

# How Strategic Alliances Change: The Case of the Japanese Semiconductor Business

YOSHIYA TERAMOTO

*Economics Faculty, Hokkaido University, Hokkaido*

NAOTO IWASAKI

*Economics Faculty, Seijo University, Tokyo*

TOHRU TAKAI

*Economics Faculty, Obirin University, Tokyo*

## ABSTRACT

*The structure of the semiconductor industry has been changing recently. Japanese companies have lost their competitiveness, while their US and Korean counterparts have been strengthening theirs. At the same time, the map of the inter-firm relationships in the IT industry is changing. Patterns of strategic alliances in the semiconductor business have been evolving and have become complicated.*

*We will investigate the transformation of strategic alliances, and we will propose how Japanese semiconductor companies can recover through a new type of alliance.*

**Key Words :** Strategic Alliance, Vertical Alliance, Single-front Alliance, Multi-dimensional Alliance

## INTRODUCTION

Technological advancement generates tremendous changes in the market and competitive structure in the information era. With these changes, alliance relationships in the information technology industry have become more complicated than ever before. They might reflect not only the change of industrial structures, but also the changing strategies of individual companies. Thus we will investigate them, focusing on the semiconductor business.

### *(1) Overview of the Semiconductor Industry*

In the 1980s Japanese companies caught up with American companies by investing their resources in DRAM (Dynamic Random Access Memory) and they have kept their top position since the latter part/half of the 1980s.

However, in the 1990s American companies improved their performance in

the field of MPUs (Micro Processor Unit), in which Japanese companies fell behind. With falling growth rates, Japanese companies now face deficits.

However, just because American sales of semiconductors are surpassing those of Japanese firms, it does not mean that the US firms are taking a commanding lead in all fields. The one reason why Japanese companies grew so rapidly in the 1980s is that there was strong demand for computers, home appliances and electronics in the Japanese market. Now, the demand is strong for personal computers, a field in which US-made chips have an advantage.

In fact, some Japanese companies have improved their performance as a result of the increasing demand for personal computers in the American market. However, there is little expectation that Japanese companies will improve their growth in the future as long as they focus on DRAM production. According to market forecasts of WSTS, MPUs will have much higher growth

TABLE 1. Global Competition in the Semiconductor Business<sup>1</sup>

Rank	1981	1992	1993	1994
1	TI	NEC	INTEL	INTEL
2	MOTOROLA	TOSHIBA	NEC	NEC
3	NEC	INTEL	MOTOROLA	MOTOROLA
4	HITACHI	MOTOROLA	TOSHIBA	TOSHIBA
5	TOSHIBA	HITACHI	IBM	IBM
6	NS	TI	HITACHI	HITACHI
7	INTEL	FUJITSU	TI	SAMSUNG
8	MATSUSHITA	MATSUSHITA	FUJITSU	TI
9	PHILIPS	PHILIPS	SAMSUNG	FUJITSU
10	FAIRCHILD	NS	mitsubishi	MITSUBISHI

rates than DRAM from now on. Intel is the best positioned company as business shifts from DRAM to MPUs.<sup>2</sup>

If Japanese companies keep falling behind in the field of MPUs, Japanese companies will allow American companies to take hold of the core processor technology in the new multi-media society. What is worse, the competitive advantage of Japanese companies, the process technology of DRAM, is no longer the technology driver for semiconductor production. Recently there has been no difference between the production of MPUs and DRAM.

There are yet other competitors for Japanese companies. Korean electronics firms, such as Samsung, Hyundai and Kinsei, have been concentrating their resources on the DRAM field to catch up. Korean companies might even reach the level of Japanese companies in scale and technology, according to some reliable resources. In fact, a Korean company, Samsung, has entered into OEM agreements with some Japanese companies to build very sophisticated production equipment.

## (2) Research Question

Japanese companies are exposed to severe competition and difficult market conditions. In the DRAM field, Korean companies have caught up with Japanese companies in technology. Meanwhile American companies dominate the market for core products such

as MPUs. Japanese companies need new business strategies for the future.

However, there are not that many options for Japanese firms. They have no choice but to build on the advantages they have in the DRAM field. However, in the DRAM field, it is becoming increasingly difficult to develop strategy based on a single company's resources, because of intense global competition, the increasing importance of *de facto* standards, and the increasing cost of research and development.

The purpose of this paper is to consider how strategic alliances evolve and change, and what characteristics recent strategic alliances have. In addition, we look into how Japanese companies should manage the alliance for re-growth.

These research questions will be illustrated by two case studies, involving Toshiba and Hitachi. The reason why we have chosen these two companies is that they have similar business structures and are focusing on DRAM production as their core businesses.

## CASE STUDY : TOSHIBA

### (1) The Outline of Toshiba's Semiconductor Business

Toshiba was established in 1939 by the merger of two electrical equipment manufacturers: Shibaura Manufacturing and

the Tokyo Electrical Company. During the high economic growth period after the second world war, Toshiba grew with heavy electrical equipment as its core business, and has now become a leading company world-wide. It occupies second place after Hitachi in electrical machinery sales, with gross annual sales of 361 billion yen in 1990, and assets of 3.214 billion yen. However, Toshiba's current performance is supported by new information- and communication-related business rather than heavy electrical or home appliances manufacturing. Toshiba appeared as a leading company in the semiconductor business in 1982 when the W-strategy aimed first to further advance the company's strength in the semiconductor business, was implemented. W had two purposes, which is firstly, to win competition in the semiconductor business, and secondly, to develop that business world-wide. It was a very ambitious strategy.

In order to implement this strategy, Toshiba aggressively invested in the semiconductor business when rival manufacturers, Hitachi and NEC, did not dare invest. Toshiba continued to invest heavily to establish clean rooms and LSI research laboratories. The amount of investment rose to \$5700 million from 1983 to 1988. The investment was five times larger than before the implementation of the W-strategy and, as a result, Toshiba overtook Hitachi in 1987, taking second place next to NEC in the world market.

One of the aims of the W-strategy is to develop a solid and balanced base in memory, logic, bipolar ICs. For example, except for Bip Digital and Micon, Toshiba occupied the top three positions in the world in other product fields. This balance is the main characteristic of Toshiba's business structure.

On the other hand, one feature of Toshiba's semiconductor strategy is its policy towards overseas operation. Hitachi, NEC and Fujitsu have rushed to increase their production capacity overseas as a reaction to the appreciation of the yen. However, Toshiba still sticks to domestic operations, keeping high export rates compared with rival companies.

Even though Toshiba manufactures semiconductors in Germany, the US, and Malaysia, these are only post-processing operations. In the case of pre-processing, improvements in manufacturing are of the utmost importance to maintain and raise profitability. In semiconductor production, pre-processing is the most important stage in the manufacturing process, so Toshiba keeps its pre-processing operation at home, where improvements in production are most easily implemented.

Toshiba's strategies seem to run against the trend of internationalization. However Toshiba has a unique approach to overseas investments and has been building strategic alliances with many foreign companies. Other rival companies, NEC and Hitachi, also build alliances with foreign companies, but Toshiba is the only company which has experienced co-operation with foreign companies from R&D to production.

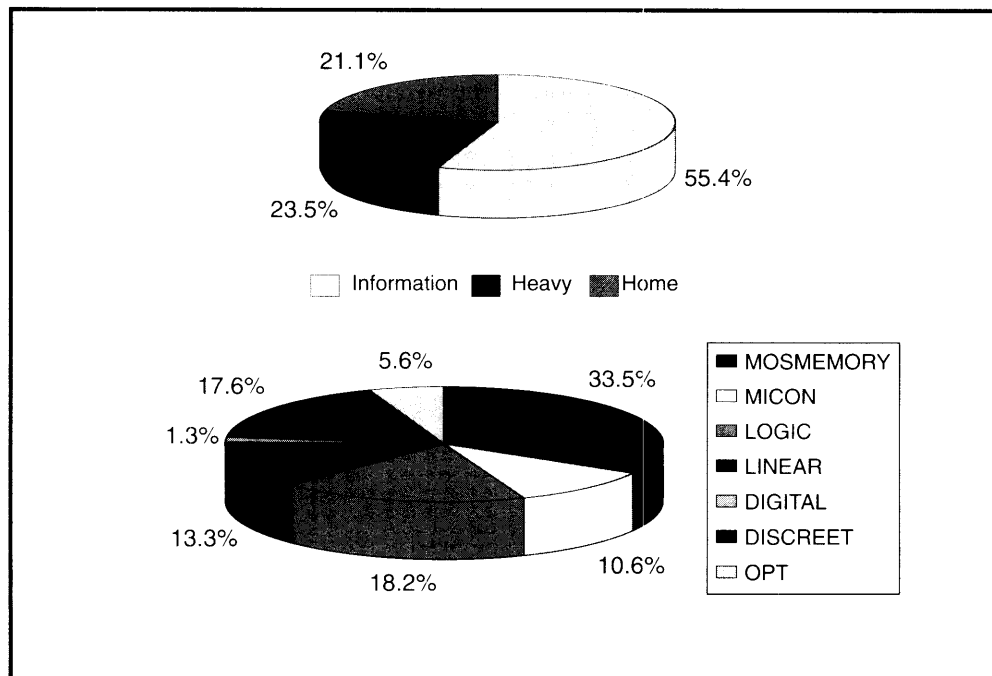
Whenever there is an emergent need to move production facilities overseas, Toshiba can transfer them by taking advantage of its co-operation with foreign companies. Until that sort of emergent need arises, Toshiba can strategically invest resources in order to enhance its competitive advantage in mass production technology for DRAM.

Toshiba's strategy has been on the management of strategic alliances and refined mass production technology.

## (2) *The Development of Strategic Alliances*

Toshiba started to build alliances with foreign companies before rival firms. Toshiba is quite open to acquiring resources which they have not accumulated previously from the outside. There is a principle for alliances in Toshiba; when they build alliances with foreign companies, the partner should be a player in this field<sup>1</sup>. Toshiba's alliances have been growing rapidly in number, but in the late 1980s there were not very many. Toshiba realized its strategic objective by deepening alliance relations with two companies, Motorola and Siemens.

The alliance with Motorola started under the following circumstances: while

FIGURE 1. Performance of Toshiba<sup>3</sup>

Motorola was the world leader in MPU production in 1985, it had been forced out of the memory field due to competition from Japanese manufacturers. In order to get back to memory manufacturing, it proposed a partnership with the leader in 1M DRAM technology and mass production.

Toshiba, while it was the leader in 1M DRAM, along with other Japanese manufacturers, was unable to compete with American companies in the MPU field. Toshiba had been looking to strengthen its operation in this area. In other words, the two companies' strategic intent for the future dovetailed perfectly.

Since the establishment of a joint venture in 1987, the relationship has become closer and closer every year. For example, in 1988, Toshiba began selling 32 bit MPUs in Japan with OEM supplied from Motorola. At this time the MPU world market was dominated by two manufacturers, Motorola and Intel, selling 32 bit MPUs.

Toshiba's relationship with Siemens began in 1985 with providing Siemens with its DRAM technology. Building a partnership with Siemens placed Toshiba in a solid market

position in Europe where Toshiba did not have a high level of recognition. The partnership also had the benefit of raising product image and expanding the sales networks.

The relationship between the two companies rapidly expanded in 1985 and in the following years joint development of one type of ASIC, the standard cell, and joint second source agreements were worked out. In 1989 the partnership was expanded as the demand for the standard cell greatly rose. Toshiba provides the design technology of the Gate Array, which is said to have a market potential of \$4600 million, to Siemens. Since then Siemens has become a second source and vendor of this product. Through this alliance Toshiba increased its market share of the Gate Array, which used to be weak. At the same time, joint development of ASIC led to the development of the next generation of the standard cell which is 30% faster than the existing one.

The major characteristic of Toshiba's strategic alliance in the late 1980s is that other alliances developed around these two companies. In addition, acquiring technology

TABLE 2. Major Alliances of Toshiba<sup>5</sup>

Partner	Year	Content (Press Release)
Siemens	1985	1M DRAM Technology Transfer from Toshiba
Motorola	1987	Joint Venture from 1M DRAM Production
Motorola	1987	OEM Supplies of 16 bit MPU from Motorola
Motorola	1988	OEM Supplies of 32 bit MPU from Motorola
Motorola	1989	Joint Production of 256 Bit Static RAM
Siemens	1989	Technology Supply of Gate Array from Toshiba
Siemens	1989	Joint Development of other ASIC Field
Echelon System	1990	Technological Agreement of MPU
Mips	1990	OEM Supply of Risk Chip from Mips
Motorola	1990	Joint Development of 4M DRAM
Synergy	1991	Technology Supply of Bipolar from Synergy
Pilkington	1991	Joint Development of High Integrated Gate Array
IDT	1992	Joint Development of Risk Chips
IBM	1992	Joint Development of Flush Memory
IBM and Siemens	1992	Joint Development of 256M DRAM
Synops	1993	OEM Supply of Design Technology on ASIC
Samsung	1993	OEM of Flash Memory from Toshiba
National Semiconductor	1993	OEM of Flash Memory from Toshiba

and accessing foreign markets have been realized through the deepening relationship with these two companies.

### (3) *Diversifying Alliance Relationships*

Due to the rapid yen appreciation, and the increasing cost of R&D, it became more difficult to adapt to the competitive environment in the 1990s. So there was increasing need to link up with external resources. In order to deal with the difficult environment, Toshiba diversified its alliance relationships and rearranged its partners for strategic purposes. For example, Toshiba built an alliance with IBM in the flash memory business. They cooperated in the fields of R&D, production, and marketing. Toshiba also forged an alliance with Samsung Electronics in which Toshiba gives product information on flash memory circuits/chips to Samsung, and Samsung produces them based on that information.

Toshiba also has a similar alliance relationship with National Semiconductor. The aim of diversifying alliance relationships is to get the *de facto* standard in these products. In the flash memory market there

are two types of products competing, one is NAND which is developed by Intel, and the other NOR which is developed by Toshiba.

In order to meet the increasing cost of R&D for new product generation, such as 256M DRAM, Toshiba built alliances with IBM and Siemens for joint development in 1992. In the following year they succeeded in developing a prototype.

One characteristic of Toshiba's vertical alliances is that they are diversified for particular strategic purposes. To diversify relationships means not only realizing the strategic purpose but also hedging the risks for the partners involved.<sup>6</sup> The task of building, maintaining, and advancing the relationship is quite difficult in the semiconductor industry, which is exposed to rapid technological and market change. In addition there are complicated relationships existing in the IC industry, involving both cooperation and competition.

To develop effective strategic alliances, companies have to build at least two core relationships with their partners, one dealing with existing technologies, the other dealing with next generation technologies. Toshiba has recently tried to find venture businesses

having high potential for new technology development.

In short, Toshiba builds alliances with companies which are similar to itself in scale and have competitive advantage in the existing technological trajectory. At the same time, Toshiba builds alliances with venture businesses to find technological seeds which lead to new technological trajectories.

Toshiba is involved in technological cooperation with Echelon to produce semiconductors for decentralized processing which allow contact with other processors and are installed into other machines. In the ASIC field Toshiba has built an alliance with Synapse to acquire design technology.

In addition to the companies mentioned above, Toshiba is actively promoting relationships with those companies possessing a high level of technology regardless of the partner company's name or its size.

#### CASE STUDY : HITACHI

"In order to raise efficiency of R&D and to proceed standardization of technology for flash memory with products, we made a cooperation with Mitsubishi" <sup>7</sup>

Hitachi has built an alliance with Mitsubishi for joint research on flash memory technology. It is not unusual for both of them to build alliances with foreign companies, for the purpose of saving investment in R&D, plant and equipment, or shortening R&D time. But this alliance is different from others. Alliances between large Japanese semiconductor manufacturers tend to be avoided, because these companies are keenly competing in the same market in Japan and have until now had special sensitivity towards each other.

Thus we can expect that Hitachi will attempt to change its business strategy through the alliance.

##### (1) Corporate Business

Hitachi, whose market share of the semiconductor business is the 5th largest in the world, is one of the biggest comprehensive

electronics manufacturers in Japan. The total sales of the company amount to \$3,811 billion. It has three major business fields: the first, heavy electrical apparatus like equipment for electric power and industrial and traffic systems; the second, household electronic appliances such as television sets, VTR and so on; the third, information electronic equipment such as semiconductors, PC and telecommunication equipment. Though the household electronics field has been very sluggish under the influence of three years of *Heisei* Recession in Japan, the heavy electrical apparatus field, which is a core business historically for the company, shows stable growth and supports the entire Hitachi company. Also the information electronic equipment business is flourishing again due to the recovery of foreign business. In this business field, sales of semiconductors amount to about \$5,600 billion and it occupied 15.8% of total sales in 1993.

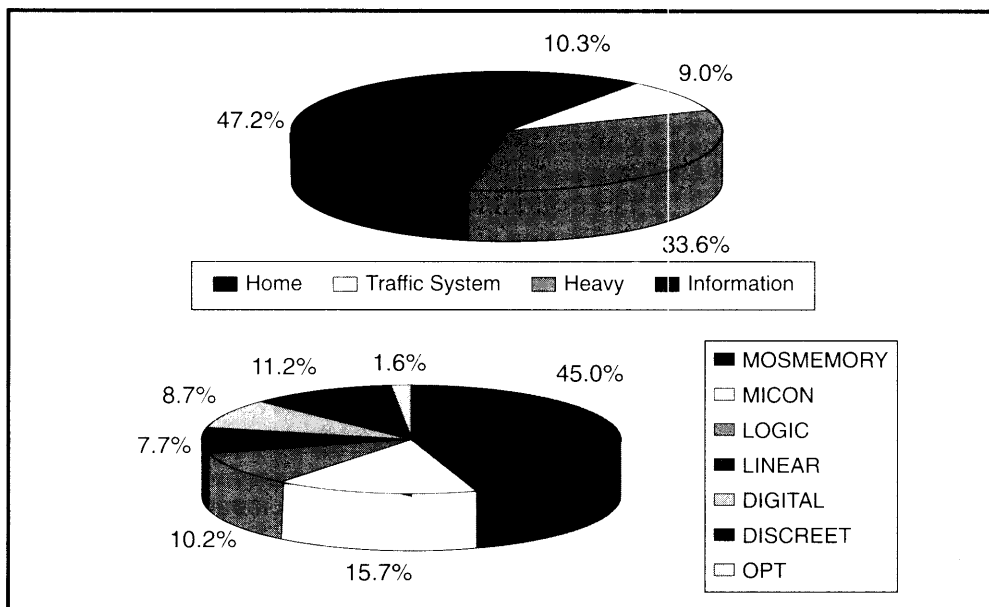
##### (2) Present Situation of the Semiconductor Business

In the domestic semiconductor business Hitachi is placed in 3rd position after NEC and Toshiba. In the field of MOS-memory, however, the company stands first and has a 12.4% world-market share. And the company stands 7th in the field of Logic ICs, and 4th in MPUs. It occupies 7.4% of world-market share with regards to all kinds of semiconductors.

This business structure, where MOS DRAM is the main business, has continued since the early 1980s when Hitachi was number one in the field of 256K DRAM. Technological accumulation of DRAM technology as the "Technology Driver" created the current strength of the company based on the advantage of manufacturing technology.

On the other hand, in the case of the MPU business which Hitachi started in 1975 under the contract of second source supply to Motorola Inc., the two companies have since maintained their relationship for over ten years. However, Hitachi produces RISC for workstations as a member of a Hewlett-Packard standardization group at present.

FIGURE 2. Performance of Hitachi \*



Also as a member of an IBM group, Hitachi makes IBM compatible personal computers with Power PC.

In the field of flash memory which is expected to be a main product in next generation semiconductors, Hitachi has been trying to build a new standardization group with Mitsubishi and SGS-Thomson of France.

*(3) Strategy of Alliances in the 1970s and 1980s*

Hitachi was able to build alliances with a lot of global companies by making its manufacturing technology advanced and by utilizing it as the company's strength. Through this means Hitachi has been growing in the semiconductor business and we can say that Hitachi's success in this business field is based on alliances.

Full-scale semiconductor production by Hitachi was started in 1975 based on the second source agreement of MPU with Motorola. This was an indispensable process for Hitachi's technological development, because it enabled the company to accumulate its manufacturing technologies during its relationship with Motorola which continued for over ten years. Thereby

Hitachi had the first position in the 256K DRAM field during this period.

After 1985, Hitachi's strategy in the semiconductor business has been changing. With the technological development of Hitachi, its dependency on Motorola diminished and their balance of power achieved an even footing. In 1986 their relationship expanded to include joint development of the 16 bit MPU, in which both of them were equal partners.

In those days, Hitachi began to make alliances with other foreign companies. For example, the company gained a license for the production and sale of CMOS Logic ICs from Fairchild in 1986, and tied up with VLSI concerning OEM supply of customized ICs in 1987. After this, the company built an alliance with TI concerning joint development of the 16M DRAM in 1988 and supplied SRAM for TI according to an OEM agreement in 1989.

In this way, from the end of the 1980s to the early 1990s, Hitachi entered into cooperation with a lot of foreign companies in various fields of the semiconductor business, in order to gain international competitive advantages.

*(4) New Phase of Strategic Alliances*

TABLE 3.1. Major Alliances of Hitachi (1985-1989)<sup>9</sup>

Partner	Year	Content (Press Release)
Motorola	1985	MPU Second Source and Joint Development of 16 bit CMOS MPU
Thomson	1985	Mutual Exchange of License of Production
Fairchild	1986	License for Production and Sales of Logic IC
VLSI	1987	Production of Customized IC
Fairchild	1987	Second Source of Logic IC
VLSI	1988	Technology Exchange on ASIC
TI	1988	Joint Development for 16M DRAM
VLSI	1989	OEM Supply of SRAM
TI	1989	Mutual OEM of SRAM

TABLE 3.2. Major Alliances of Hitachi (1989 - 1994)<sup>10</sup>

Major Partner	Year	Content (Press Release)
Kinsei	1989	Technology Transfer of 1M DRAM
HP	1990	Joint Development for RISC
Kinsei	1991	Technology Transfer of 4M DRAM
TI	1991	Joint Development of 64M DRAM
Ramtron	1992	Technology Transfer for FRAM from Ramtron
NMBS (J)	1992	Technology Transfer for DRAM
Compass Design	1993	Software Design Technology with VLSI
Sun Micro	1993	Production of SPARC
Kinsei	1993	Technology Transfer of 16M DRAM
Mitsubishi (J)	1994	Joint Development of Flash Memory
IBM	1994	Supply RISC (Power PC)

In the 1990s the semiconductor business is undergoing a huge transition in the business environment through downsizing and the advent of multi-media and networking. With this transition, the position of DRAM as a technology driver is losing ground, and instead MPUs are growing in importance. The links between semiconductors as components and final products are becoming much stronger, as we can see, for example, in personal computers. The vertical relations with both the software and hardware sides influence the whole semiconductor business more than ever.

Therefore Hitachi, just like other Japanese manufacturers which do not have MPU technology, is behind other foreign companies on software technology and must

build alliances with foreign companies which try to advance the global standardization strategy (including *de facto* standard).

In such a turbulent situation, Hitachi selected Hewlett-Packard (HP) as a partner to introduce RISC-type MPU technology. Their relationship has continued since 1982 and now they know each other well. In this way, alliances can be said to have advanced from a one-way relationship to a two-way one. At present, however, Hitachi's cooperation in the field of RISC is not restricted only to HP. Hitachi tied up with Sun Micro-systems to collaborate in the production of RISC, although the latter is competing with HP in the workstation business. Consequently, Hitachi's alliances on RISC became more complicated. At the



same time the number of alliances with US small venture businesses (VB) which have advanced software technologies, has increased recently. The relationships between Hitachi and these VBs are complementary, that is to say, Hitachi is getting advanced technology and the VBs are getting money and production technology.

Furthermore, the early 1990s was a turning point for semiconductor industries around the world.

Laws like "four times larger for every three years" and the "Silicon Cycle" have become irregular. The scale of investments in equipment and R&D is becoming huge in order to cope with the large sizing of DRAM. However, most Japanese companies have reduced their investments because of the economic recession in Japan. Such a situation has driven Japanese semiconductor manufacturers into alliances with large foreign competitors. That is to say, large-sized investments and the economic recession promoted alliances among large companies.

A joint venture established with TI in 1995 is a typical case for Hitachi. In this project, the capital fund of \$15 billion will be financed not only by both companies but also by other companies such as suppliers, banks and customers. The joint venture will construct a \$500 million plant for 16M DRAM and 64M DRAM in the USA.

Another feature of Hitachi's alliances in recent years is a closer relation with a Korean company, Kinsei (Lucky Golden Star). Hitachi supplied 1M DRAM technology in 1989 and 4M DRAM technology in 1991 to Kinsei. Hitachi seems to have been a pioneer that proceeded to enter into cooperation with a Korean company in those days and now their relationship has become much stronger. Hitachi gets 1-4 million 4M DRAMs from Kinsei, thanks to an agreement in which the latter should supply half its production to Hitachi. They are also bound together regarding the technological supply of 16M DRAM, and in the future, Hitachi will get the same number of 16M DRAMs from Kinsei.

Besides this, Hitachi entered into cooperation with a Japanese competitor,

Mitsubishi, with respect to flash memory, as mentioned at the beginning of this section. Flash memory will be a key product in the near future if it is standardized. In this respect the alliance is a new step for both companies, though alliances between large Japanese companies have been taboo in Japan hitherto. In any case, the intent to dominate the world market by Hitachi and Mitsubishi might make the inter-firm relations and competitive situation more complex.

## ANALYSIS

In the early 1990s the semiconductor market became divided into two types: one was the commodity type of semiconductors such as DRAM and DISCREET; the other was MPU which has scarcity value technologically. Though the latter type maintains high and stable profit, most Japanese manufacturers depend on the former type that cannot maintain high profit. In such a context, Japanese companies have increased alliances with foreign companies more than ever, as mentioned before. Moreover, patterns are changing.

### *Transitions of Alliance Patterns*

According to our case studies, strategic alliances can be divided into three phases. They can be called (1) Single-front Line Alliance, (2) Multi-front Line Alliance, (3) Multi-dimensional Alliance.

#### (1) Single-front Line Alliance

The first stage lasted from the late 1970s to the early 1980s. In this period, most Japanese manufacturers had technologies that were less advanced than those of the US or European companies. Then, Japanese manufacturers tried to gain their own international competitive edge in the focused business field. Therefore each of them entered into an alliance with a specific foreign company and deepened the relationship. This type can be called a "Single-front Line Alliance"<sup>11</sup>.

#### (2) Multi-front Line Alliance

The second stage lasted from the mid-1980s

to the early 1990s. In this period Japanese manufacturers advanced their technologies by leaps and bounds. They were able to get rid of the one-way dependence on US or European companies by building complementary relationships. There were various types of alliances like technological supply, OEM production, joint development and so on. Moreover, each company had to ally with different companies depending on the situation, because their products or markets became diverse, changeable and complex. Thus Japanese companies had to cope with complicated situations in which they fought or allied with many other companies. This can be called "Multi-front Line Alliance".<sup>12</sup>

### (3) Multi-dimensional Alliance

The third stage is the 1990s where the semiconductor industry is confronted with unprecedented environmental changes. Highlights of the features of the recent transitions in the semiconductor business are as follows:

#### a. Partners of Alliances

The first feature is that the partners are not restricted to American or European firms. Until the 1990s, the partners of Japanese semiconductor manufacturers were only American or European companies, regardless of the size of these companies. Not only in the period from the 1970s to the early 1980s, when US companies technologically overwhelmed the Japanese, but even in the late 1980s when Japanese companies had already become competitive, the partners of Japanese companies were American or European firms.

However since 1993, the number of Japanese-Korean alliances has been increasing. One of the reasons is that the demand for DRAM is rapidly increasing, due to the recovery of the computer market in the US. The other reason is that the product life cycle of semiconductors has reached the period of maturity. Under such conditions, Japanese and Korean semiconductor suppliers intend to avoid price competition through these alliances.

Besides these Japanese-Korean alliances, we have recently observed a trend toward Japanese-Japanese alliances. The main purposes of the alliances with US and European companies were to share resources and reduce R&D costs. In the case of alliances between Japanese companies, however, the partners want to build a market leader group through realizing the technological standardization. Therefore, these alliances may be seen as more strategic in nature.

#### b. Alliances with VB

A second feature is that the number of alliances with venture businesses is increasing. Alliances between large Japanese companies, and with US venture businesses are very common, although we cannot find many articles about them in the database.

Production of advanced semiconductors requires high-level manufacturing technologies and a lot of investment, even if a small VB has sophisticated design technologies, which is why they cannot produce such semiconductors by themselves. Manufacturing MPUs and ASICs requires rather advanced process technology, although MPUs and ASICs did not need as high a level of manufacturing technology as DRAM in the past. In fact, Intel's process technology attains the highest level in the world, and this company invests in equipment and R&D no less than Japanese manufacturers. The era when companies could become competitive based only on design technology has passed. Therefore VBs, being short of money, are positively trying to approach Japanese companies.

Moreover, as each final product requires the development of semiconductors suitable for it, the variety of semiconductors is increasing. This is also the reason why the number of alliances with VBs is increasing.

#### c. Vertical Alliances

The third feature is the increasing number of vertical alliances with downstream or upstream companies which are adding to horizontal alliances. Relationships between

FIGURE 4.1. Single-front Line Alliance

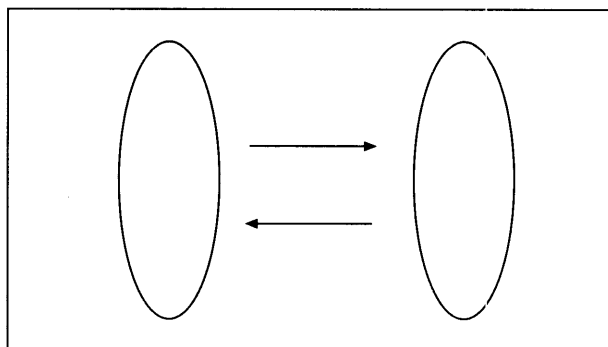


FIGURE 4.2. Multi-front Line Alliance

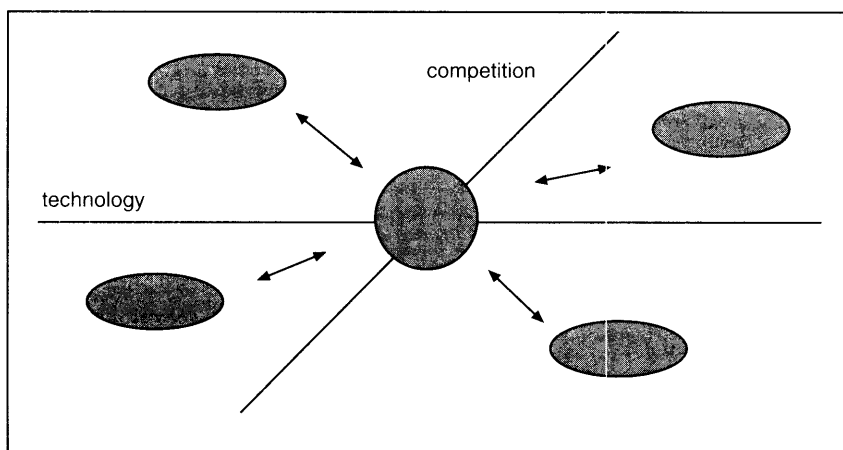
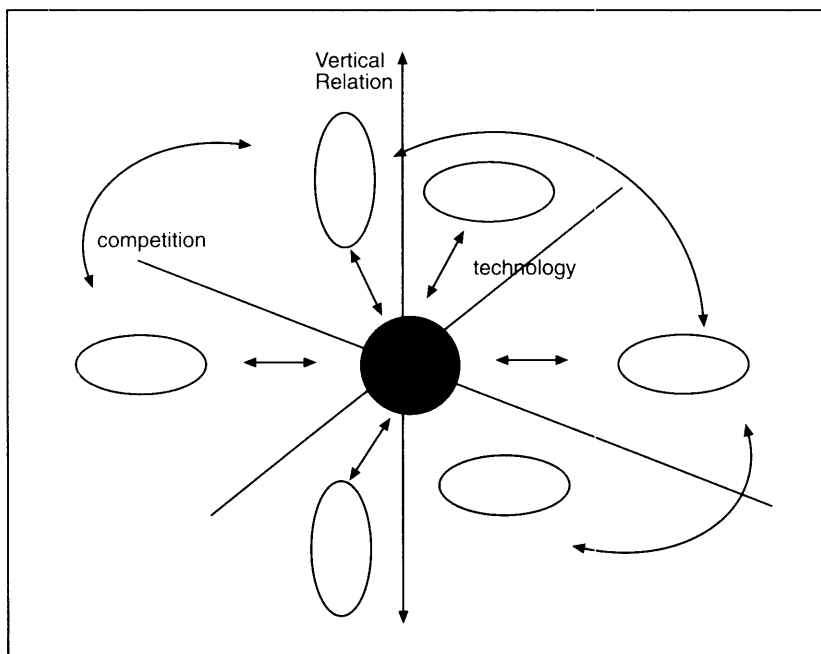


FIGURE 4.3. Multi-dimensional Alliance



semiconductor manufacturers and “set makers”, the makers of final products, were mainly “customer-supplier” relationships based on their trade, but these have become much closer. They include inter-firm development collaboration called “design-in”. Some researchers have pointed out that this was the strength of Japanese manufacturers whose businesses were comprehensive<sup>13</sup>.

Currently the number of a new type of collaboration called “concept-in” is increasing. It means that companies in the partnership collaborate from the phase of concept-making of products. In short, the relationships evolve from supplier-customer to cross-industry relationships, with the concomitant deepening of vertical relationships. Such a transition of inter-firm relationships can be seen in the relations with software companies. Thus, alliances with companies upstream or downstream or with different industries become an indispensable strategy for survival in the semiconductor business.

In short, alliances have evolved from Multi-front Line Alliances to “Multi-dimensional Alliances”.

### CONCLUSION

Such environmental changes are not only risks but also chances for companies. Semiconductors which have continuously advanced will not stop their progress.

Flash memories, FRAM, and/or other special semiconductors after DRAM and MPU will appear and become major products in the near future.

The question here is—under such conditions, do Japanese companies have a chance to recover a top position in the semiconductor business through new types of strategic alliances?

The first point is to recognize that inter-firm relations are continuously evolving. The inter-firm relations influence each other and change themselves. The more complicated technologies become, the lower the borders between industries or companies will be. Sometimes they may change the whole industry. If Japanese companies do not consider their inter-firm relations from

the view point of their present business domain based on horizontal inter-firm relations, but try to consider them from a multidimensional view point in order to fuse other business into their business domain, then they may be able to expand their chances of creating a new business or a new industry in the future. At that time it may become an advantage for Japanese semiconductor manufacturers to be comprehensive electronics companies.

The second point is to understand multidimensional relations and to interpret them in the context of the vision and strategy of the corporation as a whole. When the company changes or rearranges inter-firm relationships with partners or competitors in the turbulent environment, some contradictions might be brought about in individual relationships. If each relationship is not linked with corporate vision and strategy, it might lead to a long-term disadvantage. The weight of each relationship in the multi-dimensional alliances is lower than in the single-front line alliance. As a result, it becomes very important to keep the total balance of multi-dimensional alliances as a whole.

In summing up, how to manage the multidimensional relationships is a key factor to success for Japanese semiconductor manufacturers.

### NOTES

1. This table was drawn based on data from Data Quest.  
TI = Texas Instrument, NS = National Semiconductor
2. Intel has consistently focused on its resource development for a new product before other competitors quickly come into the market and begin price competition with them.
3. *Toshiba Annual Report 1993*
4. To keep building strategic alliances with the best player, Toshiba has been emphasizing research teams which help maintain Toshiba's position at the

- cutting edge of new technologies.
5. Data collected from Nikkei Database
  6. Interview with Yasuhiko Shibatsuji, Strategic Alliance and Contracts, Strategic Business Planning Office in Toshiba Corp., on 12 Oct. 1994.
  7. *Hitachi Annual Report 1993*
  8. Data collected from Nikkei Database
  9. Data collected from Nikkei Database
  10. Data collected from Nikkei Database
  11. See "New Era of Strategic Alliance", *Grand Strategy*, Teramoto et al. (1993), Japan Management Association Management Centre, Tokyo.
  12. *ibid.*
  13. See "The Core Competence of the Corporation", *Strategy*, Prahalad, C. K., and Hamel, G. (1989), HBS Press, Boston.

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