

The impact of deregulation was relatively mild. As margins shifted from refining to production, the net income percent of revenue changed a little. However, refiners decreased margins dramatically. Average net income of the top 7 refineries dropped from 6.5% of revenue in 1979 to 1.3% in 1981.

Table 3-1-5 : Net Income (% of Revenue)

Year	1979	1980	1981	1982
Integrated company --- International				
British Petroleum	8.9	6.9	4.2	2.4
Chevron	6.0	5.9	5.4	4.0
Exxon	5.4	5.5	5.2	4.3
Mobil	4.5	4.7	3.8	2.3
Royal Dutch Shell	11.1	6.3	4.7	4.7
Shell Transport	11.1	6.5	4.2	4.0
Texaco	4.6	4.4	4.0	2.7
Average	6.8	5.6	4.6	3.5
Integrated --- Domestic				
Arco	7.2	7.0	6.0	6.3
Occidental	5.9	5.7	4.9	0.9
Phillips	9.4	8.0	5.5	4.1
Shell	7.8	7.8	7.9	8.0
Standard (Indiana)	8.1	7.3	6.4	6.5
Standard (Ohio)	15.0	16.4	14.5	13.9
Sun	6.8	5.6	7.2	3.5
UNOCAL	6.6	6.5	7.4	7.7
Average	8.2	7.8	7.2	6.3
Refiners				
Ashland	8.1	2.5	1.0	2.0
Charter	8.7	1.1	1.1	0.8
Crown Central	6.8	1.5	0.2	0.4
Holly	2.6	2.2	1.4	2.0
Quaker	4.9	3.1	3.0	4.2
Tesoro	2.5	2.9	2.6	2.1
Tosco	4.1	1.9	0.7	3.5
Average	**6.5**	2.2	**1.3**	1.9
Crude & Gas Production				
LL&E	21.4	17.4	11.6	6.5
Mesa Petroleum	113.2	29.0	31.4	34.7
Mitchell E&D	13.4	14.5	10.8	8.4
Pogo Producing	26.3	24.5	22.9	18.4
Southland Royally	21.4	17.1	9.1	8.1
Texas oil & gas	10.8	13.3	13.4	14.9
Average	25.3	17.1	14.1	12.6

Source : Standard & Poor's Industrial Survey

2) Change from the regulated to deregulated world

All the companies interviewed spoke of the difficulties in changing from a regulated environment to a deregulated environment. Under the regulated world, it is quite clear what you can and cannot do, and how you are supposed to do it. However, under the competitive environment, there are many competitors rather than one government. It is difficult to get good information about how to cope. You must be responsible to the customer instead of the government. Also, under the regulated environment, the cost plus margin determines price. Under the competitive environment, price determines your cost.

The most difficult thing is to get back into the old habits of aggressive marketing and cost control. You need to be more active in those areas as you were in the past. You must change quickly. It is better to change the way of thinking before the deregulation. However, it is difficult in the real world. One way is to hire new people and re-train people to do the job in the competitive market.
In many companies, leadership played an important role.

> "Look! Deregulation is coming. We are going to start working on this particular problem. How are we going to respond ?"

If the leadership has this in mind, the organization will move. It is difficult to think about these kinds of things from the bottom of the company.

Some large companies had difficulties. The bottom people did not commit to it because middle management became the filter for the change. Soon after they realized the roots of causes, they changed their organization.

> "What specifically are we going to do, if the gasoline price goes down? How do we react when competitor A reduces price?", etc.

were the key questions to be raised.

3) Strategy

Under the regulation, strategy becomes similar. Once you understand the regulation, it is clear what you should do. Also, what you can do is very limited. You just need to follow the regulation. Under the deregulated world, companies can choose their own strategy and goal. Because companies are different, the strategy of each company becomes different. It is decided based on culture, history, people, strong areas, etc. In other words, in the regulated world, understanding the regulation is the key. Under the deregulated world, understanding business, competitors, and its core competency are the keys.

For example, both Amoco and Exxon thought reserves were important and then invested in Canada. However, Amoco invested in gas and Exxon invested in oil. Both Chevron and BP had a lot of reserves in Alaska. Chevron became a leading marketer in California, but BP pulled out its refining and marketing business from the west coast.

Recently, Tenneco announced its spin-off. At the time of natural gas deregulation, Tenneco's management decided to focus on transportation, instead of exploration and production. It cannot be said that it was a bad strategy. Transportation was their core competency at that time. However, it is clear that the strategy decides the future of company.

4) Competition

Under the regulation, government protects a company's weak side. However, under the deregulated world, competitors begin attacking their weak point. On the other hand, in order to grow or become more profitable, a company tries to compete with its competitors by using its strong points. Competitive advantage becomes the key. The area in which you have a stronger position becomes much stronger.

A strong position in North American production led Amoco to become much stronger in that area. BP's strong position in exploration and production let them become much stronger in that area. Chevron's west coast position became stronger. Mobil's east coast position became much stronger. Exxon's financial strength became far stronger. Royal Dutch Shell's global position also became much stronger. The strong positions became much stronger in the deregulated world.

Competitive advantage is also important for the internationalization. After the deregulation, many US independent companies became international. Their competitive advantage in exploration and production through the US experience let them to compete in the world.

5) Regulation related work

When the industry was regulated, companies formed a special team to understand the regulation to use it to maximize their profits. Smart young people joined the team. They spent more time in lobbying and meeting with government officials to try to get more reasonable regulations. Once deregulated, those people had nothing to do. Also, many accountants and lawyers lost their jobs. Regulation created a lot of jobs.

One company told me that they used the regulation very successfully. However, when market was deregulated, people, especially who used regulation successfully, found it difficult to go back to the aggressive world. They had a difficult time. The more familiar they were with regulation, the more difficult it was to forget.

6) How the oil refineries coped with the deregulation

Special countermeasures for the deregulation[2] were asked of the US refineries.[3] Also, for the Japanese oil refineries, their future plans were asked for. All refineries are categorized responses in three clusters[4], (1) US Large, (2) US Small, and (3) Japanese refiners.

Among the 42 responses from the US refineries, 60% of refiners took special countermeasure, but more than 50% of large refiners did not take special countermeasures. Among the countermeasures, *plant shut down ((a) in the questionnaire summary in table 3-1-6)* and *(b) consolidation* were not popular, especially among the small refiners. Investments, such as *(g) plant expansion for the economies of scale*, *(h) cracking capacity increase*, and *(i) revamping plant to the latest technology* were heavily taken among the large refiners. Large refiners found effectiveness in *(g) plant expansion* and *(h) cracking capacity increase*. Both required large investment.

---

[2] Refinery Questionnaire C1 and C2 question : "Did you take any special countermeasure for the price control deregulation in the late 70s and to early 80s ?", "If yes, please show how effective you think the measures had worked to strengthen and maintain your competitive advantage at that time."

[3] This question is raised only for the US refineries who was operating at that time. Canadian refineries and US refineries who started operation after the deregulation are excluded.

[4] Three clusters are (1) US large refineries with 80,000 barrels per day or higher crude capacity, (2) US small refineries with lower than 80,000 barrels per day crude capacity, and (3) Japanese refiners. Average capacities of US large, US small, and Japanese refineries are 158, 33, 137 thousand barrels per day, respectively.

On the other hand, actions which did not require a huge investment, such as *cost reduction* and *(l) save energy* were popular among the small refiners. Small refineries found effectiveness in *(i) plant revamp*, which required less investment, compared to *(g) plant expansion* and *(h) cracking capacity increase*, which large refineries found effectiveness.

Table 3-1-6 : Refinery's countermeasures for deregulation

	USA				Japan	
	Large		Small			
	Action taken	Effecti -veness	Action taken	Effecti -veness	Action taken	Effecti -veness
# of response	18		29		11	
# of refiners took special measure	8		17		11	
Average capacity (mBPSD)	158		33		137	
Percentage of refinery which take countermeasure #1	*44%*		**71%**		**100%**	
Area to strengthen						
< Down-sizing >						
a Shut down plants	63%	5	41%	4	45%	5
b Consolidate or scrap plants	38%	5	35%	*3*	55%	*3*
c Reduce operating labor	88%	4	76%	4	100%	**5**
d Reduce maintenance cost	100%	4	88%	5	91%	**6**
e Reduce logistics cost	75%	4	71%	4	82%	**7**
f Reduce overhead cost	88%	*3*	82%	**4**	100%	**5**
< Investment >						
g Expand plant capacity	**88%**	**6**	*53%*	*4*	91%	*4*
h Increase cracking capacity	**88%**	**6**	*65%*	*4*	91%	*5*
i Revamp plant	**100%**	4	*76%*	**5**	91%	5
j Introduce computer to operation	88%	5	71%	5	100%	5
< Operation >						
k Shift from heavy to light crude	75%	4	59%	4	91%	4
l Save energy	100%	4	88%	4	100%	**5**
m Total quality control	75%	*3*	71%	**4**	100%	**5**

Source : Survey "Refining questionnaires" C1, C2 questions
Note : 1-7 Scale, 7 = Very effective to maintain your competitive advantage,
4 = Moderate, 1 = Little effective
Note #1 : Percentage of refinery (third row) does not include 5 refiners who have not started operation

All the Japanese refiners are planning to take special action to cope with the future deregulation. As seen in the US experience, *(a) plant shut down* and *(b) consolidation* are not popular. Compared to the large US refiners, Japanese refiners expect effectiveness of down-sizing, such as *(c) operation labor reduction, (d) maintenance cost reduction, (e) logistics cost reduction*, and *(f) overhead cost reduction.* Also they expect effectiveness in operation areas, such as *(l) save energy* and *(m) total quality control.* They do not expect so much to take actions which require investment, such as *(g) plant expansion* and *(h)*

cracking capacity increase. In one sense, their action to reduce cost seems reasonable, because cost leadership is very important in the mature deregulated industry. However, the areas which oil refiners expect effects are the areas they have been working for since the oil crisis. It is doubtful whether they are trying harder to cope with the deregulation or just following the activities that they used to.

Japanese refineries are expecting effectiveness in the area where US refineries, especially large ones, did not find large effectiveness.

7) Other topics

Key success factors of market deregulation are the same as that of a commodity or mature industry. During the interview, cost leadership, competitive advantage, and so on, were discussed. In the next chapter, not only their experience in the early 80s, but also the experience 15 years after the deregulation are discussed.

Section-3: Application to Japan

[Lesson-1: Market mechanism]

Product price in Japan is artificially set. Compared to the international price, the gasoline price is very high. Jet fuel, kerosene, gas oil are almost the same. Naphtha and heavy fuel oil are cheaper than the international price. So, it is expected that importing gasoline will shrink the refining margins. However, because gasoline is used mainly for leisure purposes, low gasoline prices will not create very much demand. Also, because of the infrastructure restraints, such as storage tanks, the volume of import gasoline is expected to be small, 1 to 2% maximum, in the short term[5]. In order to maintain profit, oil companies will raise the prices of other oil products. Naphtha, jet oil, and gas oil do not have substitutes. The resistance of buyers of these products must be very strong. Buyers of kerosene and heavy fuel oil may switch to LPG according to the price. The demand for heavy crude may shrink. If oil companies do not export petroleum products, demand for petroleum products shrinks and this might decrease the refinery throughput. They also have to cope with over-capacity.

[5] Aoe, Syunji, "Possibility of Gasoline Import", Sekiyu Seisaku, 1994

Table 3-1-7 : Gross margin of Japanese Refinery

Item	Domestic Price Base $/barrel	International Price Base $/barrel	Difference $/barrel
Naphtha	-9.7	-6.5	-3.2
Gasoline	27.5	10.0	17.5
Jet fuel	2.4	1.1	1.3
Kerosene	2.5	2.4	0.2
Gas oil	1.7	2.5	-0.8
Heavy fuel oil	-10.0	-8.0	-2.1
Fuel total	14.6	3.0	11.6

Source : UOP

In addition to that, new quality standards may cause problems. The new standards for gasoline are very mild compared to the current standard, Japan Industrial Standard (JIS). All refineries are JIS refineries. So, they have to produce JIS qualified products, even after the deregulation. On the other hand, new standards for imported gasoline do not require key indicators, such as RON and vapor pressure[6]. So, importers can provide significantly lower quality cheap gasoline. Now, the actual gasoline quality is far better than both the JIS and new standards. In order to reduce refining costs, some refiners should lower their quality to the JIS level. For example, if we reduce the RON of premium gasoline, 100 RON, to the JIS standard level, 96 RON, we can reduce refining variable cost by $1.32 per barrel[7]. However, this reduction in quality level leads to idle downstream capacity and increase the fixed cost per barrel. Thinking about the transporting cost from Japan to the other countries, there is a very little possibility to increase refinery utilization by exporting products. Again, they must cope with the Over-Capacity.

[6] The higher the vapor pressure, the easier to vaporize gasoline. In order to burn gasoline, some vapor pressure is required. However, if it is too high, it creates danger of explosion. Also, gasoline easily vaporize into the atmosphere and causes environmental problem.

[7] Japan Energy internal data

Table 3-1-8 : Product Quality (Standards and Actual)

Gasoline

Item	Unit	Current Standard	Actual Quality		New Standard for Imports
		Premium / Regular	Premium	Regular	
RON		96.0~ / 89.0~	100.2	90.5	
Spgr	g/cc	~0.783	0.755	0.735	
ASTM-10%	C	~70	49.4	48.8	
ASTM-50%	C	~125	94	89	
ASTM-90%	C	~180	144	154	
ASTM-EP	C	~220	180	188	
Residue	%	~2	1	1	
Copper corrosion	(50C',3h)	~1	1	1	
Vapor Pressure	(37.8c')kPa	44~78	68	68	
Oxidation stability	min.	240~	931	932	
Existent gum	mg/100ml	~5	13	3	~5
Color		Orange	Orange	Orange	Orange
Lead			None	None	None
Benzene	%		1.5	2.2	~5%
Sulfur	ppm		5	22	~100
MTBE	%		0~7.0	0	~7.0
Methanol			None	None	None

Gas Oil (July)

Flash Point	C'	50~	64		
ASTM-90%	C'	~360	342		~360
Pour point	C'	~5	-8.6		
CR. of 10% Residue	%	~0.1	0.03		
Cetane Index		50~	59.8		45~
Viscosity	CST	2.7~	3.5		
Sulfur	ppm	~2000	1400		~2000

Source : Japan Energy

[Lesson-2: Deregulated world]

Compared to the US, it must be much more difficult to think and act in the deregulated world, because Japan has not lived in the deregulated world. Everybody understands that Japan must change. But how?

Unfortunately, analysis of annual reports shows the lack of leadership. Among the top 8 companies (No.2 Idemitsu Kosan and No.8 General Oil's annual reports are not published), only one company shows a clear numerical target on how to cope with the deregulation. One company shows the direction to strengthen its competitiveness. Four

other companies just mention that they have to cope with deregulation by increasing efficiency and by rationalization measures, including procurement, refining, logistics, and marketing. They do not show "HOW".

On the other hand, American companies clearly mention their strategy in the annual reports. One of my favorites is Amerada Hess. Its annual report of 1980 said:

> "Certain events which occurred during 1980 and some of challenges facing Amerada Hess during 1981 are discussed in detail in this letter ....."

Historically, the Japanese government rescued industries all the time. For example, since 1955, no commercial bank has gone bankrupt. If one company is in trouble, MITI asks other rival companies to help. MITI also asks bankers to lend more money. If an industry is in trouble, MITI helps by tariffs or subsidies. Rice farmers, chemical, metal, and airline industries are good examples. While reading the annual and financial reports from 14 Japanese oil companies, it is surprising to find that the contents are almost the same. Do Japanese oil companies understand the meaning of living in the deregulated world or not? It is not necessary to panic, but leaders should have a clear vision in the new environment and show that vision to the shareholders, employees, and customers. One interviewee told me:

> "We were in trouble to cope with new environment at that time. So, we reorganized the company to the same as before the market regulation and started to raise the same question they asked to the employees. Finally, we could change."

Coping with deregulation could be tougher than Japanese companies expect.

3.2 Gasoline deregulation in Europe [8]

Section-1 : Overview

1) UK gasoline market

In 1979, the UK abolished the prior price notification obligation, which forced oil companies to notify the Price Committee of selling at what price level and when. At that time, the UK was a gasoline importing country. So, from that time, its oil companies increased the refining capacity aggressively. In 1983, production exceeded demand. In order to sell excess gasoline, oil companies started building service stations next to suburban shopping centers, called hyper-markets. Residential areas began spreading out to suburbs at that time. People started purchasing daily necessaries at the hyper-markets. Hyper-markets were crowded by owner-driven cars from suburb and urban areas. Those service stations sold gasoline in a huge volume. Soon, hyper-markets found it easy to construct service stations within the parking lots and could make money. People went to the service station in the parking lot of hyper-market, instead of to ones near the hyper-market. The number of hyper-market-owned service stations increased, accompanied by the increase of hyper-markets. In 1994, the share of hyper-market-owned service station exceeded 20%.

At the beginning, these hyper-market-owned service stations procured fuel directly from oil companies. Soon, they began purchasing from traders who bought oil products from oil companies for export, in addition to making conventional purchases from oil companies. Because oil companies still had excess products, they had no option but to sell to the hyper-markets.

In order to become profitable, oil companies tried to increase efficiency of their retail arms by closing unprofitable service stations. From 1990 to 1994, one eighth of the service stations were closed. Also, they switched service station from full-service to self-service. The percentage of self-service station jumped from 20% in 1980 to 77% in 1994.

---

[8] Koide, Yasuhiro, "Deregulation and Future of Japan's Oil Industry", Energy in Japan, 1995
[8] Bacon, Robert, Demand, Price, and the Refining Industry, 1990
[8] Mitchell, John, V., An Oil Agenda for Europe, 1994

Table 3-2-1 : UK Oil Industry

Year	# of SS m site	SS throughput per site KL/month
73	33	54
78	28	68
83	23	87
88	20	118
93	18	131

Source : Institute of Petroleum, "Petroleum Review"
Note : Year 1988 data is average of 1987 and 1989

2) France

Until 1985, product prices, construction of service stations, imports and marketing of products were regulated by the government. Prior to the UK, hyper-market-owned service stations became popular in France. However, regulations prevented them from rapid growth. They had a 10% market share in 1980. After the deregulation in 1986, hyper-market-owned service stations increased their market share. Their market share is about 50%, up from 20% in 1985. Their strategy was to provide gasoline at low price, get a good reputation, attract customers, and make money from food and other goods. Also, they had their own procurement route of imports. So, they could obtain lower-priced products efficiently. The ratio of self-service station was 57% in 1993, which increased from 11% in 1980.

Table 3-2-2 : French Oil Industry

Year	# of SS m site	SS throughput per site KL/month
75	47	34
80	40	29
85	35	53
90	24	78
94	19	91

Source : Total, etc.

3) Germany

Germany is a country of free trade. Even at the time of the oil crisis, the government did not regulate. From mid 70s, cheap products from the Netherlands came into the market. Cheap imports decreased the domestic price. Also, it decreased the refinery utilization. Refiners kept reducing refining capacity to strengthen their competitiveness. In the late 80s, finally, they gained cost competitiveness against imports. Also, the non-popularity of hyper-markets helped the oil companies. Unlike the UK or France, hyper-markets did not become popular in Germany. Their market share was less than 10%. So, oil companies could keep controlling the market. In addition to that, oil companies promoted the closing of unprofitable service station and construction of large scale service stations. Compared to 1970, volume sales per site increased by more than 500%. In 1994, percentage of self service station is 95%.

Table 3-2-3 : Germany Oil Industry

Year	# of SS m site	SS throughput per site KL/month	Oil demand mm BPSD	Refinery Capacity mm BPSD	Refinery Utilization %
70	45	34	2.7	2.3	
75	33		2.7	3.1	78
80	26	98	2.7	3.1	73
85	23		2.4	1.7	99
90	18	191	2.4	1.5	
94	17	218	2.9	2.2	

Source : Oil & Gas Journal, etc.

Section-2 : Lessons from Europe

In the UK, Over-Capacity enabled outsiders to procure cheap gasoline. Hyper-markets, who initially bought gasoline from domestic oil companies, soon got their own procurement route and increased their market share.

Before the deregulation in France, the gasoline price was higher than that of international market. Hyper-markets already had a 10 to 20% market share. They knew the business and had their own procurement route. When the market was deregulated, they expanded their market share rapidly. In both countries, hyper-markets played an important role. They

changed the people's life style and the pattern of gasoline purchase. They sold gasoline with their own distribution and procurement.

In Germany, there was no regulation and deregulation. Like other countries, oil companies had difficulties, such as low refining utilization in the 70s and early 80s. However, they aggressively reduced refining capacity. From mid 80s, their refining cost became lower than the international level. Refinery utilization reached 100%. Also they reduced the number of service stations, increased the throughput of service station, and increased self-service stations. The low growth of hyper-markets also contributed to the profitability of German oil companies. The oil companies controlled the market.

Domestic gasoline price, refinery utilization, and cost leadership are the key internal variables. On the other hand, availability of cheap import gasoline, changes of life style or purchase pattern, availability of distribution channel, type of newcomer, and growth of gasoline demand are key external variables. The variables are pointed out here and discussed in detail in the next chapter.

Table 3-2-4 : Comparison between Europe and Japan

Country	UK	France	Germany	Japan
Regulation				
Market regulations	Price Notice	Product Price SS construction Product import	None	Product import
At the time of deregulation				
Deregulation year	1979	1986	< 1979 >	1996
Refinery	Over-Capacity	Over-Capacity	Over-Capacity	Over-Capacity
Gasoline price	High	High	High	High
Hyper-market growth	12% / year	5% / year	1% / year	Very low
Through put of SS	70 KL/M	50 KL/M	100 KL/M	70 KL/M
Oil company owned SS	30%	20%	N/A	16%
Source of new entry	Domestic	Import	Import	Import
Availability	Large	Large	Large	Small ??
Now				
Through put of SS	130 KL/M	90 KL/M	220 KL/M	70 KL/M
Oil company owned SS	38%	34%	60%	16%
Hyper-market's share	20%	50%	10%	0%

Source : O&G, Total, Institute of Petroleum, MITI, etc.
Note : Germany has no regulation. So, second row "At the time of dereguiation" for Germany is the data of 1979.

3.3 Summary

After the deregulation, the US oil refining business got into trouble. Large margins under the regulation encouraged crude capacity expansion and upgrading facility construction. The unexpected sluggish demand reduced refinery utilization dramatically. Abolishment of price controls led to the adjustment of the crude oil price, product price, and refinery margins to international levels. Also, deregulation oriented competition shrank refinery margins more. Small refineries and unprofitable refineries went out of business.

In Japan, the industry has an Over-Capacity problem. When the market is deregulated, refinery utilization will decline more because of the increase of product imports. In addition to that, new mild quality standards may create more Over-Capacity. Regarding the price, market mechanism will be introduced. Even thought the amount of gasoline import is expected to be limited, gasoline imports will decide the ceiling price.

For the oil companies, price increases of other products, especially ones which are lower than international prices, are necessary, even though strong buyers should resist. It helps to maintain margins. Regarding Over-Capacity, Japanese companies must reduce it. However, the survey shows that Japanese refineries are planning to cope with the deregulation by cost reduction and operation improvement. They are not planning to invest in plant expansion and cracking capacity, which US oil companies answered were the most effective at the time of deregulation. In my opinion, Japanese countermeasures are the same as what they have been working on for the last 15 years. They must invest more to strengthen their competitiveness.

Table 3-3-1 : Keys for deregulation

Keys	USA experience	Japan's plan
1) Countermeasure in the refinery	Investment is very effective	Negative to investment
	Operation improvement is not effective	Emphasizes operation improvement
	Cost reduction is not effective	Emphasizes cost reduction
2) Preparation	The more, the better	Preparation not evident
	Leadership is the key	Preparation not evident

Coping with new environment must be the largest difficulty for Japan. It must be difficult because this is their first experience. However, neither leadership nor preparation for

change in Japanese companies was noted at this time. They underestimate the difficulty of change. The US lessons should be applied immediately.

In European countries, cheap imported gasoline or excess domestic gasoline reduced the domestic gasoline price and created or accelerated the Over-Capacity. It is exactly the same as in the US.

There were two lessons from Europe. One is that new players have the potential to change the whole industry. Hyper-markets played an important role. They got a large share by changing people's life styles. The other is the importance of speed of change. German industry became competitive before outsiders grasped the market. On the other hand, UK and French companies became competitive, but they were slow. They lost market share dramatically because of the delay to become competitive.

In Japan, there are three candidates for new entry: supermarkets; Agriculture Organizations; and trading companies. All of them have financial strength. The Agriculture Organizations and trading companies understand the retail business because they already own their service stations jointly with oil companies on a small scale. Supermarkets do not understand the business.

In the short term, there is small possibility of drastic market share change. It is difficult to imagine that supermarkets will get large share because: (1) gasoline is not available on a large scale; (2) infrastructure, such as storage tanks, transportation, and service stations, is not ready, (3) the supermarket is predicted not to grow rapidly, and (4) they do not understand the business. Agriculture Organization and trading companies seem ready to launch their own business. However, because of the capital relationship between the oil companies, they cannot act independently. They own service stations jointly with oil companies and do not have their own infrastructure and supply of gasoline by themselves.

Things may change soon. If foreign countries think Japan is an attractive market, they will increase gasoline exports to Japan. This requires large investments. Large amounts of imported gasoline will become available in 3 to 5 years. Infrastructure becomes available if those new-entry-candidates invest. The Supermarket will learn the business soon.

If Japanese oil companies would like to stay in the industry, they must do everything to become competitive, like German companies did. Time is very limited. Speed is the key. Otherwise, they lose their market like UK or French companies.

In the next chapter, I discuss strategy and key success factors, by learning from the US experience after the deregulation.

Table 3-3-2 : Comparison among US, Europe, and Japan

	USA	UK	France	Germany	Japan
SS throughput (KL/M)	**296**	**131**	**91**	**218**	**73**
Self-service Station (%)	**85**	**77**	**57**	**95**	**0**
Refinery Utilization (%)	**90**	**N/A**	**N/A**	**100**	**83**

Chapter-4 Strategy in the Deregulated Environment

The objective of this chapter is to learn lessons from the strategies of the US oil companies in the deregulated environment.

In the first part, the strategies of oil companies after the deregulation are analyzed. This part is organized in two sections. In the first section, the lessons learned from their experience are discussed. In the second section, the key success factors of corporate level strategy are analyzed.

In the second part, the key success factors of business level strategy, refining and marketing are discussed. Interviews, annual reports, questionnaires[1], and literature are the main sources of this chapter.

4.1 Corporate level strategy

Section-1: Lessons in the 80s and 90s

Because the oil industry is a mature one, cost leadership is very important. After the cold war, oil completely became a commodity. On the other hand, the environment is changing dramatically. The end of the cold war opened markets in Eastern European countries. China and South East Asian countries continue to grow rapidly. The oil rich countries, such as Venezuela, asked the oil majors to come back to their countries. In those areas, you must get your position fast. So, in the growing market, speed and flexibility are important. The key words for the oil companies are (1) cost leadership and efficiency, and (2) speed and flexibility. The following section analyzes and teaches how they achieve them.

My survey[2] shows that in the exploration and production area, two factors are important in

---

[1] Two sets of questionnaires were prepared : One concerned corporate strategy and the other refinery strategy. In order to analyze the data, answers of corporate strategy are categorized in two clusters : large companies (top 30 companies in terms of revenue) and the others. Because of the small number of response from Japanese company, those information is used only for the insight into Japanese industry and not statistically analyzed. About refinery questions, refiners are categorized in three clusters : large US and Canadian refineries with more than 80,000 barrels per day crude capacity, small US and Canadian refineries, and Japanese refineries. These categories are used throughout this thesis.

[2] "Show the extent to which your company has aggressively engaged in maintaining your competitive advantage in the last five years"

cost reduction : *increasing production efficiency by investment* ((a) in the questionnaire summary on table 4-1-1) and *(b) shrinking unprofitable production section.* For cost reductions in the refining area, oil companies aggressively engage in *(e) increasing refining efficiency by investment.* For reducing costs in support functions, *(g) focusing research and development (R&D) only in core businesses* is aggressively pursued. For cost reductions, investment and selected assets seem to be the direction they pursue.

Table 4-1-1 : Cost Reduction Measurement

Measurement	Top 30	Others
	9 companies	11 companies
< Production >		
a Increase production efficiency by investment	**5**	**4**
b Shrink production section	**5**	**4**
c Shrink exploration	4	3
< Refining >		
d Shrink refinery	4	2
e Increase refining efficiency by investment	**6**	**5**
< R&D >		
f Switch to external technology	4	3
g Focus R&D only in core business	**5**	**4**
< Others >		
h Shrink sales force	3	3
i Focus core business	4	3
j Diversification	2	3

Source : Corporate strategy questionnaire, C2 question
Note : 1-7 scale, 7 = Aggressively engaged, 1 = Not aggressively engaged

1) Organization

In general, oil companies decentralized their organization to manage diversified business in the 70s and early 80s. This type of organization is suitable for the growing business and new business. However, from the cost leadership point of view, centralized organization is better because of the lower coordination cost. After the oil price crash in 1986, oil companies started divesting their non-core business. On the other hand, the end of the cold war opened opportunities to grow in the developing countries, such as Eastern Europe. So, both cost leadership, and flexible and quick decision making are required for the organization. In the 90s, the following re-organizations are seen, especially in large companies:

(1) Strong headquarters only for the corporate level strategy;

(2) Small number of staff, or shared staff;

(3) Elimination of operating companies, or reduction of layers;

(4) Strong autonomy and accountability to business units,
including short and long term strategy making.

A) Effect of labor reduction

From the cost leadership point of view, the labor force was reduced. The number of employees was reduced by 20-30% from 1989 to 1994. Some companies, such as BP and Murphy Oil reduced their labor force dramatically without any major spin-offs.

Table 4-1-2 : Reduction of number of employee

	Revenue		Employee		# of employee
	1989 mmm$/y	1994 mmm$/y	1989 people	1994 people	growth %
Integrated Companies --- International					
Amoco Corp.	24.0	26.0	53.7	43.2	-19
British Petroleum	29.6	33.1	119.9	66.6	-44
Chevron Corp.	35.8	35.9	54.8	45.8	-17
Exxon Corp.	96.3	113.9	104.0	86.0	-17
Mobil Corp.	56.2	67.4	67.9	58.5	-14
Texaco Inc.	35.7	33.4	37.1	29.7	-20
Integrated Companies --- Domestic					
Amerada Hess Corp.	5.7	6.7	8.7	9.9	13
Atlantic Richfield Corp.	16.8	17.2	26.6	23.2	-13
Kerr-McGee Corp.	3.1	3.4	7.9	5.5	-30
Murphy Oil Corp.	1.7	1.8	4.5	1.8	-61
Occidental Petroleum	20.1	9.4	53.5	19.7	-63
Pennzoil Co.	2.3	2.6	10.7	10.5	-2
Phillips Petroleum Co.	12.5	12.4	21.8	18.4	-16
Sun Co. Inc.	11.4	9.9	21.6	14.5	-33
UNOCAL Corp.	11.4	8.0	17.3	13.1	-24
Refiners & Marketers					
Ashland Oil Inc.	8.5	10.4	37.8	31.6	-16
Diamond Shamrock Inc.	2.1	2.6	5.0	6.4	28
Tosco Corp.	1.4	6.4	1.7	3.6	119
Total	396.4	421.8	685.8	509.4	-26

Source : Moody's Industrial Manual
Note: revenue of BP is billion pound per year

In order to work with a relatively small labor force, they had to change their process. Documentation was reduced. The approval process was shortened. Individual skills

became more critical. Formal and informal communication networks were built. Operation and marketing started to work more closely. Their re-organization and employee reduction led to the re-engineering process. Information technology was used for information sharing and networks.

In order to share ideas and information, and to simplify the process, standardization was started.

However, morale became a problem in the labor reduction process. The top management's clear vision, their commitments, the employee's perception, and reward system were crucial in keeping the organization active.

B) Business units

From the flexibility viewpoint, autonomy and responsibility to the business units are very important. Each business operates like an independent. For example, if chemicals are in a low cycle, they must cut the capital spending instead of being subsidized. Also R&D for chemicals is paid for by the chemical business. Companies are putting more stress on letting business units act aggressively and flexibly by taking the risk of treating the long term perspective lightly.

In order to grow, people play key roles. So, oil companies are focusing on becoming a learning organization, and on the tools, methodology, and opportunities to improve learning. It is necessary to help employees to make decisions faster and move more quickly. With agreements on strategic intent, with agreements that this is the business they are involved in, and within certain boundaries, people have to make decisions and capture the opportunities before the competitors come in.

C) Staff sharing

In order to reduce staff, support functions move from business units to headquarters and are consolidated. Finance, analysis, government relations, human resources, information technology[3], legal service, and procurement are commonly used. Some companies share engineering among exploration and refining. It looks as if business units out-source those functional supports to headquarters.

---

[3] Allen, Thomas J, Information Technology and the Corporate of the 1990s, 1994

D) Re-engineering [4]

The re-engineering process always accompanies a cut in the labor force. Employees tend to resist that. In order to be successful, every company mentioned the importance of leadership. Not only do leaders have responsibility, but also they went to sites to talk to the employees. Only after the employees understood its process, importance, and the top management's commitment, could re-engineering succeed. So, in order to re-engineer an oil refinery, the CEO or VP of the refinery section goes to the refinery to talk and discuss things with operators several of times a year. It is difficult to imagine this in Japan.

My survey[5] shows that large oil companies aggressively engaged re-engineering in *production ((a) in the questionnaire summary on table 4-1-3)* and *(b) refining*, rather than *(c) R&D* and *(d) sales*. However, they performed well in *(e) marketing* and *(f) headquarters*, such as human resources, finance, and law. Performance of *(a) production*, *(b) refining*, and *(c) R&D* were relatively poor. Small companies engaged in re-engineering relatively little. However, they showed good performance in operating functions.

Table 4-1-3 : Re-engineering (application & its effectiveness)

Item	Top 30 (9 companies respond)		Others (11 companies respond)	
	Application	Effectiveness Median 1 to 7 score	Application	Effectiveness Median 1 to 7 score
a Production	**100%**	4	50%	7
b Refining	**100%**	4	45%	5
c R&D	56%	4	67%	4
d Sales	56%	6	27%	4
e Marketing	78%	6	45%	4
f Head Quarter	78%	6	27%	3
g Procurement	78%	5	45%	4
h Logistics	67%	5	27%	4

Source : Corporate strategy questionnaire, C1 question
Note : Head quarter includes H&R, Finance, Law, etc.
I use median for this survey because the number of answers is small in some areas
Note : 1-7 Scale : 7= Result is above the expectation, 4= About the same as expectation
1= Completely failed

[4] Champy, James, Re-engineering Management, 1995
[4] Bower, Joseph L., When Market Quake, 1986
[4] Nikkei Business, Re-engineering for Japan, 1994
[5] "Has your company engaged in re-engineering before ? If yes, show how satisfied you are with its outcome in the area you implemented"

It was initially thought that both large and small companies had been engaged in support functions more and performed well. The possible reasons why large companies engaged in operating functions are; (1) they re-organized a process by giving more autonomy and at the same time they applied re-engineering, and (2) they finished the restructuring or re-engineering procedure in the support functions in the late 80s. Because small companies spent most of the cost on operating functions rather than support functions, they performed with relatively high efficiency in the re-engineering of the operating functions.

In Japan, most companies aggressively start applying re-engineering to support functions, especially in logistics. Re-engineering in operating functions is not popular yet.

Table 4-1-4 : Culture of organization

Factor	Category *1	Top 30 9 companies Mean	Others 11 companies Mean
1	2 Authority and responsibility is clear	5	5
2	1 Cooperate free from organization	5	5
3	1 Project is highly independent and authorized	5	4
4	4 Line is stronger than staff	4	5
5	4 Excellent employee is assigned staff	5	5
6	2 Strict profit management	5	5
7	SBUs have authority and accountability	**6**	4
8	1 Combination of heterogeneous people	5	4
9	2 Lines of command and report is clear	4	4
10	1 Idea is put into practice even risky	4	4
11	1 Set high target	5	5
12	3 New proposal will be evaluated seriously	5	**6**
13	Allocate resource for forecasting	*3*	*3*
14	2 Obey strategic planning definitely	*3*	4
15	2 Plan and budget is clear	5	5
16	1 Change is a good opportunity	5	5
17	3 Constant efforts	5	**6**
18	1 Field's opinion is respected	5	5
19	Keep cash for contingencies	5	5
20	1 Originality is respected	5	5

Source : Corporate strategy questionnaire, A3 question
Note *1: Category by Kagano
Category-1 : Organization which is sensitive to change
Category-2 : Authority is given to business units
Category-3 : Organization which act carefully to the change
Category-4 : Staff oriented Organization
Note : 1 to 7 scale, 7 = Agree to your organization, 4 = Neutral, 1 = Disagree

E) Culture of organization [6]

The survey[7] shows that in a large company, *business units have authority and accountability ((7) in the questionnaire summary on table 4-1-4).* But it is not true for small companies. In the small companies, *(12) new proposals are evaluated seriously.* Also. According to the study by Kagono[8], it is categorized as an organization which acts carefully to the change. According to this assessment and the returned surveys from the Japanese oil companies, Japan is in the same category as small US companies.

2) Limited resources

A) Effective use of Resources

The company puts heavy emphasis on the effective use of its resources, both people and assets. As oil is a commodity business, its assets must have some special advantages, such as technology and location. This leads oil companies to focus on their core business, the hydrocarbon business. Many companies start selling unprofitable assets and invest in growing opportunities. In order to get costs down and to achieve or maintain their cost leadership, this type of activity has become very important in the 90s.

Now, sometimes human resources, not financial resources or competitive advantages, become the key factor in deciding the strategy of whether take opportunities or not.

B) Alliance

There are several reasons why alliances have become popular in recent years. In order to cope with local matters, a local partner is the best solution. In order to get a reasonable market share for competition, an alliance with another medium size partner makes sense. Also an alliance enables a company with limited resources to invest in a huge project. This trend will escalate.

3) Core business vs. Diversification

Many oil companies went into the energy related business aggressively in the 70s. Oil companies prepared for the future shift from oil to the other substitutes. Among the top 25 oil companies, 22 companies invested in Uranium, 19 in oil shale, and 15 in coal. After the oil shock, the oil price skyrocketed. Many large oil companies became cash rich. However, they could not find enough opportunity in exploration to invest. So, they tried to grow

---

[6] Peters, Tom J., In Search of Excellence, 1982

[7] "Show the degree to which you agree or disagree to the following questions"

[8] Kagano, Tadao, Restructuring and Organizational Culture, 1993

outside of the oil business. They diversified into business in mining, computers, food, pharmaceutical, retail, newspaper, etc.

Since the mid 80s, oil companies started divesting their business. They found out that they did not have a competitive advantages in those businesses. For the oil company, pharmaceuticals, mining, and computers are not core businesses. In order to be successful, you must have inherent skill and competencies, along with the basic assets. Now, BP, Mobil, Shell and Amoco focused on three core businesses, exploration & production, oil refining & marketing, and petrochemical. Texaco focused on exploration & production and oil refining & marketing only. For the relatively small sized company, this trend is exactly the same. Every company seeks to invest in businesses where it has competitive advantage with growth potential.

Table 4-1-5 : Business diversification

USA	BP	Chevron	Exxon	Mobil	Shell	Texaco	Amoco	Arco
Exploration & Production	YES	YES	YES	YES	YES	YES	YES	YES
Oil Refining & marketing	YES	YES	YES	YES	YES	YES	YES	YES
Petrochemical	YES	YES	YES	YES	YES		YES	YES
Coal		YES	YES					YES
Mineral			YES					
Power			YES					
Solar business								
Fertilizer				YES				
Pharmaceutical								
Real Estate		YES		YES				
Electric Material								

Japan	Cosmo	General	Idemitsu	J-Energy	Mitsubishi	Nippon	Shell	Tonen
Exploration & Production	YES	YES	YES	YES	YES	YES	YES	
Oil Refining & marketing	YES	YES	YES	YES	YES	YES	YES	YES
Petrochemical			YES			YES		YES
Coal		YES	YES					
Mineral			YES					
Power								
Solar business							YES	
Fertilizer								
Pharmaceutical				YES				YES
Real Estate								
Electric Material				YES				

Source : Annual reports

One refining and marketing company said that refining is an important business, but not its core business because it does not have a competitive advantage. For this company, only the growing areas with competitive advantage, such as marketing and chemicals, can be a core business. The General Electric Company thinks the same way. Companies must withdraw from the business in which they do not have a competitive advantage.

4) Integration merit

A) Vertical Integration between upstream and downstream

It is clear that the merit of integrating upstream (exploration and production) and downstream (refining and marketing) businesses is fading. In the deregulated world, the crude oil market is available. Most of the crude oil produced in the US is sold in the marketplace and not transported to the originator's own refinery. Sun Oil, which was a large integrated company, spun off its exploration business, mentioning that there was no integration advantage.

However, in terms of diversification, there is an advantage. History teaches that when the production margin is low, the downstream margin is high, and vice versa. That is the reason why integrated oil companies' profits are relatively stable at the period of regulation and deregulation.

B) Vertical integration between refining and marketing

On the other hand, it is believed that there are vertical integration advantages between marketing and refining. Lower transaction cost is one advantage. Also, as refining is the process business and the refinery operates 24 hours a day, it needs distribution channels to sell the products which it refines.

For the integration, location of the refinery and distribution around the refinery are important. Exxon has a refinery in San Francisco and sells only in northern California and western Nevada, but not in the Los Angels area.

Some marketing companies are looking for vertical integration of marketing and refining. Clark Refining Oil, which used to be a relatively small marketer, bought Chevron's large refinery and is making a lot of money. Sun Oil spun-off its upstream business and focused on downstream integration.

However, it is doubtful whether there is an integration advantage between marketing and refining in the future. In short, vertical integration between refining and marketing is logistics. Like upstream and downstream integration, the market solves the pricing and distribution channel in the near future.

5) Technology

Oil companies understand the importance of technology. In early 90s, deep water drilling and efficient platforms enabled production with acceptable costs, which was thought to be impossible. This differentiated the successful companies from the unsuccessful ones. In order to cope with the deregulation, cost reduction works in the short term. In the long term, technology plays an important role. The deregulation accelerated the competition. The competition led to the technological innovation. Under the regulation, technology is not necessary because you can transfer the cost to the consumers. By deregulation, new players come into the game and they look for cheaper and better ways to compete.

Although oil companies understand the importance of technology, many companies start thinking that it is not necessary to develop technology by themselves. Even the majors think it is not necessary to be a technology leader in all areas. They want to be strong in a couple of key areas. But in other areas, they think first follower is good enough. They do not care about the source of technology, whether it is in-house or out-sourced. There are companies which engage in technology only and they are good. So, oil companies try to put together the engineering company's technology with what they know and what they have. This creates a competitive advantage, even though the technology is out-sourced.

The results of the questionnaires[9] backed up the interviews. Regarding technology strategy, not only *the leader ((a) in table 4-1-6),* but also, *(b) par with competition* and *(c) first follower* were chosen among the large companies. Half of the small companies did not have any technology policy.

[9] "Which technology policy does your company take in the refining technology area ?"

Table 4-1-6 : Technology Strategy

	Technology Strategy	#of company Top 30 9 companies	Others 11 companies
a	Leader	**3**	1
b	Par with competition	**3**	2
c	First follower	**2**	1
d	Late follower	1	1
e	N/A (Do not have any policy)		**4**

Source : Corporate strategy questionnaire, B8 question

Regarding the level of technology, the survey[10] shows that *"Able to improve or arrange external technology((d) on the table 4-1-7)"* is their current and target level for both large and small companies.

Table 4-1-7 : Technology Level

	Technology level	#of company Top 30 9 companies		Others 11 companies	
		Current	Target	Current	Target
a	Have original technology in all areas			2	
b	Have original technology in several key areas	3	3	3	
c	Have at least one original core technology	1	1	1	
d	Able to improve or arrange external technology	**6**	2	**4**	**4**
e	Able to handle external technology	3	2		2

Source : Corporate strategy questionnaire, B7 question
Note : Allow one company with several answers

According to the survey[11], large companies increased technology out-sourcing and plan to increase it even more. Small companies do not care very much about technology itself.

[10] "What is your current refining technology level and the level which suits your technological strategy needs ?"
[11] "Show the extent how willingly you introduce external technology"

Table 4-1-8 : Technology out-sourcing

Advantage	Top 30 9 companies	Others 11 companies
	Mean	Mean
3 years ago	4	4
Now	5	4
3 years later	6	4

Source : Corporate strategy questionnaires, B3 question
Note : 1 to 7 scale, 7 = Actively introduce out-sourcing , 4 = Moderate, 1 = Reluctantly

Joint development is used in two cases. One is a large project, such as deep water production, and the other is the case when there is one big player who has great technology. The joint venture makes sense in terms of resources and risk.

6) Strategic planning [12]

A) Planning process

In most companies, business units are given authority and accountability to build their strategy. Both short and long term strategies are developed by the business unit. A planning department, which consists of a "shared staff", assists business units in building strategy by providing uniform assumptions and coordinating different groups. In this process, people play key roles. So, oil companies are focusing on learning organization, tools, methodology, and opportunities to improve them. Also, formal and informal education programs are held to develop planning skills.

In order to build strategy themselves, business units must understand the business. "Understanding business" is emphasized in all of the companies. Historically, oil companies are not good at external focus. They tend to focus within themselves by comparing their results to the previous year's rather than understanding the market environment around them. Open discussions, challenges to assumptions, and use of bench-marking are encouraged to understand a business well. Understanding a business is discussed in the next section.

One of the purposes of business unit oriented planning process is "Speed." With the agreement of strategic intent, with the agreement that this is the business they are involved in, and within certain boundaries business units have to make decisions and capture the

[12] Hatoh, Ryo, Strategic Planning, 1995

opportunities before the competitors come in. The system allows business units to access to the executive leaders immediately for quick decisions.

Also, accountability is clear in this system. Together with autonomy and authority, leaders of business units are also given strong accountability. Leaders are able to show their leadership and must lead employees to achieve the goals they set.

B) Tools for implementation (Rewards and milestones)

The reward system is generally used and more emphasized, recently. It is surprising that more emphasis is placed on team performance than individual performance. Part of the salary is decided by the group's performance. The percentage of group performance on total salary depends on the company and his or her position. It varies from 10 to 50%. On the other hand, the percentage of personal performance on total salary is less than 10%.

Some companies emphasized the importance of targets other than financial ones. Strategic milestones were set. They include: completion of plant construction, increasing the number of customers, etc. To be number 1 or 2 in the local market and to become a top 20% low cost refinery are other examples. Milestones enable everybody to clearly see the whole view of what is to be accomplished.

C) Bench-marking

In order to understand a company's position in the industry, bench-marking is widely used by many companies. For refining companies, Solomon Associates provides a bench-marking service. For the marketing companies, many local and national companies provide services.

One company explained the use of bench-marking. It picked 13 key drivers: at the business level, (1) raw material, (2) bottom upgrading, (3) scale or niche, (4) market concentration, (5) quality image, (6) integration, (7) good fit to all prices, (8) best operators, (9) good long-term contract, (10) past success, and (11) good oil finder are considered. At the portfolio level, (12) balance of business, and (13) financial flexibility are selected. Based on the benchmarks, it ranks itself against competitors and uses it to understand its actual and expected position. Based on it, they develop strategy. Some large companies used to benchmark by themselves. Now, consulting companies become the main source of bench-marking, because that source is cheaper.

For organization issues and planning issues, some large companies use bench-marking from all industries. They learn outside of the oil industry.

D) Scenario planning [13]

All the companies think that a scenario is useful, especially for the high ranking people to prepare for some events. Also, it is good for the long term planning.

However, most companies do not use scenarios for planning. Some said that correct crude price forecast solves the most of the problems. The others said if you are in the top position, or top 20%, it is not necessary to worry about drastic change. You will have problem only after other 80% have problem. The others said if you diversified and have strong financial position, it is not necessary to prepare for the uncertainties.

In addition to the learning tool, some use it for the investment analysis sensitivity. The project should be robust against more than one scenario. The discussion of assumptions and uncertainties helps to develop good strategy.

In order to understand the use of scenarios, one case is explained. This company focuses on five scenarios.

- Global Integration
- World volatility
- Commodity market
- Green Energy
- Geopolitical regionalism

A scenario is used to ask themselves where they are going. They ask themselves every year. Now, they use a commodity market scenario. They think there is a small possibility of a global integration scenario. When business units evaluate potential investment project, they need to forecast future market. And the forecast must be tied back by the scenario.

E) Key variables for planning

The survey[14] shows some interesting data. *Crude oil price ((a) on table 4-1-9)* and *(c) product price* are both thought to be important in both large and small companies.

---

[13] Wack, Pierre, "Scenarios : uncharted waters ahead", HBR, 1985

[14] "Show stress your company lays on when you design scenario for basic corporate strategy" "Also, rank top 3 variables in order of importance"

However, *(b) price difference between heavy and light crude*, which influences refining margin, is not thought to be important among the small companies. This is because many small companies can process only light crude oil. In large companies, *(h) government* and *(i) other companies' strategy* are thought to be important variables for planning.

Table 4-1-9: Key variables for planning

Factor		Top 30 9 companies		Others 11 companies	
		Mean	Rank	Mean	Rank
a	Crude oil price	5	**15**	**6**	**14**
b	Price difference b/w heavy and light crude	**6**	**9**	4	1
c	Product price	5	**8**	**6**	**9**
d	Product demand	5	3	5	2
e	Business situation	4	1	3	
f	Interest rate	3	1	2	
g	Exchange rate	2	1	2	
h	Government	5	**14**	5	2
i	Other rival companies' strategy	5	**8**	4	
j	Oil producing countries	3	1	2	
k	Oil reserves	2	1	2	
l	Processing capability	4	4	5	1
m	Market share	4	1	4	1

Source : Corporate strategy questionnaire, A1 question
Note : Rank is calculated by sum (1st = 3 point, 2nd = 2 point, 3rd =1 point)
: Mean is 1 to 7 scale, 7 = lays stress extensively, 4 = Moderate, 1 = lays stress not very much

Section-2: Key success factors

This question was raised to almost all the people that were interviewed. Many points were discussed. Answers were different even among the same company. Five keys were picked for the following: (1) understanding business; (2) opportunity for growth; (3) people; (4) size; and (5) mistakes. Other key success factors, which were discussed, included leadership, shareholder's value, customer, low cost, investment, finance, and portfolio.

1) Understanding business

Without understanding business, it is difficult to make good strategy and plan. Understanding business includes the (1) background of business, (2) objective of business, (3) environment of business, including attractiveness, competitive advantage, changes, and major strategic issues, (4) strategy of business, including options, strategies, and capital conditions, and (5) perspective results of business.

In the old days, only the top people understood the business. Middle and lower people just followed. Now, discussed in the previous section, understanding business is required at all levels. Operators in a service station do not need to understand the corporate level strategy, but they have to understand their business, the retail business.

2) Find a good opportunity for growth

Because oil is mature industry, oil companies have to focus the area where market is growing. Other than that, they cannot grow.

International companies are very aggressive to get position in the developing countries. They use chemical business as the first step to go into those countries. This seems a good way to start understanding market and building a good relationship. In the future, they want to expand their business to exploration, production, refining, and marketing.

Domestic oil companies also seek opportunities to grow by branded marketing, lubricant business, and etc..

3) Good people

Good people is the standard answer. However, it really is an important factor.

Good people make others good. Since human resource is limited, individual competence is very critical, especially in this environment. People create the company. If people are willing to change, willing to think strategically, and willing to learn, then company becomes good. Learning organization is important for success in the future.

4) Size

Oil companies focus on the area where they can get enough size to be a significant player in the market. Ten to 20% level is thought to be a minimum share for gasoline sales. In order to enjoy economies of scale, size is very important. Also, from the view of limited resources, they must focus only on the market where you have or can have large market share. However, size is not important for the niche players.

5) Avoid mistakes

This factor is suggested by only one company. People may think this is a given condition. However, I think this is one of the most important factors.

In the 70s and early 80s, many oil companies thought the oil price would sky-rocket and invested heavily in the exploration. Then finally they realized that it was a mistake. Many

companies invested in non-core business, such as uranium, coal, mining, and real estate. They realized that was a mistake after a huge loss. Companies who joined the M&A game lost financial strength.

The largest difference between good companies and bad companies is created by big mistakes.

4.2 Key Success Factors of Business unit level

"Please indicate the strength of your company, compared to the top 3 companies" was asked in the survey. In general, competitive advantage of large oil companies is stronger than that of small companies. However, that of small companies is larger in two areas: *management ((8) on table 4-2-1)* and *(1-d) oil refining technology and skills*. Large oil companies think they are strong in *(4) sales* and *(5) customer service*, which small companies also think they have competitive advantage in. One more thing found in the survey is that oil companies are not good at *(12) information technology*, which is thought to be a key tool in the near future.

In the following section, I discuss about the key success factor (KSF) of refining and marketing, which are the major business of Japanese oil companies.

Table 4-2-1 : Competitive advantage of corporation

	Advantage	Top 30 9 companies	Others 11 companies
		Mean	Mean
1	Operation in general	5	4
a	Oil production wells	4	3
b	Oil production technology	4	3
c	Advanced refinery	5	4
d	Oil refining technology & skills	5	**5**
e	Petrochemical	4	2
f	Other energy related business	3	2
g	Non-energy business	3	2
2	R&D	4	2
3	Marketing	5	4
4	Sales	**6**	5
5	Customer service	**6**	5
6	Procurement	5	4
7	Logistics	5	4
8	Management	5	**6**
9	H&R	5	4
10	Finance	5	5
11	Legal & Government relations	5	5
12	Information technology	3	3

Source : Corporate strategy questionnaire, A4 question
Note : 1 to 7 scale, 7= stronger than top 3 companies, 4= About the same
1= weaker than top 3 companies

At the beginning, the plan was to rank the KSF of each business. However, this was very difficult. Even in the same company, ranks were different among the interviewees. Also, it is true that you cannot be successful with only one strength. KSFs work together. So, I discuss KSFs one by one in this chapter without ranking. Exxon's 1994 annual report clearly mentions:

> "There is no single key to success in managing Exxon's business. Rather, superior returns are achieved through continuous attention to all essential aspects of the company's operations."

Section-1 : KSF for refining

Two surveys related to the success factor were done; one was key variables for the investment[15] and the other was competitive advantage.

Table 4-2-2 : Key variables for refinery investment

Competitive advantage	Large	Small	Japan
	23 refineries	31 refineries	11 refineries
< Environmental Issues >			
a Product supply and demand	**6**	**6**	**7**
b Market of by-products	4	4	4
c Crude oil price	5	5	**6**
d Product price	5	5	**6**
e Economic factors	4	4	5
f Regulation change	**6**	**6**	**6**
g Competitor's reaction	4	4	**5**
< Technical Issues >			
h Fitness to the existing refinery	**6**	5	5
i Material balance	5	**6**	**6**
j Utility balance	4	5	5
k Product quality	5	**6**	**6**
l Operability	5	**6**	**6**
m Technology innovation	4	4	5
n Environment problem	**6**	**6**	**6**
o Tried and true, or technology	5	5	5

Source : Refinery questionnaire, A2 question
Note : 1-7 scale, 7 = Put heavy weight for new plant investment, 4 = Moderate, 1= Light weight

[15] "Show the extent of weight when deciding about a new plant investment"

The key variables for refinery investment were almost the same as were initially thought. There is no significant difference among large oil companies in the US, small oil companies in the US, and Japanese oil companies. One interesting thing that was found was that Japanese companies put heavy weight on *competitors' reaction ((g) on table 4-2-2).*

The survey[16] of competitive advantage shows a clear difference between large US oil companies and Japanese oil companies. Large US oil companies are far stronger in refinery capability, such as *cracking ((h) on table 4-2-3).* They operate at *(j) a high utilization factor.*

Table 4-2-3 : Competitive advantage of a refinery

	Competitive advantage	Large	Small	Japan
		23 refineries	31 refineries	11 refineries
< Operation Functions >				
a	Relatively small labor force	5	5	4
b	High energy efficiency	5	4	4
c	Good quality control	5	5	5
d	Safe and stabile operation	**6**	**6**	5
e	Operational know-how	5	**6**	**6**
f	Advanced operation	5	4	5
g	The latest technology	4	4	4
h	large cracking plant capacity	**6**	3	4
i	Profitable special plants	4	3	3
j	High plant utilization factor	**6**	5	5
k	Large plant capacity	4	2	4
< Other Support functions >				
m	Low maintenance cost	4	5	4
n	Low overhead cost	4	4	4
o	Low labor cost	3	4	3
p	Well optimized blending	5	4	5
q	Procurement of cheap crude oil	4	4	4
r	Precise operating planning	5	5	5
s	Coordination with allied refinery	*3*	*3*	**5**
t	R&D support	4	3	4
u	Excellent people	**6**	**6**	*5*
v	HQ's strong support	4	4	4

Source : Refinery questionnaire, B2 question
Note : 1-7 scale, 7 = We have stronger competitive advantage than average
4 = About the average, 1 = Weaker than average

On the other hand, Japanese oil companies think they are strong in *(s) coordination with allied refineries.* In addition to the strong autonomy and authority given from the company,

[16] "Show your company's position, compared to the average level refinery"

it is thought that the availability of the gasoline market in the US leads oil refineries to operate more like stand-alone businesses. About *(u) people*, it was surprising that US companies think they are stronger. Their scale is larger than Japanese companies. This is the reason why US companies emphasize their human resources, which was discussed in the previous part.

1) Strategic factors

The KSFs which are categorized here are very strategic. Once you decide the location, you cannot change it other than closing or selling one and building new one. Others can be changed with medium size investment. Because the following items require huge investments, some companies sell or shut-down the ones which do not have the following advantage.

In the interview, economies of scale, refinery capability, and location were mainly discussed.

A) Economies of scale

Economies of scale are very important for the refining business. Utilization factor, throughput divided by capacity, is its indicator. It is decided not only by the refinery itself but also by the market. In order to increase the utilization factor, some companies scrap refineries instead of selling to the others.

B) Refinery capability

A refinery which has cracking facilities is more profitable than a straight run refinery. Also, refineries with sour crude capability can become profitable especially when there is a large price difference between heavy and light crude. In order to get these capabilities, you need investment. In other words, you can get this easily by investment. In order to sustain it, you must keep investing.

C) Location

The location is important. It was the most emphasized factor from interviewees. Once you build a refinery, you cannot change its location any more. So, this is the most strategic issue to decide. If the refinery exists near the long market, you can make money very easy. Also, availability of cheap crude oil and pipeline are important in terms of procurement and logistics of crude oil refining.

2) Tactical factors

The KSFs which are categorized here are tactical. You can manage these factors. Because interviews were conducted with planning departments in headquarters, their view was a little different from a surveys which were answered by refinery managers or their subordinates. Refineries emphasized safety, environment, and people issues. On the other hand, cost leadership was the main topic discussed at the interviews. Only a few people pointed out reliability, safety, investment, and effectiveness of local management as the key success factors for refining.

A) Cost

In order to reduce costs, catalyst performance, yield improvement, and process improvements are important. The effort to overcome constraints of the equipment (so as to operate at more than 100%) are also important in reducing fixed costs. The quality of products should be controlled not to become over-specification. Companies must achieve these goals while maintaining safety.

Section-2: KSF for marketing

In the oil business, the word "marketing" is used for the retail business, especially for gasoline stations. It is different from the marketing which I learned at the Sloan school.

1) Strategic factors

The location, local market share, and appropriate facilities are discussed.

A) Location

The marketing business is also capital intensive. Most companies suggest location as the number one priority.

In the US, oil companies worried about convenience stores at the time of their rapid growth. However, they found out that it was not necessary to worry about convenience stores because oil companies already had the best location. High traffic concerns were already occupied by the service stations, not by the convenience stores. On the other hand, the European story was different. Hyper-markets changed people's life style and pattern of gasoline purchase. Suburban areas, which used to have zero location advantage began to have a location advantage. Oil companies built service stations near hyper-markets. But the best locations were the parking lots in the hyper-markets. The location advantage of hyper-markets led them to increase their gasoline share dramatically.

B) Local market share

All of the companies interviewed tried to become #1 or #2 in the local market. In the view of branded marketing, or high reputation, high market share makes sense. In order to achieve this goal, companies focused on limited areas. If you have only a 1% share in the US, but focus on only 2 states (4% of the market), then you have a 25% local share. For example, Chevron sells gasoline in only 16 states, and it has one of the top 3 market shares in 15 of them.

If you have a large share in local markets, consumers recognize your brand and accept your brand. The brand, which is not measurable, is included in this factor.

C) Appropriate facilities

In different locations, different types of service stations are required. If the right ones are on the right sites, they should be successful. It is differentiation. You should provide car wash, convenience store, maintenance service, and fast food where required.

2) Tactical factors

As for the managerial factors, customer satisfaction, non-fuel margin, and throughput are discussed.

A) Customer satisfaction

In order to get customer satisfaction, service is important. In addition to the appropriate facilities discussed before, intangible services, such as speed of delivery, convenience of payment, good service, and high quality are important to satisfy customers.

Industry calls it branded marketing. A high reputation, including high quality and good service, strengthens their brand name.

B) Non-fuel margin per site

Non-fuel margin for maintenance services, convenience stores, fast food, and car washes, are emphasized. Because the self-service stations are very popular in the US, it was initially thought not to be the case. However, oil companies found growth opportunity in this area and emphasized its promotion. Related to this, the premium ratio[17] was also emphasized.

[17] Premium ratio = premium gasoline sales / total gasoline sales

C) Throughput

The retail business is asset intensive. So, throughput is important. The fixed cost of a 100 thousand gallon per month and 200 thousand gallon per month service station is almost the same. Because marketing is a mature industry, cost is very important. Given the cost advantage, other key factors discussed above become important.

4.3 Summary

Cost leadership and efficiency are important for the mature industry. On the other hand, in order to grow and to cope with the current environment, speed and flexibility are necessary. Efficiency and flexibility are two keys.

From the aspect of organization, companies did a lot of things in the US. In order to achieve flexibility or speed, companies decentralized their organization and gave autonomy, authority, and accountability to the business units. Short and long term strategies were developed by the business units. In this process, people played the key role. Companies tried to help them by providing formal and informal education systems. For the efficiency or cost reduction, staff reduction, or shared staff were introduced. For both the efficiency and flexibility, elimination of middle layers, layoffs, and re-engineering were undertaken. US companies reduced 25-30% per year in last 5 years. In order to maintain morale, the commitment of the top people was the key. It was the same for the re-engineering process. The president or vice president of the US company went to the site to discuss openly about those issues frequently. Japanese executives must learn this attitude.

In Japan, re-engineering has just started. Now, they apply it to the boundary functions, such as logistics and procurement. Companies use the re-engineering process more aggressively outside rather than inside their company. In general, re-engineering accompanies employee reduction. So, it is understandable that it is difficult to apply to internal functions. However, US companies' experience clearly shows that re-engineering is most effective in headquarters, sales and marketing.

Under the competitive world, resources, both people and financial, became critical. Most companies gave up diversified business and focused on their core business. Also, they started to distinguish profitable and non-profitable assets. They sold non-profitable assets and invested in the core business. In Japan, several companies still engage in non-hydrocarbon businesses. Thinking about their financial weakness and limited human resources, they should focus on their core business. For example, most companies engage in exploration and production. It is nice to have both the upstream and downstream sides. It helps to stabilize their profit. However, do all Japanese companies have a competitive advantage in those areas? The answer is no. Most companies do not have competitive advantage. In my opinion, companies should withdraw from those areas without

competitive advantage and use resources in their core business. Nobody can be successful in the area where they do not have competitive advantage.

Thinking about competitive advantage, vertical integration between refining and marketing is the key for Japanese companies. If they build competitive advantage in this area, this becomes sustainable, because only oil companies can have this advantage. In this sense, it is good to start re-engineering from logistics. They should thoroughly complete re-engineering not only of external and boundary areas, but also internal areas.

Regarding the technology, out-sourcing became popular in the US. They plan to increase out-sourcing more in the future. In Japan, companies try to do everything by themselves. As seen historically, technological innovation plays an important role. So, Japan should keep R&D expenditures, which are relatively higher than that of US. However, they should spend money only in the selected area. In the area companies are not strong, they should change from in-house development to out-sourcing. Severe selection of theme may become more important. For out-sourcing, companies must build formal and informal information networks to grasp the emergence of new technology.

The five key success factors are discussed. Understanding business is the most important thing for Japan. To be frank, Japan does not understand business, especially the deregulated business.

I also think that to "avoid mistakes" is important. In the deregulated world, companies' strategies became different company by company. As seen historically, large mistakes may lead the company to big trouble.

As for the key success factor of refining, (1) economies of scale, (2) refinery capability, (3) location, and (4) cost leadership are discussed. Location is a very strategic factor which you can decide only at the time of building refinery. In order to achieve economies of scale and refinery capability, you need medium size investment. You can reduce cost by catalyst performance improvement, yield improvement, and process improvement. However, you cannot reduce cost drastically only by those things. For large cost reduction, capital investment is required. In order to be successful in the refining business, there are very few things that a company can do.

As for the marketing, (1) location, (2) local market share, (3) appropriate facilities, (4) non-fuel margin, (5) customer satisfaction, and (6) throughput are discussed. Compared to the refining business, you can get good location and appropriate facilities with a relatively small investment. In order to be successful, there are many managerial factors. This must be one of the reasons why companies seek growth opportunity in the marketing area.

The key success factors which were discussed are not new. However, comparing USA and Japan, Japanese weaknesses become apparent.

In refining, the scale is similar. However, upgrading capacity is only one third. Compared to European countries, it is one half. Also, refining & distribution cost is almost double. Japan must cope with them immediately. Or else, it will be in trouble.
In marketing, market share is relatively low because all the companies play all over Japan. The variety of facilities is less than that of the USA. Throughput is only one fourth. Even though those KSFs are discussed and well-known in Japan, the level is still far behind that of the US.

Table 4-3-1 : Comparison of KSF

	USA	Japan
Refining		
Scale --- Average crude capacity of top 30% (mBPSD)	199	206
Upgrading capacity (% of crude capacity)	55	18
Cost --- Refining/distribution cost (cents per litter)	5	9
Marketing		
Share --- Top company's market share (%)	20-40%	15-20%
Facilities --- Car wash	Yes	Yes
--- Maintenance	Yes	Yes
--- Convenience store	Yes	No
--- First food	Yes	No
Throughput (KL/Month/ site)	295	73

Chapter-5 Conclusion

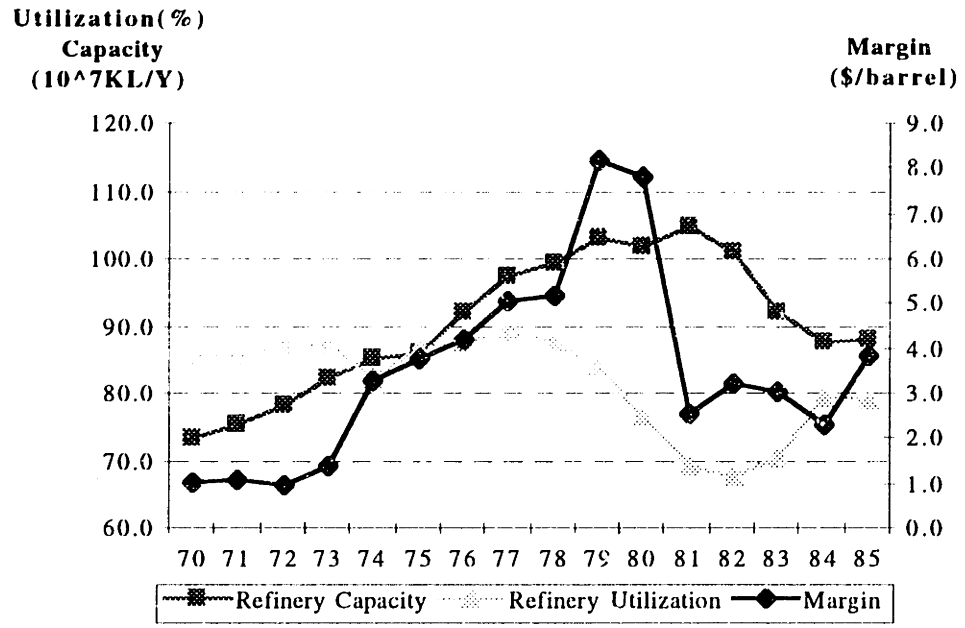
Reviewing the history of regulation in both the US and Japan, shows that regulation has played a key role in both the US and Japanese oil industries. However, the type of regulation was different. In the US, price regulation and allocation programs were introduced to reduce the influence of Arab countries. Its main objective was to stabilize the oil price and supply. On the other hand, objective of Japanese regulation, which allows only Japanese oil companies to provide oil and oil products in Japan, is to let MITI control the oil industry. MITI used the oil industry to promote the domestic economy and to help all Japanese industries to grow, by forcing oil companies to decrease and increase the oil price and oil supply. So, the freedom of oil companies is different between US and Japan. Historically, the US oil industry had regulated periods and deregulated periods. Even during the regulated periods, US oil companies were given relatively free hand, especially for international activities and product imports. However, the Japanese oil industry has been completely regulated since World War II.

Even though the Japanese oil industry was smaller and weaker than the US oil industry in 1979, five force analysis concludes that Japan is more attractive than the US. MITI played an important role. It created an artificial environment which caused a price imbalance since only the price of gasoline became high. Oil companies were not allowed to become international, thus losing an opportunity to become competitive. Without strategy and by following MITI's policy, high cost and low profitability became the characteristics of the industry. Now that MITI has decided to stop playing its role, the industry will change dramatically.

In short, deregulation activated the market mechanism. Fig.5-1 shows the US refining industry. During regulation, relatively low oil prices created artificial demand. Oil companies increased refining capacity aggressively. Utilization was between 85 and 90%. With the increase of crude price, refining margins also increased which accelerated the capacity expansion. Starting from the late 70s, the US government started to deregulate the market which then became completely deregulated in 1981. Refining margins dropped by 70%. The market mechanism set crude oil price, oil product price, and refining margins to the international level. High oil prices stopped the demand growth and utilization started declining. However, refining capacity kept increasing because of the delay of awareness of utilization decline and the refinery completion. In 1982, utilization dropped below 70%.

After the deregulation in Japan, the market mechanism will decide the ceiling price of gasoline, even though the amount of gasoline import is expected to be limited, in the short term, given the competition among Asian countries for oil imports. Gasoline prices should decrease to the international level. Refining margins will also decline to the international level. In addition to the current over-capacity, reduction in quality standards may create even more over-capacity. The situation is expected to be the same as in the US. Capacity reduction must be necessary.

Fig. 5-1 : US Oil Refining Industry



The experience of the US market deregulation in the early 80s teaches that we must prepare to cope with the deregulated world. Also, we must invest to become competitive. Because this deregulation is the first experience for the Japanese industry, it must be very difficult to cope with the deregulated world. From the US deregulation experience, the difficulties of changing people's attitude and the importance of preparation for change is observed. Leadership played a key role in forcing people to prepare for changes. Many companies struggled to cope with the new environment. Now, in Japan, executives of oil companies emphasize the imbalance in product prices. They want to increase the price of kerosene and diesel oil to make up for the reduction in gasoline margins. This is important for the company; however, the market mechanism will solve it automatically. This is not the area where they should spend their energy. They should set concrete targets in the deregulated

world and put it into practice. However, neither leadership nor preparation for change were noted in Japanese companies. They underestimate the importance and difficulties of change. If Japanese companies do not understand how to prepare for deregulation, then it is important to discuss what will happen and how they should react. Only if they start thinking about the deregulated world, can they find out what they should do. Leaders should raise specific questions with their subordinates to change their ways of thinking. For example, "What we should do if competitor decreases the price of gasoline?" is a good start.

From the research, it is also learned that investments, such as upgrading facilities, were the most effective way to strengthen competitiveness at the time of US deregulation. However, Japanese companies are not planning to invest aggressively. They think cost reduction activities and operational improvement are good enough for the deregulated world. They are mistaken. They must realize their weakness. Their investment in upgrading capacity is only one third that of the US refiners'. Gasoline sales per site are only one fourth. Without investment, Japanese companies cannot fill out these gaps. Without investment, they cannot become competitive.

The European gasoline deregulation informs us that any outsider has potential to change the whole industry. Also it shows the importance of becoming competitive before outsiders grasp the market. The Japanese oil industry underestimates the importance of speed in becoming competitive. It is clear that they should become competitive. But the gap in competitiveness is very large. They cannot catch up with the international level only by daily improvement activities. They must make some difficult decisions, such as refinery consolidation and shutdown, disposal of unprofitable service stations, spin-off of non-core assets, and lay-off. Those decisions are painful, especially for their employees. However, the sooner they act, the smaller their pain will be as opposed to the case where they are forced to do so later (i.e. No pain, no gain). The difference in speed to become competitive shows in the profitability of oil companies. German companies acted quicker and became competitive and profitable. UK and French companies responded late.

Current strategies of US oil companies are: (1) to become the cost leader and (2) to build a flexible organization. Because oil is a mature or commodity industry, cost leadership is important. On the other hand, speed and flexibility are necessary to grow and to cope with the current environment.

In order to achieve cost leadership, labor reductions are on-going in the US. Resource limitation oriented shared staff, out-sourcing, and alliances have become popular. In Japan, because of the life time employment system, layoffs happen only after a crisis comes. Also, other down-sizing actions are difficult to put into practice. However, without those procedures, it is difficult to achieve drastic cost reduction in a short term.

For the sake of practicality, resource management should be taken into action to strengthen their competitiveness, which leads to the achievement of cost reduction. First, they should focus on core business. Many companies are still engaged in diversified business in which they do not have any competitive advantage. Second, they should dispose of unprofitable assets and invest the money into their core business. And third, they should focus on their core technology. They should invest heavily in their core technology and out-source other non-core technology.

In order to achieve speed and flexibility, strong autonomy and authority are given to the business units in the US companies. Re-engineering and elimination of layers speeds up the strategic planning process. Because these processes also accompany labor reduction, it is difficult for Japan to proceed with them. Now, Japanese oil companies apply re-engineering only in the areas where labor reduction is not required.

In the deregulated world, companies must build their own strategy to make money, instead of following MITI's policy. In order to build good strategy, understanding business is the key. From the information gathered, it seems that Japanese companies understand the daily business very well, but do not comprehensively understand the nature of business, which includes:

(1) background of business;
(2) objective of business;
(3) environment of business, including attractiveness, competitive advantage, changes, and major strategic issues;
(4) strategy of business, including options, strategies, and capital conditions; and
(5) prospective result of your business.

They must understand their weaknesses and strengths by comparing themselves not only to their domestic rivals, but also at the international level. Low utilization, low upgrading capability, and small throughput are their weaknesses. Also marketing is their weakness.

Japanese companies used to put emphasis more on refining than on marketing. On the other hand, excellent employee, technology level, and good location are their strengths. Once they understand their position, they can set targets and create strategy. For example, vertical integration between marketing and refining can become their strength. If Japan can build a competitive advantage in this area, a new entry cannot imitate it. By transferring people from headquarters to the marketing section, they can achieve organizational efficiency and strengthen marketing at the same time. If they find their weakness in their size or market share, a horizontal integration (merger) will solve it. Regarding the necessary size to achieve awareness of brand and economies of scale, the answer is clear.

Different companies have different strategies in the deregulated world. Companies must build their own strategy where they have, or they can have, competitive advantage. Also, history states that to "Avoid mistake" is import. This differentiates profitability.

Through the interviews, I strongly felt the power of people in the US oil companies. They understand their business very well. They have clear vision and strategy. Concept of management, such as "Think global, act local", "Number 1 or number 2 business only", "Core competency", and "Competitive advantage", are well recognized and properly applied. Their attitude is "let's do it", rather than "wait and see". I think that the Japanese companies must learn their style in some sense. This is the way to live in the deregulated world.

There are, however, still reasons for optimism about the future of Japanese oil companies. They have excellent employees. I believe that they can become competitive, if their leaders recognize the difficulties in changing people's attitude to work in the deregulated world and prepare for the deregulation immediately.

APPENDIX

1) Questionnaires
   - Corporate Strategy
     - English version
     - Japanese version
   - Refinery Strategy
     - English version
     - Japanese version
2) Memo of Interview
3) Bibliography
4) List of Annual Reports

Massachusetts Institute of Technology
Sloan School of Management

This Correspondence is a part of research work being done for a Master's thesis

Management of Technology Program
Suite E52-101
50 Memorial Drive
Cambridge, Massachusetts 02142-1347

In reply, write to :
Futoshi Toyoda
One Longfellow Place #421
Boston, MA 02114
Tel & Fax : (617) 367-2541
E-mail : Saude@aol.com

February 20, 1996

Director
Corporate Planning

Re : Request of your response to the questionnaire

Dear Madam or Sir,

We are writing to request your valuable assistance in our study about Oil Company Strategy. This study is being conducted as a part of the research for a master's thesis at MIT Sloan School of Management. We request that the Director of Corporate Planning (or his/her designate) answer the questions from his/her personal experience and knowledge. Your participation is very important to us, and information you provide will be crucial to the success of our research.

US petroleum companies have coped with issues of deregulation and intensifying competition in the last two decades. This study concerns the corporate level strategy, organizational culture, and technology strategy to find out what is the source of the strength in terms of profitability.

The questionnaire is anonymous, and your responses will be aggregated with those of other respondents. This questionnaire is being distributed to over seventy companies which own oil refineries in the USA. We have made every effort to ensure that the questionnaire is very easy to complete and should take approximately 20 minutes of your time. A return envelope is provided for your convenience.

The results of this survey will be disseminated to all the participants who reply, expected in June 1996. Because of the time constraint involved in producing the thesis, we would appreciate your response by March, 11, Monday. Please feel free to contact us if you have any questions.

Thank you very much for your time and cooperation.

Sincerely yours,

D. Eleanor Westney
Professor

Henry Birdseye Weil
Senior Lecturer

Futoshi Toyoda
Master's Candidate

Questionnaire about the corporate strategy

This questionnaire is used for our survey on corporate strategy of the North American oil companies. For the following questions, **please limit the responses to American and Canadian activities only, including those of wholly or majority owned subsidiaries.**

In completing this survey, we request that **the Director of Corporate Planning (or his/her designate)** answer the questions from his/her personal experience and knowledge.

Although no proprietary information is sought in this survey, we assure you that total privacy of your responses will be maintained. All data analysis will be carried out in multi-company aggregates. No identification of your company will be made in any presentation of the survey result. If there is any question you prefer not to answer, please skip it and go on to next.

We sincerely appreciate your timely cooperation and your sharing of insights in this research for practice and performance bench marking of corporate level strategy of oil companies. We will send all survey respondents a copy of the study results, which are expected in June 1996. Because of the time constraint, **we would appreciate your response by March, 11, Monday**.

Our trials with this questionnaire show it takes approximately **20 minutes of your time**. Please respond to all questions and thank you for your participation !

A. Characteristics of Corporate Level Strategy

A1. Many companies use scenarios as a base for developing strategy. Does your company use scenarios ? If your company uses scenarios, please show how much stress your company lays on when you design scenario for basic corporate strategy (1 = not very much, 4 = Moderate, 7 = Extensively). Also, please rank the top 3 variables in order of importance.

	Not very much <-------+--------> Moderate Extensively	Rank
a. Crude oil price	1 2 3 4 5 6 7	( )
b. Price difference between heavy and light crude oil	1 2 3 4 5 6 7	( )
c. Price of petroleum products	1 2 3 4 5 6 7	( )
d. Demand of each product	1 2 3 4 5 6 7	( )
e. Business situation (GDP growth, etc.)	1 2 3 4 5 6 7	( )
f. Interest rate	1 2 3 4 5 6 7	( )
g. Exchange rate	1 2 3 4 5 6 7	( )
h. Government (Changes of environmental regulation, tariff, tax, etc.)	1 2 3 4 5 6 7	( )
i. Other rival companies' strategy	1 2 3 4 5 6 7	( )
j. Oil producing countries	1 2 3 4 5 6 7	( )
k. Oil reserves	1 2 3 4 5 6 7	( )
l. Processing capability	1 2 3 4 5 6 7	( )
m. Market share	1 2 3 4 5 6 7	( )
n. Others ( )	1 2 3 4 5 6 7	( )

A2. How often do you develop and review your short and long term corporate strategy ? Please select from the list below and check one parenthesis.

	Short-term strategy (3 years or less)	Long-term strategy (More than 3 years)
a. Every three months or more frequent	( )	( )
b. Every six months or more frequent	( )	( )
c. Every one year or more frequent	( )	( )
d. Every three year or more frequent	( )	( )
e. Less frequent than once in three years	( )	( )

A3. We would like to understand the culture of your organization. Please circle the degree to which you agree or disagree to the following questions. (1 = completely disagree, 4 = neutral, 7 = completely agree)

	Disagree <----------->Agree
1. Manager's authority and responsibility are prescribed clearly and accurately.	1 2 3 4 5 6 7
2. We cooperate with each other and are free from formal authority and organization.	1 2 3 4 5 6 7
3. Project team is highly independent and authorized.	1 2 3 4 5 6 7
4. Operation section personnel has stronger power in decision making than other staffs.	1 2 3 4 5 6 7
5. Excellent employees are assigned to the staff department.	1 2 3 4 5 6 7
6. Strict profit management is taken quarterly or half-yearly.	1 2 3 4 5 6 7
7. Strategic Business Units (SBUs) are given authority and responsibility for the business.	1 2 3 4 5 6 7
8. Combination of heterogeneous people is thought to be important.	1 2 3 4 5 6 7
9. Lines of command and report are arranged clearly.	1 2 3 4 5 6 7
10. An exciting idea is put into practice, even though it is risky.	1 2 3 4 5 6 7
11. We usually set a high target without a fear of failure.	1 2 3 4 5 6 7
12. A new proposal is put into practice only after serious consideration and evaluation.	1 2 3 4 5 6 7
13. We heavily allocate our resources to predict market and technological innovation.	1 2 3 4 5 6 7
14. We obey strategic planning definitely.	1 2 3 4 5 6 7
15. The strategy management takes a concrete shape, such as plan and budget.	1 2 3 4 5 6 7
16. We take changes as an opportunity rather than threat.	1 2 3 4 5 6 7
17. Our strength has been built by constant efforts.	1 2 3 4 5 6 7
18. We deeply respect opinions coming from the field.	1 2 3 4 5 6 7
19. We keep a cash position to be ready for contingencies	1 2 3 4 5 6 7
20. Originality, creativity, and uniqueness are always held in high regard.	1 2 3 4 5 6 7

A4. In each following area, please indicate the strength of your companies, compared to the top 3 other companies. (1 = Much weaker than competitors, 4 = About the same, 7 = Much stronger).

	Weaker <--------+---------->Stronger (About the Same)
1. Operation in general	1 2 3 4 5 6 7
a. Oil production wells (reserves, well location, etc.)	1 2 3 4 5 6 7
b. Oil production technology & Skills	1 2 3 4 5 6 7
c. Advanced (well-equipped) refinery	1 2 3 4 5 6 7
d. Oil refining technology & Skills	1 2 3 4 5 6 7
e. Petrochemical and/or Biochemical	1 2 3 4 5 6 7
f. Other energy related business (Coal, LPG, Uranium, etc.)	1 2 3 4 5 6 7
g. Non-energy related business (Electronics, Real estate, etc.)	1 2 3 4 5 6 7
2. Research and Development	1 2 3 4 5 6 7
3. Marketing	1 2 3 4 5 6 7
4. Sales(distribution network)	1 2 3 4 5 6 7
5. Customer Service	1 2 3 4 5 6 7
6. Procurement (crude oil, oil products)	1 2 3 4 5 6 7
7. Logistics	1 2 3 4 5 6 7
8. Management	1 2 3 4 5 6 7
9. Human Resource	1 2 3 4 5 6 7
10. Finance (Cash position, etc.)	1 2 3 4 5 6 7
11. Legal and Government relations	1 2 3 4 5 6 7
12. Information Technology	1 2 3 4 5 6 7

Technology Strategy

B1. Measuring R&D performance is extremely difficult; however, if you consider your company's R&D projects over the last 3 years, how would you rate them overall in terms of schedule, meeting specs, and budget, in a 7 point scale ? (1 = did not meet expectations, 4 = met expectations, 7 = performed above expectation)

	Not meet Expectation <--------+----------> Same as Expectation Performed Above Expectation
1. Schedule	1 2 3 4 5 6 7
2. Meeting specification	1 2 3 4 5 6 7
3. Budget.	1 2 3 4 5 6 7

B2. Please fill in the approximate percentage for R&D spending, in terms of budget and man-power (people).

	Budget	Man power
a. Improvement type R&D	___%	___%
b. Innovative R&D	___%	___%
c. Basic R&D	___%	___%
d. Customer service	___%	___%

B3. Please circle the extent how willingly you introduce external technology. (1 = Reluctantly, 4 = Moderate, 7 = Very actively)

	Reluctantly<----------->Actively
a. Three years ago	1 2 3 4 5 6 7
b. Today	1 2 3 4 5 6 7
c. Three years later	1 2 3 4 5 6 7

B4. Please indicate how important each of the following approaches has been as a part of your company's response to managing R&D. (1 = Not very much important, 4 = Moderate, 7 = Extensively important)

	Not important<----------->Important
a. Strict criteria for new program start-up	1 2 3 4 5 6 7
b. Stringent requirements for program continuation	1 2 3 4 5 6 7
c. Focus only on core technologies.	1 2 3 4 5 6 7
d. Increase external acquisitionof technology	1 2 3 4 5 6 7

B5. Please rate your company's R&D organization relative to your perceptions of your most serious competitors on each of the following dimensions. (1 = Worse than competitors, 4 = About the same, 7 = Much better).

	About Same Worse<----------+----------->Better
a. Degree to which your R&D successfully satisfies:	
1) Customers	1 2 3 4 5 6 7
2) Corporate strategy	1 2 3 4 5 6 7
3) Crude oil production department	1 2 3 4 5 6 7
4) Crude oil refining department	1 2 3 4 5 6 7
b. Overall performance of R&D in terms of:	
1) Effective use of R&D resources	1 2 3 4 5 6 7
2) Efficient use of R&D resources	1 2 3 4 5 6 7
3) R&D's timelines (on schedule)	1 2 3 4 5 6 7
4) Success in reducing cost of production	1 2 3 4 5 6 7
5) Success in reducing cost of refining	1 2 3 4 5 6 7
c. Ability of your R&D organization to adjust to major external changes	1 2 3 4 5 6 7

B6. In the last 5 years, has your company taken steps to improve R&D organization in the following ways ? If so, how effective have those measures been ? (Not tried = did not try, 1 = Not effective, 4 = Moderate, 7 = Very effective).

	Not Tried	Not Effective<----------> Very Effective
a. Stronger accountability	( )	1 2 3 4 5 6 7
b. Streamlining R&D organization	( )	1 2 3 4 5 6 7
c. Tighter measurements	( )	1 2 3 4 5 6 7

Following two questions are limited to the oil refining technology.

B7. I would like to know your current refining technology level and the level which suits your technological strategy needs. Please check one parenthesis from the followings.

	Current	Target
a. Have original technology in all the areas	( )	( )
b. Have original technology in several key areas	( )	( )
c. Have at least one original core technology	( )	( )
d. Able to improve or arrange external technology	( )	( )
e. Able to handle external technology	( )	( )

B8. Among the followings, which technology policy does your company take in the refining technology area ? Please check one parenthesis.

( ) a. Leader
( ) b. Par with competition
( ) c. First follower
( ) d. Late follower
( ) e. N/A (We do not have any policy)

Re-engineering / Restructuring

C1. Has your company engaged in re-engineering before ? Please show how satisfied you are with its outcome in the area in which it was implemented. (N/A = Do not engage in, On-going = Currently going on, 1 = Completely failed, 4 = About the same as expected, 7 = Above the expectation)

	N/A	On-going	Failed<----------> About Same as Expected Above Expectation
a. Production	( )	( )	1 2 3 4 5 6 7
b. Refining	( )	( )	1 2 3 4 5 6 7
c. R&D	( )	( )	1 2 3 4 5 6 7
d. Sales	( )	( )	1 2 3 4 5 6 7
e. Marketing	( )	( )	1 2 3 4 5 6 7
f. HQ(H&R, Finance, Law, etc.)	( )	( )	1 2 3 4 5 6 7
g. Procurement	( )	( )	1 2 3 4 5 6 7
h. Logistics	( )	( )	1 2 3 4 5 6 7
i. Others ( )	( )	( )	1 2 3 4 5 6 7

C2. Many companies are making efforts to increase efficiency and reduce costs. From the following, please circle the extent to which your company has aggressively engaged in maintaining your competitive advantage in the last five years ? (1 = not very much, 7 = Extensively).

	Not very much<----------->Aggressively
Production	
a. Increase efficiency of production by investment (automation, etc.)	1 2 3 4 5 6 7
b. Shrink production section by selecting efficient wells (shut-down unprofitable wells)	1 2 3 4 5 6 7
c. Shrink production development activities	1 2 3 4 5 6 7
Refining	
d. Shrink refinery to increase plant utilization factor (shut-down unprofitable refinery)	1 2 3 4 5 6 7
e. Increase efficiency of refinery by investment (automation)	1 2 3 4 5 6 7
R&D	
f. Shrink R&D by switching to external technology	1 2 3 4 5 6 7
g. Shrink R&D by focusing on core competency	1 2 3 4 5 6 7
Others	
h. Shrink sales forces	1 2 3 4 5 6 7
i. Withdraw from other business (Focus on oil business)	1 2 3 4 5 6 7
j. Switch to the other business (Diversification)	1 2 3 4 5 6 7
k. Others ( )	1 2 3 4 5 6 7

Corporate background information

D1. If the following information is available, we would appreciate your providing it to us here. It will be useful in helping us to cluster responses. Please omit any responses which you consider to be of a sensitive or proprietary nature.

a. Approximate annual sales volume of recent completed year ($ millions)	( )
b. 5 year average annual sales growth of the company (%)	( )
c. Approximate net income after tax ($ millions)	( )
d. Annual R&D spending (% of sales or $ millions)	( )
e. Approximate crude oil production volume (BPSD or million barrel per year)	( )
f. Approximate crude oil volume you refine (BPSD or million barrel per year)	( )
g. Approximate percentage of usage of your refining capacity (%) (# exclude maintenance period)	( )
h. Approximate gasoline sales volume (BPSD or million barrel per year)	( )
i. Approximate number of employee engages in	
1) Total	( )
2) Crude oil production	( )
3) Oil refining	( )
4) Sales & Marketing	( )
5) R&D	( )
6) Strategic planning	( )
7) Others (Head quarter, other business)	( )
j. Approximate number of patent you got last year	( )

全社戦略に関する調査

この調査は、石油会社（米国、日本、他）に関する私どもの研究に用いられるものです。これらの質問に対しては、企画担当役員、部長、又は、その指名する方が、個人のご経験に基づいてお答えくださいますようお願い致します。

機密内容に触れるような質問は無いと思われますが、お答えいただいた内容の取扱については当方にて保証致します。すべてのデータは統計的に扱われ、調査結果では、御社の会社名は一切触れられません。もしご回答されたくない質問がございましたら、飛ばして次にお進みください。

この石油会社の全社戦略に関する調査は、日本の他、米国等その他の諸外国にも送付されており、その関係上、多少わかりにくい表現があるとは思いますが、ご協力下さいますよう、宜しくお願い申し上げます。尚、ご協力くださいました会社に対し、本調査の結果を７月初旬に送付させていただきます。また、時間の都合上、３月２２日（金）までに日本発送していただけましたら幸いです。

本調査の所要時間は、約２０分程度と思われます。ご多忙の折誠に申し訳ございませんが、すべての質問にご回答いただけますよう、宜しくお願い申し上げます。

A．全社戦略

１．多くの会社では、戦略を立てる上でシナリオを用いていることと思います。あなたの会社ではシナリオを用いていますか？　もしご使用でしたら、全社戦略を立てる上で、どの程度それを重要視しているかお答え下さい。（１＝重要視していない、４＝中庸、７＝大変重視している）また、重要視している３項目について、カッコ内にその順位を示して下さい。

	重視していない<----------+----------> 中庸 重視							ランク
1) 原油価格	1	2	3	4	5	6	7	(　)
2) 原油の重軽格差	1	2	3	4	5	6	7	(　)
3) 石油製品の値段	1	2	3	4	5	6	7	(　)
4) 石油製品の需要	1	2	3	4	5	6	7	(　)
5) 景気（ＧＤＰ成長率等）	1	2	3	4	5	6	7	(　)
6) 金利	1	2	3	4	5	6	7	(　)
7) 為替レート	1	2	3	4	5	6	7	(　)
8) 政府（環境規制、関税、税金他）	1	2	3	4	5	6	7	(　)
9) 他社の戦略	1	2	3	4	5	6	7	(　)
10) 産油国の動向	1	2	3	4	5	6	7	(　)
11) 自社の確認原油埋蔵量	1	2	3	4	5	6	7	(　)
12) 精製能力	1	2	3	4	5	6	7	(　)
13) マーケットシェア	1	2	3	4	5	6	7	(　)
14) その他（　　）	1	2	3	4	5	6	7	(　)

2．どの位の頻度で短期、長期の戦略を立案、見直ししていますか？　下記の項目から該当するものを選んで（X）を記入して下さい。

	短期戦略（3年以下のもの）	長期戦略（4年以上のもの）
a）3ヶ月に一度又は、それ以上頻繁に	（　）	（　）
b）6ヶ月に一度又は、それ以上頻繁に	（　）	（　）
c）1年に一度又は、それ以上頻繁に	（　）	（　）
d）3年に一度又は、それ以上頻繁に	（　）	（　）
e）3年以上の期間に一度	（　）	（　）

3．あなたの会社の組織文化についての質問です。下記の項目について、該当する程度についてお答え下さい。（1＝全くあてはまらない、4＝どちらともいえない、7＝全くその通りだ）

	反対			中庸			賛成
1）経営者、管理者の責任と権限が明確に規定されている。	1	2	3	4	5	6	7
2）公式に決められた権限や責任にとらわれずに、協力が行われている。	1	2	3	4	5	6	7
3）プロジェクトチ-ムには、高度の自律性が与えられている。	1	2	3	4	5	6	7
4）スタッフ部門より、ライン部門の発言力が大きい。	1	2	3	4	5	6	7
5）スタッフ部門により優秀な人材が投入されている。	1	2	3	4	5	6	7
6）4半期、半期毎の収益管理が厳しく行われている。	1	2	3	4	5	6	7
7）事業単位には、業務遂行に関して大幅な権限と責任とが与えられている。	1	2	3	4	5	6	7
8）異質な人材の組合せが重視される。	1	2	3	4	5	6	7
9）命令、報告系統がはっきりと決められている。	1	2	3	4	5	6	7
10）面白いアイデアは、多少の危険があっても実行される。	1	2	3	4	5	6	7
11）失敗を恐れずに、高い目標が設定される。	1	2	3	4	5	6	7
12）新しい提案は、慎重に検討されてから実行に移される。	1	2	3	4	5	6	7
13）市場や技術の将来予測の為、大量の資源(資金と人力)が投入される。	1	2	3	4	5	6	7
14）戦略、計画が遵守される。	1	2	3	4	5	6	7
15）経営戦略は、計画、予算という形で具体化されている。	1	2	3	4	5	6	7
16）変化を脅威というより、むしろ好機として捕らえている。	1	2	3	4	5	6	7
17）会社の強みは、継続的な努力の積み重ねによって築かれている。	1	2	3	4	5	6	7
18）現場からの意見が重視されている。	1	2	3	4	5	6	7
19）不測の事態に備えて、余裕資金が蓄えられている。	1	2	3	4	5	6	7
20）独自性、創造力、独創性が、常に尊重されている。	1	2	3	4	5	6	7

4．つぎの部門について、あなたの考える国内上位3社と比較した場合、貴社の強さを示して下さい。（1＝大変劣っている、4＝同等、7＝大変勝っている）

	劣っている<----------+---------->優っている			同等			
1) 製造全般	1	2	3	4	5	6	7
-1) 原油生産能力	1	2	3	4	5	6	7
-2) 原油生産技術	1	2	3	4	5	6	7
-3) 石油精製設備	1	2	3	4	5	6	7
-4) 石油精製技術	1	2	3	4	5	6	7
-5) 石油化学、バイオ化学	1	2	3	4	5	6	7
-6) その他エネルギー関連事業（石炭、ＬＰＧ等）	1	2	3	4	5	6	7
-7) 非エネルギー事業	1	2	3	4	5	6	7
2) 研究開発	1	2	3	4	5	6	7
3) マーケティング	1	2	3	4	5	6	7
4) 販売	1	2	3	4	5	6	7
5) 顧客サービス	1	2	3	4	5	6	7
6) 原油、石油製品の調達	1	2	3	4	5	6	7
7) 物流（購買、出荷）	1	2	3	4	5	6	7
8) 経営	1	2	3	4	5	6	7
9) 人材	1	2	3	4	5	6	7
10) 資金繰り	1	2	3	4	5	6	7
11) 政府との関係	1	2	3	4	5	6	7
12) 情報技術の活用	1	2	3	4	5	6	7

B．技術戦略

1．研究開発部門を評価するのは大変難しいと思われますが、過去三年間の研究開発は、スケジュール、性能、予算の三点からみた成果については、いかがでしたでしょうか？　あなたのお考えでお答え下さい。（1＝期待外れ、4＝期待通り、7＝期待を超える成果）

	期待外れ<----------+----------->期待以上			期待通り			
1) スケジュール	1	2	3	4	5	6	7
2) 性能	1	2	3	4	5	6	7
3) 予算	1	2	3	4	5	6	7

２．研究開発の為に、およそどの程度の資源を使ったのかを、資金、人力の二面からお答え下さい。

	資金	人力
1）改良型の研究開発	＿＿＿％	＿＿＿％
2）革新的な研究開発	＿＿＿％	＿＿＿％
3）基礎研究	＿＿＿％	＿＿＿％
4）顧客サービス	＿＿＿％	＿＿＿％

３．外部の技術の導入をどの程度積極的にされていますか？　三年前、現在、三年後、それぞれについてお答え下さい。（１＝しかた無く、７＝積極的に）

	しかた無く<----------+---------->積極的に						
1）三年前	1	2	3	4	5	6	7
2）現在	1	2	3	4	5	6	7
3）三年後	1	2	3	4	5	6	7

４．次の方法が、貴社において、研究開発を管理する上でどの程度の重要性を持っているのかお答え下さい。（１＝重要で無い、７＝重要である）

	重要で無い<----------+---------->重要である						
1）新しいテーマの選定を厳しく審査	1	2	3	4	5	6	7
2）テーマの継続を厳しく審査	1	2	3	4	5	6	7
3）核となる技術に集中	1	2	3	4	5	6	7
4）外部技術の導入の増加	1	2	3	4	5	6	7

５．あなたの一番重要な競争相手と比較して、貴社の研究開発部門を評価して下さい。（１＝競争相手より劣っている、４＝競争相手と同等、７＝競争相手より優っている）

	同等 劣っている<----------+---------->優っている						
研究開発部門が、次の要求を満足させていますか？							
1）顧客	1	2	3	4	5	6	7
2）全社戦略	1	2	3	4	5	6	7
3）原油生産部門	1	2	3	4	5	6	7
4）石油精製部門	1	2	3	4	5	6	7
以下の尺度でみた、研究開発部門の成果は？							
1）効果	1	2	3	4	5	6	7
2）効率	1	2	3	4	5	6	7
3）スケジュール	1	2	3	4	5	6	7
4）原油生産コストの削減	1	2	3	4	5	6	7
5）石油精製コストの削減	1	2	3	4	5	6	7
研究開発部門の外部要因への適応能力	1	2	3	4	5	6	7

6．過去5年間を振り返って、研究開発部門を強化するために、下記の対応をされましたか？もし、行われたならば、その成果についてお答え下さい。（1＝効果は無かった、4＝まあまあ効果はあった、7＝大変効果があった）

	効果ナシ<----------+---------->大きな効果						
1）権限、責任の強化	1	2	3	4	5	6	7
2）研究開発組織の合理化	1	2	3	4	5	6	7
3）研究開発テーマの管理基準の強化	1	2	3	4	5	6	7

質問7、8は石油精製部門についてお答え下さい。

7．現在の精製技術のレベルと技術戦略上目標とすべき技術レベルについて、下記の中からあてはまるものを選んで、（X）を記入して下さい。

	現状	目標
1）独自技術をすべての分野で持つ	( )	( )
2）独自技術をいくつかの重要な分野で持つ	( )	( )
3）少なくとも一つの核となる独自技術を持つ	( )	( )
4）外部技術を改善、又は、自社に適合させられる	( )	( )
5）外部技術を取り扱える	( )	( )

8．石油精製において、次のどの技術戦略を貴社では用いていますか？　下記の中からあてはまるものを選んで（X）を記入して下さい。

1）リーダー（一番手）	( )
2）競争相手と横並び	( )
3）最初に追従する	( )
4）他社も追従してから、追従する	( )
5）特に技術戦略は無い	( )

C．リエンジニアリング／リストラクチャリング

1．貴社では、リエンジニアリングを実行されましたか？　実行された分野及び、実行中の分野において、どの程度の成果が得られたのかお答え下さい。（未実施＝実施していない、実施中＝現在進行中、1＝全くの失敗、4＝期待通り、7＝期待を上回る成果）

	未実施	実施中	期待通り 失敗<----------+---------->期待以上						
1）原油生産	( )	( )	1	2	3	4	5	6	7
2）石油精製	( )	( )	1	2	3	4	5	6	7
3）研究開発	( )	( )	1	2	3	4	5	6	7
4）販売	( )	( )	1	2	3	4	5	6	7
5）マーケティング	( )	( )	1	2	3	4	5	6	7
6）本社（人事、経理、法務他）	( )	( )	1	2	3	4	5	6	7
7）調達（原油、製品）	( )	( )	1	2	3	4	5	6	7
8）物流	( )	( )	1	2	3	4	5	6	7
9）その他（　　）	( )	( )	1	2	3	4	5	6	7

２．多くの会社では、効率を上げ、コストを削減するため様々な努力がなされています。貴社で、過去五年間に以下の項目をどの程度積極的に実施されたかについてお答え下さい。（１＝あまり積極的には実施していない、７＝積極的に実施した）

	積極的でない<----------+----------> 積極的
原油生産	
1） 投資による生産効率アップ	1 2 3 4 5 6 7
2） 規模の縮小(高い効率油井の選別)	1 2 3 4 5 6 7
3） 新規油田開発の縮小	1 2 3 4 5 6 7
石油精製	
4） 製油所の統廃合による稼働率アップ	1 2 3 4 5 6 7
5） 投資による生産効率のアップ	1 2 3 4 5 6 7
研究開発	
6） 外部技術依存度を高め、部門の縮小	1 2 3 4 5 6 7
7） 核となる技術を絞り込み、部門の縮小	1 2 3 4 5 6 7
その他	
8） 販売要員の縮小	1 2 3 4 5 6 7
9） 非石油産業部門からの撤退、切離し	1 2 3 4 5 6 7
10）非石油産業への転身（多角化）	1 2 3 4 5 6 7
11）その他(　　)	1 2 3 4 5 6 7

D．会社情報

１．下記の質問は、お答え頂いたデータを分類整理する上で使用するものです。社外秘項目は、飛ばして次にお進み下さい。お答えいただける範囲で宜しくお願いします。

1） 昨年度の年間売上げ高(億円)　(　　)
2） 過去五年間の平均売上げ高成長率(%)　(　　)
3） 昨年度の経常利益（億円）　(　　)
4） 昨年度の当期利益（億円）　(　　)
5） 年間の研究開発費用(億円、又は、売り上げ高比率)　(　　)
6） 自社原油生産量（ＢＰＳＤ，バーレル／年）　(　　)
7） 原油処理量（ＢＰＳＤ，バーレル／年）　(　　)
8） 製油所の稼働率（%）　(　　)
9） ガソリン販売量（ＢＰＳＤ、Kiro Litter／年）　(　　)
10）従業員数
　-1）全従業員数　(　　)
　-2）原油生産部門　(　　)
　-3）石油精製部門　(　　)
　-4）販売、マーケティング　(　　)
　-5）研究開発　(　　)
　-6）戦略策定、企画　(　　)
　-7）その他(本社、非石油産業)　(　　)
11）昨年度獲得した特許数　(　　)

ご協力いただきましてありがとうございました。

Massachusetts Institute of Technology
Sloan School of Management

This Correspondence is a part of research work being done for a Master's thesis

Management of Technology Program
Suite E52-101
50 Memorial Drive
Cambridge, Massachusetts 02142-1347

In reply, write to :
Futoshi Toyoda
One Longfellow Place #421
Boston, MA 02114
Tel & Fax : (617) 367-2541
E-mail : Saude@aol.com

February 27, 1996

Refinery Manager

Re : **Request of your response to the questionnaire**

Dear Madam or Sir,

We are writing to request your valuable assistance in our study about Oil Refinery Strategy. This study is being conducted as a part of the research for a master's thesis at MIT Sloan School of Management. We request that the Refinery Manager (or his/her designate) answer the questions from his/her personal experience and knowledge. Your participation is very important to us, and information you provide will be crucial to the success of our research.

US petroleum companies have coped with issues of deregulation and intensifying competition in the last two decades. This study concerns the refinery strategy and your experience of the price control deregulation in the late 70s to early 80s to find out what is the source of the strength.

The questionnaire is anonymous, and your responses will be aggregated with those of other respondents. This questionnaire is being distributed to all the oil refineries in the USA. We have made every effort to ensure that the questionnaire is very easy to complete and should take approximately 15 minutes of your time. A return envelope is provided for your convenience.

The results of this survey will be disseminated to all the participants who reply, expected in June 1996. Because of the time constraint involved in producing the thesis, we would appreciate your response by March, 18, Monday. Please feel free to contact us if you have any questions.

Thank you very much for your time and cooperation.

Sincerely yours,

D. Eleanor Westney
Professor

Henry Birdseye Weil
Senior Lecturer

Futoshi Toyoda
Master's Candidate

Refinery Questionnaire

This questionnaire is for our survey on business unit level strategy of North American oil refineries. In completing this survey, we would be most grateful if **the Refinery Manager (or his/her designate)** would answer the questions, from his/her personal experience and knowledge.

Although no proprietary information is sought in this survey, we assure you that total privacy of your responses will be maintained. All data analysis will be carried out in multi-refinery aggregates. No identification of your refinery will be made in any presentation of survey results. If there is any question you prefer not to answer, please skip it and go on to next.

We sincerely appreciate your timely co-operation and your sharing of insights in this research for practice and performance benchmarking of business unit level strategies of oil refineries. We will send all survey respondents a copy of the study results, which are expected in June 1996. Because of the time constraint, **we would appreciate your response by Monday, 18 March, 1996.**

Our trials with this questionnaire show it takes approximately **15 minutes of your time**. Please respond to all questions and thank you for your participation !

Operations

A1. Have you invested in the plant for the last five years ? If no, please skip A1 and A2 questions. If yes, please show the extent to which you have successfully invested in the plant. (1 = Unsuccessful, 4 = about the same as initially planned, 7 = Extensively successful)

Same as initial plan
<---------+--------->
Unsuccessful Successful
1 2 3 4 5 6 7

A2. Please circle the extent to which you put weight on each factor, when deciding about a new plant investment. (1 = light weight, 4= moderate, 7= extensively heavily weighted)

Moderate
Light <----------+-------> High-weigh

Environmental issues

a. Market changes (product demand and supply) 1 2 3 4 5 6 7

b. Market for by-products 1 2 3 4 5 6 7

c. Crude oil price, Price difference b/w heavy and light crude oil 1 2 3 4 5 6 7

d. Product price 1 2 3 4 5 6 7

e. Economic factors (interest rate, business condition, etc.) 1 2 3 4 5 6 7

f. Regulation changes 1 2 3 4 5 6 7

g. Competitor's reaction 1 2 3 4 5 6 7

Technical issues

h. Fitness to the existing refinery (influence of other facilities) 1 2 3 4 5 6 7

i. Material balance (yield estimation, input/output balance, etc.) 1 2 3 4 5 6 7

j. Utility balance problem 1 2 3 4 5 6 7

k. Product quality 1 2 3 4 5 6 7

l. Operability 1 2 3 4 5 6 7

m. Technology innovation 1 2 3 4 5 6 7

n. Environmental problem (pollution) 1 2 3 4 5 6 7

o. Tried and true, or tested technology 1 2 3 4 5 6 7

Industry Position

B1. Which contributes more to your competitive advantage, "Lower cost" or "Differentiation". Please circle the extent. (1 = Lower cost, 4 = Moderate, 7 = Differentiation)

Lower cost <-------+------->Differentiation

1 2 3 4 5 6 7

B2. We would like to know the source of your competitive advantage. Please indicate the strength of your company's position, compared to the average level refinery. (1 = much weaker than average level refinery, 4 = about the same, 7 = much better than average level refinery).

About the Same

Weaker <-------+--------> Stronger

Operation

a. Relatively small labor force (High efficiency)	1 2 3 4 5 6 7
b. High energy efficiency	1 2 3 4 5 6 7
c. Good quality control (Small quality space)	1 2 3 4 5 6 7
d. Safe and stable operation	1 2 3 4 5 6 7
e. Operational know-how (Experience)	1 2 3 4 5 6 7
f. Advanced operation (Computer-aid, etc.)	1 2 3 4 5 6 7
g. The latest technology	1 2 3 4 5 6 7
h. Large cracking plant capacity	1 2 3 4 5 6 7
i. Profitable special plants (Coke, Lub, Chemicals)	1 2 3 4 5 6 7
j. High plant utilization factor	1 2 3 4 5 6 7
k. Large plant capacity (Economy of scale)	1 2 3 4 5 6 7
l. Others ( )	1 2 3 4 5 6 7

Other support functions

m. Low maintenance cost	1 2 3 4 5 6 7
n. Low overhead cost	1 2 3 4 5 6 7
o. Low labor cost (direct and indirect)	1 2 3 4 5 6 7
p. Well optimized blending	1 2 3 4 5 6 7
q. Procurement of cheap crude oil	1 2 3 4 5 6 7
r. Precise operating planning and scheduling	1 2 3 4 5 6 7
s. Coordination with an allied refinery	1 2 3 4 5 6 7
t. R&D support (active catalyst, etc.)	1 2 3 4 5 6 7
u. Excellent people	1 2 3 4 5 6 7
v. HQ's strong support (financial, legal, etc.)	1 2 3 4 5 6 7
w. Others ( )	1 2 3 4 5 6 7

Experience with the deregulation of price control in the late 70s to early 80s
(Countermeasure for the low cost import gasoline)

C1. Did you take any special countermeasure for the price control deregulation in the late 70s to early 80s ? Please check "X" one of them.

( ) a. Yes
( ) b. No
( ) c. Plant did not exist at that time

C2. If yes, please show how effective you think the measures had worked to strengthen and maintain your competitive advantage at that time (Not apply = did not apply it, 1 = not very much effective, 4 = moderate, 7 = Extensively effective).

		Little effective	Moderate	Very effective
Down-sizing				
a. Shut down unprofitable plants	Not apply	1 2 3 4 5 6 7		
b. Consolidate or scrap refineries and plants.	Not apply	1 2 3 4 5 6 7		
c. Reduce operating labor cost by automation	Not apply	1 2 3 4 5 6 7		
d. Reduce maintenance cost by prolonging cycle	Not apply	1 2 3 4 5 6 7		
e. Reduce logistics cost (consolidation, automation)	Not apply	1 2 3 4 5 6 7		
f. Reduce over head cost (R&D, general affair, etc.)	Not apply	1 2 3 4 5 6 7		
Investment				
g. Expand the plant capacity for economies of scale	Not apply	1 2 3 4 5 6 7		
h. Increase cracking capacity	Not apply	1 2 3 4 5 6 7		
i. Revamp plants with the latest technology	Not apply	1 2 3 4 5 6 7		
j. Introduce computer for plant operation	Not apply	1 2 3 4 5 6 7		
Operation				
k. Shift from expensive light crude oil to cheap heavy one	Not apply	1 2 3 4 5 6 7		
l. Save energy (increase heat efficiency, etc.)	Not apply	1 2 3 4 5 6 7		
m. Total quality control	Not apply	1 2 3 4 5 6 7		
Others				
n. Others ( )		1 2 3 4 5 6 7		
o. Others ( )		1 2 3 4 5 6 7		

C3. We are researching for any published materials on de-regulation during that period. If you know of any such materials that you believe are particularly useful, could you provide the following information ?

Title	Author	Publisher
_____	_____	_____
_____	_____	_____
_____	_____	_____

Refinery background information

D1. If the following information is available, we would appreciate your providing it to us here. It will be useful in helping us to cluster responses. Please omit any responses which you consider to be of a sensitive or proprietary nature.

a. Approximate utilization factor of your refining capacity (%) (Note: exclude maintenance period) ( )

b. Approximate average gasoline yield (%) ( )

c. Approximate number of employees engaged in

1) Operation ( )

2) Maintenance ( )

3) Environment and Safety ( )

4) Operation support (Eng., IT, planning, R&D) ( )

5) General affair (HR, finance, law, etc.) ( )

6) Total (includes others) ( )

d. Approximate average **refinery's** annual sales over the past three years ($ millions) ( )

e. Approximate average **refinery's** net income over the past three years ($ millions) ( )

f. Approximate average plant investment over the past five years ($ millions) ( )

製油所戦略に関する調査

この調査は、製油所（米国、日本、他）に関する私どもの研究に用いられるものです。これらの質問に対しては、製油所所長、または、その指名する方が、個人のご経験に基づいてお答えくださいますようお願い致します。

機密内容に触れるような質問は無いと思われますが、お答えいただいた内容の取扱については当方にて保証致します。すべてのデータは統計的に扱われ、調査結果では、御社の会社名は一切触れられません。もし、ご回答されたくない質問がございましたら、飛ばして次にお進み下さい。

この製油所の戦略に関する調査は、日本の他、米国等、その他の諸外国にも送付されており、その関係上、多少わかりにくい表現があるとは思いますが、ご協力下さいますよう、宜しくお願い申し上げます。尚、ご協力くださいました製油所に対し、本調査の結果を７月初旬に送付させていただきます。また、時間の都合上、３月２２日（金）までに日本発送していただけましたら幸いです。

本調査の所要時間は、約１５分程度と思われます。ご多忙の折、誠に申し訳ございませんが、すべての質問にご回答いただけますよう宜しくお願い申し上げます。

A．運転

１．過去五年間にプラントへ投資しましたか？　もし行っていなければ、質問－１，２は飛ばして、質問－３へお進み下さい。　もし投資されていれば、投資がどのくらいの成果を納めているかお答え下さい。　（１＝無駄な投資であった、４＝計画通り、７＝大変成功した）

計画通り

大失敗<----------+---------->大成功

1　2　3　4　5　6　7

２．新規プラントの投資を決める時、次の項目をどの程度重視するかをお答え下さい。
（１＝軽視する、４＝中間、７＝重視する）

	軽視<----------中間----------+----------重視						
環境因子							
1)　製品市場の変化(需要と供給)	1	2	3	4	5	6	7
2)　副生製品の市場	1	2	3	4	5	6	7
3)　原油価格、原油の重軽格差	1	2	3	4	5	6	7
4)　製品価格	1	2	3	4	5	6	7
5)　経済因子(利率、景気等)	1	2	3	4	5	6	7
6)　規制の変化(新規、改定、緩和他)	1	2	3	4	5	6	7
7)　競争相手の動向	1	2	3	4	5	6	7
技術因子							
8)　既存設備への影響	1	2	3	4	5	6	7
9)　マテリアルバランス(得率、他)	1	2	3	4	5	6	7
10) ユーティリティーバランス	1	2	3	4	5	6	7
11) 製品の品質	1	2	3	4	5	6	7
12) 運転のし安さ	1	2	3	4	5	6	7
13) 技術革新	1	2	3	4	5	6	7
14) 環境問題（公害）	1	2	3	4	5	6	7
15) 技術の実績（導入実績の数等）	1	2	3	4	5	6	7

B．戦略

3．あなたの製油所の競争優位は、低コスト優位ですか、それとも差別化優位ですか？　（1＝低コスト、4＝中間、7＝差別化）

低コスト<----------+----------->差別化
1　2　3　4　5　6　7

4．あなたの製油所の競争優位の源泉は何ですか？　あなたのお考えになる国内の平均的な製油所と比較してお答え下さい。　（1＝平均的な製油所に比べてかなり劣っている、4＝平均並み、7＝かなり優れている）

	劣っている<----------+----------->優れている（平均並み）						
運転							
1）比較的少ない労働力	1	2	3	4	5	6	7
2）高いエネルギー効率	1	2	3	4	5	6	7
3）品質管理（少ない品質ロス）	1	2	3	4	5	6	7
4）安全で安定した運転	1	2	3	4	5	6	7
5）運転ノウハウ（経験）	1	2	3	4	5	6	7
6）高度な運転（コンピューター他）	1	2	3	4	5	6	7
7）最新鋭の技術	1	2	3	4	5	6	7
8）充実した分解設備	1	2	3	4	5	6	7
9）高収益の特殊装置（潤滑油、ケミカル他）	1	2	3	4	5	6	7
10）高い稼働率	1	2	3	4	5	6	7
11）大きな装置能力（規模の経済）	1	2	3	4	5	6	7
12）その他（　　）	1	2	3	4	5	6	7
その他のサポート部門							
13）低い設備管理コスト	1	2	3	4	5	6	7
14）低い間接コスト	1	2	3	4	5	6	7
15）安い労働コスト(直接及び、間接)	1	2	3	4	5	6	7
16）優れたブレンド設備	1	2	3	4	5	6	7
17）安い原油の調達能力	1	2	3	4	5	6	7
18）的確な運転計画	1	2	3	4	5	6	7
19）提携関係にある他製油所との調整	1	2	3	4	5	6	7
20）研究開発の援助（触媒他）	1	2	3	4	5	6	7
21）優れた人材	1	2	3	4	5	6	7
22）本社の強力な援助(資金、法務他)	1	2	3	4	5	6	7
23）その他(　　)	1	2	3	4	5	6	7

C．規制緩和（日本以外の国には過去の市場緩和について質問しておりますが、日本ではこれからの取組みについて質問します。過去か未来かの点で、この質問は、他国と異なっています）

5．法改正に伴う石油製品の輸入自由化に対して、以下のような対応を考えていらっしゃいますか？　もしお考えでしたら、それはどの程度有効だとおもわれますか？　（適応無＝特に考えていない、1＝あまり効果的では無い、4＝まあまあ効果的、7＝大変効果的）

	適応無	効果的でない<-------+-------->						効果的
規模の縮小								
1) 利益の上がらない装置の休廃止	( )	1	2	3	4	5	6	7
2) 製油所の統廃合	( )	1	2	3	4	5	6	7
3) 自動化による運転コストの削減	( )	1	2	3	4	5	6	7
4) 点検周期延長による設備管理費削減	( )	1	2	3	4	5	6	7
5) 物流コスト削減(統合、自動化)	( )	1	2	3	4	5	6	7
6) 間接費削減(試験、総務他)	( )	1	2	3	4	5	6	7
投資								
7) 装置能力の拡大(規模の経済)	( )	1	2	3	4	5	6	7
8) 分解能力の増強	( )	1	2	3	4	5	6	7
9) 装置の最新技術設備への改造	( )	1	2	3	4	5	6	7
10) 装置運転へのコンピューターの導入	( )	1	2	3	4	5	6	7
運転								
11) 軽質原油から安価な重質原油への変更	( )	1	2	3	4	5	6	7
12) 省エネルギー	( )	1	2	3	4	5	6	7
13) ＴＱＣ	( )	1	2	3	4	5	6	7
その他								
14) その他（　　）	( )	1	2	3	4	5	6	7
15) その他（　　）	( )	1	2	3	4	5	6	7

D．製油所情報

6．下記の質問は、お答え頂いたデータを分類整理する上で、使用するものです。社外秘項目は飛ばして次にお進み下さい。正確な数字がわからない場合には、おおよその数字で結構です。お答え頂ける範囲で宜しくお願いします。

1) 稼働率（定期修理除く）（%）	( )
2) ガソリン収率（対原油）（%）	( )
3) 従業員数	
-1) 運転	( )
-2) 設備管理	( )
-3) 環境安全	( )
-4) 運転支援（技術、生産管理、情報、研究開発他）	( )
-5) 総務	( )
-6) 合計（上記以外も含む）	( )
4) 過去三年間平均の製油所の売上げ高（億円／年）	( )
5) 過去三年間平均の製油所の粗利益（億円／年）	( )
6) 過去五年間平均の装置への投資額（億円／年）	( )

ご協力頂きましてありがとうございました。

Memo of Interview

Interview Questions

I would like to ask following questions to understand the nature of your corporate strategy, including analysis, planning, implementation, and evaluation. For each question, I also would like to know the reason why your company is doing so ?
In addition to that, please share your experience at the crude price deregulation from late 70s to early 80s. I also want to get your insights about the market deregulation.

Questions for the officers responsible for the overall Strategic Planning

How the corporate strategy related to your corporate vision ?
(How the national strategy related to international strategy ?)

What is the Key Success Factor for the Strategic Planning ?

How the market deregulation changes your strategy ?
What are the Key Success Factors ?

Questions for the people engaged in the actual Corporate Strategic Planning

How is the Corporate Strategy developed ?
Who is involved ?
What is the time horizon ?
How is the Corporate Strategy changed ?

What methodology do you use for the analysis?
What methodology do you use for the scenario planning?
What are the key variables ?

How do you implement your strategy effectively ?
How do you evaluate and adjust the performance ?

How is technology strategy considered in the corporate strategy ?
What is the current and future application of the Information Technology ?

Questions for the person who is familiar with Crude Price Deregulation in the late 70s to early 80s

What happened in the industry ?
What happened to your company ?
How did you cope with ?
What was the Key Success Factors ?

Bibliography

Allen, Thomas J., and Morton, Michael S. Scott, Information Technology and The Corporation of the 1990s : Research Studies, Sloan School of Management, 1994

Aoe, Syunji, "Possibility of Gasoline Import (*Gasoline Yunyu no Kanousei wo Saguru*)", Sekiyu Seisaku, 1994

Bacon, Robert, et al., Demand, Prices and the Refining Industry: A Case-Study of the European Oil Products Market, Oxford Institute for Energy Studies, 1990

Bradly, Robert L. The Mirage of Oil Protection, Cato Institute University Press of America, 1989

Champy, James, Reengineering Management, New York, HarperCollins Publishers, 1995

Daiwa Research, Deregulation can change the industry (*Kiseikanwa de Gyoukai wa Kou Kawaru*), Nihon-Jitsugyo Press, 1994

Fujime, Kazuya, "Latest Long-term Energy Supply-Demand Outlook and Points at Issue", Energy In Japan, No.131, January 1995

Geus, Arie P.De, "Planning as Learning", Harvard Business Review, No.88202, 1988

Hamauzu, Tetsuo, International Petroleum Industry (*Kokusai Sekiyu Sangyo*), Nihon Keizai Hyouron, 1994

Hatoh, Ryo, "Strategic Planning (*Senryaku Sakutei Gairon --- Kigyo-Senryaku-Ritsuan no Riron to Jissai*)", Sannou University Press, 1995

Homma, Makoto, "Japan's Energy Policy and Its Impact on Product Trades", ICEED International Energy Conference, April 1993

Japan Energy, Japan Energy Internal documents, 1994

The Japanese National Committee for world Petroleum Congresses, Petroleum Industry in Japan, 1994

Kagono, Tadao, Tsunoda, Ryuutaro, and Yamada, Kohzoh, Restructuring and Organizational Culture (*Restructuring to Soshiki-Bunka*), Hakuto Press, 1993

Karasawa, Kei, Oil and world economics (*Sekiyu to Sekai Keizai*), Chuou-Keizai Press, 1991

Kim, Jun, and Fujii, Hideaki, "The points at issue and Subjects of Japan's Petroleum Refined Product Trade", Energy in Japan, No.130, November 1994

Koide, Yasuhiro, "Deregulation and Future of Japan's oil industry". Energy in Japan No.136, November 1995

Kojima, Ikuo, World Industry (*Sekai Gyou-kai Chizu*), The Japan Times, 1994

Koyama, Ken, "Outlook for Oil Supply and Demand in Asia-Pacific Region and Role to be Played by Japan's Oil Industry", Energy In Japan, No.132, March 1995, P.1-20

Linde, Coby van der, Dynamic International Oil Markets, Kluwer Academic Publishers, 1991

Lynch, Michael, "Shoulder Against Shoulder : The evolution of Oil Industry Strategy", The Journal of Energy and Development, ICEED, 1995

Matsubara, Michiro, "Gasoline", Petrotech, No.17 (10), 1994, p.38-442.0

Mezawa, Shogo, and Kurosaki, Takashi, and Ogawa, Yoshiki, "Japan's Future Refining Facilities", Energy In Japan, No.125, January 1994

Mitchell, John V., An Oil Agenda for Europe, Royal Institute of International Affairs, 1994

Moody's Investor's Service, Moody's handbook of common stocks, Fall 1995

Moody's Investor's Service, Moody's Industrial Manual, vol. 1 & 2, 1995

Moody's Investor's Service, Moody's Industrial Manual, vol. 1 & 2, 1990

Nikkei Business, Re-engineering for Japan (*Nihon-Gata Re-engineering*), Nihon Keizai News Paper Press, 1994

Oil & Gas Journal, Oil & Gas Journal Data Book, PennWell books, 1995

Oil Report, "Deregulation in oil (*Kisei Kanwa to Sekiyu Housei Minaoshi*)", Oil Report, Oil Report Press, No. 715, 1994, p.1-5

Oil Report, "Expansion of oil importer and its impact for the oil product market (*Yunyuu Syutai no Kakudai to Seihin Shijo*)", Oil Report, Oil Report Press, No. 716, 1994

Ogawa, Yoshiki, "International Changing Oil Product Qualities and Japan's Response", Energy In Japan, No.126, March 1994

Okabe, Akira, Petroleum (*Sekiyu*), Nihon Keizai Hyouron Press, 1986

Peters, Tom J., and R. H. Waterman, Jr., In Search of Excellence, Harper & Row, 1982

Porter, Michael E., Competitive Strategy, New York, The Free Press, 1980

Resource and Energy Department, Energy policy and its future (*Energy Seisaku No Ayumi to Tenbo*), MITI, 1993

Resource and Energy Department, Present condition of oil distribution and its problem (*Sekiyu Ryuutsuu-gyou no Genjou to Kadai*), MITI, 1994

Roberts, Edward B. and Bellotti, Paulo, "Managerial Determinants of Industrial R&D Performance: An Analysis of the Global Chemicals/Materials Industry", Working paper, The International Center for Research on the Management of Technology, ICRMOT, 1994

Roberts, Edward B., "Benchmarking the strategic Management of Technology --- I", Working paper, The International Center for Research on the Management of Technology, ICRMOT, 1994

Roberts, Edward B., "Benchmarking the strategic Management of Technology --- II: R&D Performance", Working paper, The International Center for Research on the Management of Technology, ICRMOT, 1995

Roberts, Edward B., "Seeking Global Technological Advantage", E.M.R, IEEE, 1995

Satoh, Hisao, "Deregulation and Japan's Petroleum Industry: The Global Context", USJP Occasional Paper , 92-09, 1993

Sekitsuu, "Forced regulation for import gasoline, kerosene, and gas oil (*Hinshitsu Iji Seido no Wakugumi Katamaru --- Gasoline, Kerosene, and Gas oil*)", Sekitsu, December 1994

Sexsmith, Fred J., "Downstream Petroleum Sector Reform in Asia", World Bank Energy Workshop, November 1994

Standard & Poor's, "Oil --- Basic Analysis", Standard & Poor's Industrial surveys,
Vol.139, Sec.2, June 1971, Vol.140, Sec.2, July 1972, Vol.141, Sec.2, July 1973,
Vol.142, Sec.2, July 1974, Vol.143, Sec.2, June 1975, Vol.144, Sec.2, June 1976,
Vol.145, Sec.2, June 1977, Vol.146, Sec.2, June 1978, Vol.147, Sec.2, June 1979,
Vol.148, Sec.2, Aug. 1980, Vol.149, Sec.2, Oct. 1981, Vol.150, Sec.2, Nov. 1982,
Vol.151, Sec.1, Nov. 1983, Vol.152, Sec.2, Nov. 1984, Vol.153, Sec.1, Nov. 1985,
Vol.154, Sec.2, Nov. 1986, Vol.156, Sec.3, Aug. 1988, Vol.157, Sec.1, Aug. 1989,
Vol.158, Sec.1, Oct. 1990, Vol.159, Sec.1, July 1991, Vol.160, Sec.3, July 1992,
Vol.161, Sec.3, July 1993, Vol.162, Sec.1, July 1994, Vol.163, Sec.1, June 1995

Sudo, Shigeru, Oil market --- Present and Future (*Sekiyu Shijo no Genjo to Shorai*), Sekai-no-Ugoki Press, 1995

Toichi, Tsutomu, Petroleum (*Sekiyu Sangyo*), Nihon Keizai News Paper, 1987

Verlerger, Jr., Philip K., Adjusting to Volatile Energy Prices, Institute for International Economics, 1993

Wack, Pierre, "Scenarios : uncharted waters ahead", Harvard Business Review, No.85516, 1985

Weiss, Leonard W., & Klass, Michael W., Regulatory Reform What Actually Happened, Little, Brown and Company, 1981

Yergin, Daniel, The Prize: The Epic Quest for Oil, Money and Power, Simon and Schuster, 1991

List of Annual Report

Current Annual report

USA --- 49 Companies
Amerada Hess Corportation
Amoco Corporation
Ashland, INC.
Atlantic Richfield Company

Berry Petroleum Company
BHP Petroleum Americas (BHP)
BP America

Castle Energy Corporation
CENEX, INC.
Chevron Corporation Company
CITGO Petroleum Corporation
Clark Refining & Marketing, INC.
The Coastal Corporation
CONOCO Inc.
Cornerstone Natural Gas Inc.
Countrymark Corporative INC. and Subsidiaries

Diamond Shamrock, INC

Exxon Corporation

The Farmland Cooperative System
FINA, INC.
Frontier Oil Corporation and Subsidiaries(Wainoco Oil Corporation)

Giant Industries, INC.

Holly Corpotation
Howell Corporation
Huntway Partners, L.P.

Kerr- Mcgee Corporation

The Louisiana Land and Exploration Company
Lyondell Petrochemical Company

Mapco, INC.
Marathon Oil Company
Mobil Corporation
Murphy Oil Corporation

Occidental Petroleum Corporation

Pennzoil Company
Petrolite Corporation
Phillips Pertoleum Company

Pride Companies, L.P.

Quaker State Corporation

Shell Oil Company
Star Enterprise
Sun Company, INC.
Tesoro Petroleum Corporation
Texaco INC.
Tosco Corporation
Total Petroleum (North America) Ltd.

Ultramar Corporation
Unico, INC.
Unocal Corporation

Valero Energy Company

Canada --- 5 Companies
Parkland Industries Ltd.
Petro-Canada
Shell Canada Limited
Sunoco Inc.
Ultramar Canada, Inc.

Japan --- 6 Companies
Cosmo Oil Company, Ltd.
Japan Energy Corporation
Mitsubishi Oil Company, Ltd
Nippon Oil Company, Ltd.
Showa Shell Sekiyu K.K.
Tonen Corporation

Back numbers
Annual reports from 1970s are reviewed for 10 companies. In order to kept secret the intervewee companies, I do not mention the list of company here.

--- Financial Report or Company Information ---
Husky Oil Operations Limited.

Arabian Oil Company, Ltd(Japan)
Fuji Kosan Company, Ltd.
General Sekiyu K.K.
Idemitsu Kosan Company, Ltd.
Koa Oil Company, Ltd.
Kyokuto Petroleum Industries
Toa Oil Co. Ltd.
Toho Oil Company, Ltd.
Tohoku Oil Company