

# Strategic Alliances between Pharmaceutical Companies : Comparison of Domestic and Japan–U.S. Alliances

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## I Introduction

In the pharmaceutical industry, many companies favor strategic alliances with other pharmaceutical companies. However, it is difficult for them to gain mutual trust both because potential allies also comprise the competition and because companies contemplate cooperation only at the point of new drug R&D. A strategic alliance focusing on new drug R&D may require extensive personnel and information exchange ; it is difficult to build an effective relationship on both sides.

We investigate how companies can build mutual trust when a pharmaceutical company concludes a strategic alliance with another company in the same industry. Since culture, common sense, and customs differ among team members, particularly in an international strategic alliance, building mutual trust is more difficult. Because most frequently a Japanese pharmaceutical company concludes an international strategic alliance with an American company, we focus on strategic alliances between Japanese and U.S. companies. In addition, we compare strategic alliances in Japan with strategic alliances between Japan and the U.S., and we clarify the difference in factors affecting the building of mutual trust.

We focus on strategic alliances in the drug discovery stage of new drug R&D process. The success probability in the discovery stage is very low ; since accident and fate largely influence success, it is believed that effective management of the discovery stage is very difficult in this industry. It is natural that a pharmaceutical company wants to find a candidate compound effectively and efficiently. As a strategy for that, a company seeks a strategic alliance.

We wish to find an industry-specific indicator of the management of an effective strategic alliance. Therefore, we focus on building trust useful to strategic alliance.

Wakabayashi (2006) insisted that trust promotes cooperation among organizations for joint R&D. Cooperation by both partners is indispensable to advance the strategic alliance smoothly. Additionally, many prior studies pointed out the importance of building trust as a key factor to improve cooperation. Therefore, the first objective of this study is to show clearly what kind of trust is important to improve cooperativeness. The second objective is to identify the factors raising that trust.

## II Strategic Alliance

In General, the form of a strategic alliance changed greatly in the mid-1980s. A typical alliance in the first half of the 1980s was one with an advanced company and a developing company. Between the two there was a rule and a being ruled relationship. Although this kind of alliance still exists, the number of alliances among major companies has increased since the second half of the 80s. In such cases, both are independent and equal ; the alliance aims at reciprocity. Because both are major companies, management of the alliance is difficult (Doz, 1996) ; thereby, making it difficult to achieve success. In an international strategic alliance, particularly, these achievements are difficult (Peterson and Shimada, 1978).

With the increase of strategic alliances in business, the number of studies that focus on strategic alliances has also increased. Moreover, many researchers have defined strategic alliances in different ways. Yoshino and Rangan (1995) is most often cited ; they indicated that a strategic alliance is one where mutually independent companies cooperate strategically. Lewis (1990) indicated that a strategic alliance is one in which companies share a risk and gain management resources more than a company does when conducting business independently. Moreover, Webster (1992) paid attention to management resources, stating that a strategic alliance aims at mutual practical use of management resources among partners. In addition, he distinguished a strategic alliance from a vertical dependency, such as “Keiretsu.” Hamel, Doz, and Prahard (1989) argued that we should consider the relationship of only companies which have equivalent management resources and power as a strategic alliance. Their argument limited the form of the strategic alliance. Furthermore, Nonaka (1991) regarded the case in which an interorganizational relationship may change qualitatively from a mutually complementary one into a cooperative creation as a strategic alliance.

Based on such studies, we define “strategic alliance” in this study as follows. A strategic al-

liance is “a loose interorganizational relationship in which two or more independent companies provide significant management resources to connect for a fixed period to attain a specific purpose, for example knowledge creation, rather than undertake a business independently.” Since the role that tacit knowledge plays in the process is large, communications between organization staff members become indispensable. Because a strategic alliance is a very unstable state, to develop such an alliance stably and continuously, building trust between partner companies is extremely important.

### III Trust

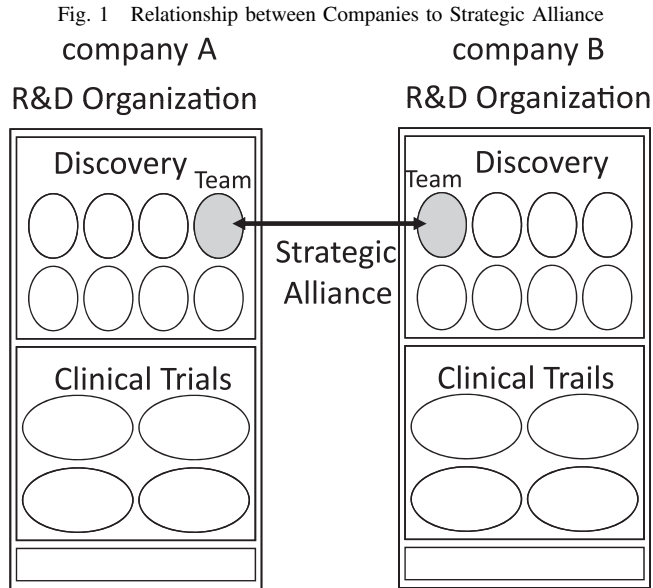
#### III-1 Trust between Individuals

Many studies, such as Child and Faulkner (1998), referred to the importance of the trust relationship in management of a strategic alliance. There are many studies such as Das and Teng (1998); Doz (1996); and Smith, Carroll, and Ashford (1995), which indicated that cooperativeness increases as a result of building trust among companies. Most of these studies focus on trust among organizations (companies). They regard an organization as one individual and focus on the trust that arises among organizations. The interorganizational trust is based on a trust relationship between gatekeepers who take charge of negotiation and connection among organizations (Wakabayashi, 2006). In this case, we discuss building trust among gatekeepers.

On the other hand, Ring and Van de Ven (1992) pointed out the importance of personal relationships, such as a partner's sincerity and good will, in a study that addressed trust among individuals. Dore (1983) took up strategic alliances between organizations whose membership comprised a small number of people. When there are few members, a gatekeeper will not exist; instead, all members will perform information exchange and communication with partner members.

Now, we would like to consider the form of the strategic alliance, which we focus on. The relationship between companies in a strategic alliance is shown in Fig. 1. The big outer frame identifies the R&D organization of each pharmaceutical company, and is divided into a department for the drug discovery stage and a department for the clinical trials stage. Furthermore, each department is subdivided into teams. The strategic alliance of pharmaceutical companies does not mean an alliance between companies, but rather alliances between these teams.

Each team has a very small organization, two or three persons to discover lead compounds in the early stages of research (sometimes it has only one person); after connecting with a



strategic alliance, it may expand to a seven or eight person team. However, compared with those in other industries, the teams are very small. Because each team has a small number of persons, each member has an equal opportunity for communication and building trust with alliance partner members. This corresponds to the argument in Dore (1983). Although there is a manager who manages his/her team, we do not believe, a gatekeeper exists. We investigated by distributing the same questionnaire to all the members of each team.

### III-2 Kinds of Trust

In previous studies, no consistent definition of measurement approach to trust is identified (Andaleeb, 1992, 1995 ; Nobeoka and Manabe, 2000) ; however, trust is based on the expectation of a partner's capability and intention (Yamagishi, 1998). Manabe (2004) defined trust as "the expectation of the capability to carry out the affirmative role for oneself and the expectation of the intention to carry out the affirmative role for oneself." We follow this definition.

Nobeoka and Manabe (2000) and Manabe (2002) focused on the relationship of the assembler and the supplier in the auto industry in response to Sako (1998). They divided trust into two types, relational trust and rational trust, and further divided rational trust into "trust for fair intention" and "trust for basic capability." We define relational trust as trust based on an expectation of coexistence and co-prosperity, the expectation of altruistic action and the expectation of related continuation. Trust for fair intention is trust based on the intention to observe

a contract, the intention to promise observance, and the intention of justice. Trust for basic capability is trust based on production capacity and development capability. They determined by questionnaire investigation that relational trust influenced cooperativeness.

In Section 5 of this paper, when setting up our hypothetical model, we use their three trusts. Therefore, we can compare our findings with that of Nobeoka and Manabe (2000) and Manabe (2002).

## IV R&D of New Drug

### IV-1 R&D Stages and Success Probability

The value of drug sales in the world leading markets is 441,100 million dollars (the period is one year from November 2007 to October 2008). The U.S. market share is 42.7%, overwhelmingly high (Yakuji Handbook 2009). Therefore, many Japanese companies participate in the U.S. market. Furthermore, many foreign companies have entered into the Japanese market, which at 15.1% is the second largest in the world. Because the kinds of new drug called for in the world are clear to the pharmaceutical industry, cross-border competition all over the world has become intense. Each company aims at epoch-making new drug R&D.

Because a new drug links directly to the acquisition of profits, the R&D competition is intensifying. In the case of other industries, it is not necessarily correct that a technically innovative product gains many sales. Consumer user-friendliness and marketing-mixes varying pricing, advertisements, and sales, have significant influence on product sales. However, since an innovative new drug may cure an illness not previously treatable, such a new drug will certainly obtain a large amount of sales. Furthermore, if medical treatment becomes available, it will also lead to philanthropy. Therefore, although each company strives for new drug R&D, it has the two problems of the various R&D processes and a remarkably low probability of success.

To produce one new drug, a company has to pass through five R&D processes (Fig. 2). To produce one new drug, 30 to 40 billion yen is required over a period of 10 to 20 years. Table 1 shows the low probability of success. When we examine the success probability for each stage, the overall success probability until a company creates a potential compound in the discovery stage and begins the next preclinical test is one in 1,731, an exceptionally low prob-

1 The drug that sold most in the Japanese market until now is Mevalotin (antihyperlipidemic drug) by Sankyo (present Daiichi Sankyo). The sales proceeds were 200 billion yen in one year. In this duration, it occupied about one-third sales of Sankyo. Moreover, the drug that was sold most in the world is Lipitor (antihyperlipidemic drug) by Pfizer. The sales proceeds were 1,604,800 million yen in 2006.

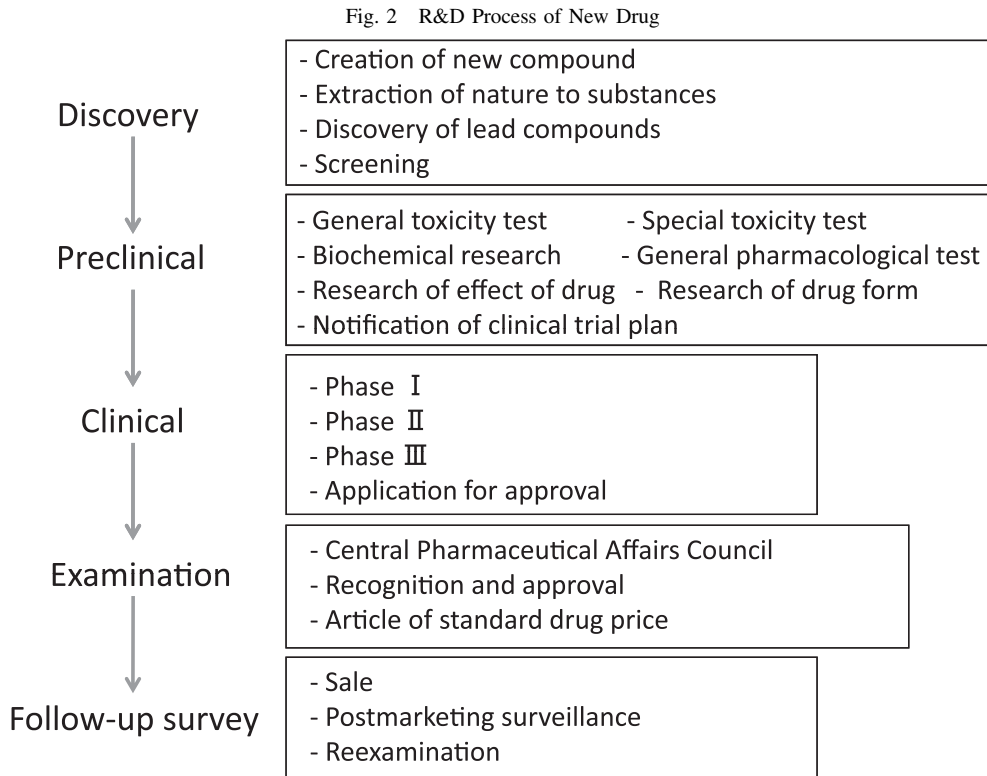


Table 1 Success Probability of New Drug R&amp;D in Japan

Stage	Number of Compounds	Success probability	Accumulation success probability
Discovery	406,753		
Preclinical	235	1 : 1,731	
Clinical	147	1 : 1.60	1 : 2,767
Application for approval	83	1 : 1.77	1 : 4,901
Approval acquisition	64	1 : 1.30	1 : 6,356
Origin	36		1 : 11,299
Introduction	28		

Notes : "Origin" is that one company performs all the stages from discovery, and "introduction" is that company B inherits the lead compound which company A creates in discovery stage by licensing, and performs it from the stage after it for example.

(Source : *Gekkan Mix*, May, 2001 issue)

ability.

Because discovery of a compound in the discovery stage is influenced by accident and fate in many cases, and because researchers individually investigate each one, it has been thought until now that companies cannot systematically manage the process (Kuwashima, 2006). However, all companies have become interested in effective and efficient management of the discovery stage because of intensified competition and introduction of the scientific research

method in recent years.

#### IV-2 Motion of Each Company toward New Drug R&D

As mentioned previously, new drug R&D requires significant expenditures. Those costs have risen in recent years due to the increased focus on genome-based drug discovery. Although Table 2 shows the sales and R&D costs of international pharmaceutical companies, the ratio of R&D cost to sales for many companies is approximately 20% ; this figure is overwhelmingly high compared with those of other industries. One strategy for securing such large R&D amounts is a merger. Since the 1990s, mergers have occurred mainly among European and American companies.<sup>2</sup>

We investigated changes in the number of strategic alliances within the pharmaceuticals industry. We counted the number of alliances by pharmaceutical companies in articles from the January 14, 1991 through the December 22, 2008 issue of the *Kokusai Iyakuhiin Jouhou*, a bi-

Table 2 Sales and R&D Cost of Pharmaceutical Company (2008)

Ranking	Company Name	Drug Sales	R&D Cost	Ratio (%)
1	Pfizer (USA)	44,174	8,578	19.42
2	Sanofi-Aventis (France)	40,304	6,689	16.60
3	Glaxo Smith Kline (UK)	37,705	6,486	17.20
4	Novartis Pharma AG (Swiss)	35,647	7,217	20.25
5	Hoffmann-La Roche (Swiss)	33,297	8,190	24.60
6	Astra Zeneca (UK)	30,677	5,179	16.88
7	Johnson & Johnson (USA)	24,567	7,758	31.58
8	Merck (USA)	23,850	4,805	20.15
9	Eli Lilly (USA)	19,369	8,676	44.79
10	Wyeth (USA)	19,025	3,373	17.73
11	Bristol-Myers Squibb (USA)	17,715	3,617	20.42
12	Abbott Laboratories (USA)	16,708	2,786	16.67
13	Bayer (German)	15,649	3,879	24.79
14	Amgen (USA)	14,687	3,030	20.63
15	Schering-Plough (USA)	14,253	3,529	24.76
16	Boehringer Ingelheim GmbH (German)	13,050	2,782	21.32
17	Takeda Pharmaceutical (Japan)	12,721	4,667	36.69
18	Teva Pharmaceutial (Israel)	10,482	2,168	20.68
19	Astellas Pharma (Japan)	9,836	1,523	15.48
20	Novo Nordisk Pharma (Denmark)	8,951	3,998	44.67

(Unit : 1 million dollars)

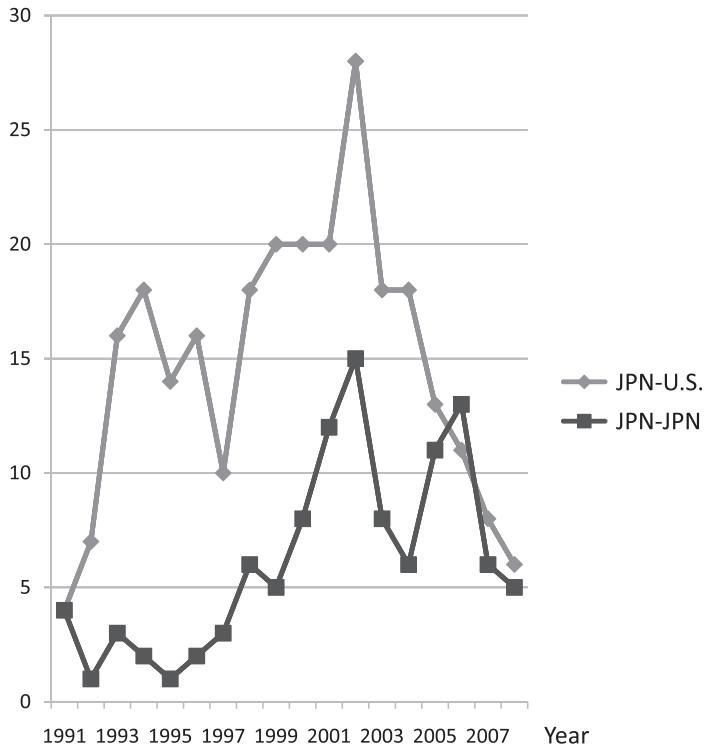
Note : Wyeth was merged by Pfizer and Schering-Plough was merged by Merck in 2009.

(Source : *Kokusai Iyakuhiin Jouhou*, March 23, 2009 issue)

2 We can see a positive correlation between the size of a company and the R&D result (Odagiri, 2001). One reason is that economies of scale and economies of scope are effective in R&D. Second reason is that smaller companies cannot obtain external funds because R&D requires time and uncertainty is high regarding success or failure. Final reason is that only the more major companies with abundant funding ability can bear the burden of funds.

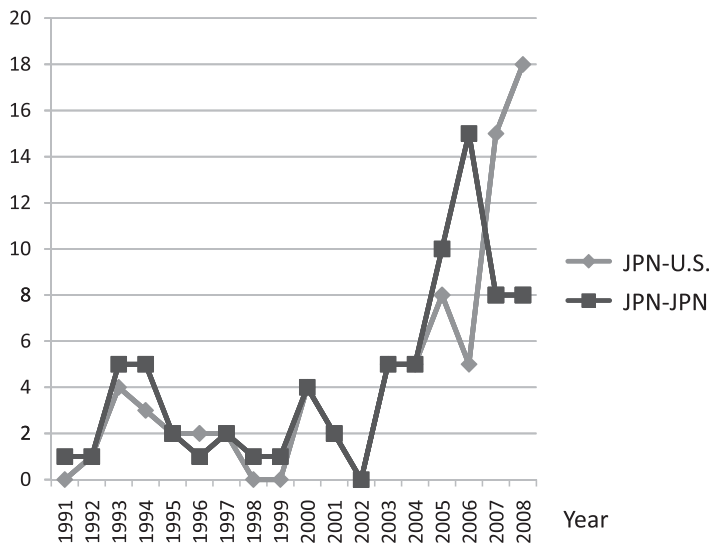
Fig. 3 Strategic Alliance Number in Pharmaceuticals Industry

Number of Cases



### Discovery Stage

Number of Cases



### Clinical Stage

(Source : Kokusai Iyakuhiin Jouhou)



weekly industry technical magazine. The first graph of Fig. 3 shows the number of discovery stages and the second graph shows the number of clinical stages. In both graphs, we divide the total by intra-national companies and by Japan-U.S. companies, respectively. We can see that until recently the overwhelming number of Japan-U.S. alliances were in only the discovery stage.<sup>3</sup>

#### IV-3 Study on Strategic Alliance

As a previous study of strategic alliances by pharmaceutical companies, Kuwashima (1996) is typical. He examined the strategic alliance of Takeda Pharmaceutical Company and Abbott Laboratories, which focused on R&D of “Leuplin” (a prostate cancer curative drug). He identified “Reciprocity” and “Long-Term Intention” as qualitative investigation success factors for strategic alliances. “Reciprocity” means that each company was able to have trust in its partner’s contribution because they indicated that mutual quality was high through frequent exchange of research results. “Long-Term Intention” means that both companies believe that joint research can be continued until they produce a new drug from the R&D effort.

## V Research

### V-1 Hypothetical Model

In order to measure trust as a factor of cooperativeness, we set up the hypothesis using the three trusts (“Relational Trust,” “Trust for Fair Intention,” and “Capability Trust”) as independent variables, akin to Nobeoka and Manabe (2000), and Manabe (2002).<sup>4</sup>

- H 1 : “Cooperativeness” in the strategic alliance increases so that “Relational Trust” toward the partner increases.
- H 2 : “Cooperativeness” in the strategic alliance increases so that “Trust for Fair Intention” toward the partner increases.
- H 3 : “Cooperativeness” in the strategic alliance increases so that “Capability Trust” toward the partner increases.

3 The number of clinical stages has increased in the past several years because the R&D processes of candidate new drugs have shifted to clinical stages from discovery stages. Since the patents of some famous drugs expired around 2010, sometimes called “The Year 2010 Problem,” each company is focused on rapidly introducing the follow-up new drugs on the market. The numerical value is not the number of cases under execution of an alliance, but rather the number of alliance commencing.

4 We express “capability trust,” although Nobeoka and Manabe (2000) and Manabe (2002) express “trust for basic capability.”

We then add two variables identified by Kuwashima (1996): “Long-Term Intention” and “Reciprocity.” Because his study was a qualitative investigation, we verified them by questionnaire investigation.

H 4 : “Cooperativeness” in the strategic alliance increases so that “Long-Term Intention” toward the partner increases.

H 5 : “Cooperativeness” in the strategic alliance increases so that “Reciprocity” toward the partner increases.

The strategic alliance of pharmaceutical companies consists of rival companies. Because it is not as long term as the supplier system of the auto industry, we assume that “Capability Trust” has a significant influence on “Cooperativeness” rather than on “Relational Trust.” Therefore, we explore the factor that raises “Capability Trust.”

Because trust is built from the alliance conclusion or before as Dodgson (1993) stated, we prepare the independent variables by dividing them into two, the alliance before and under the alliance.

We first consider the variables before the alliance. Kuwashima (1996) pointed out that both sides fully evaluated in advance the technology and capability held by the partner. We build up the following hypotheses because a main way to get to know the partner’s technology and capability in advance is through presentations at annual meetings of academic association and papers, research achievements, and reputation.

H 6 : Before the alliance conclusion, “Capability Trust” toward the partner increases so that the partner’s “Presentation at Annual Meetings of Academic Association and Papers” is evaluated highly.

H 7 : Before the alliance conclusion, “Capability Trust” toward the partner increases so that the partner’s “Research Achievements” is evaluated highly.

H 8 : Before the alliance conclusion, “Capability Trust” toward partner increases so that the partner’s “Reputation” is considered high.

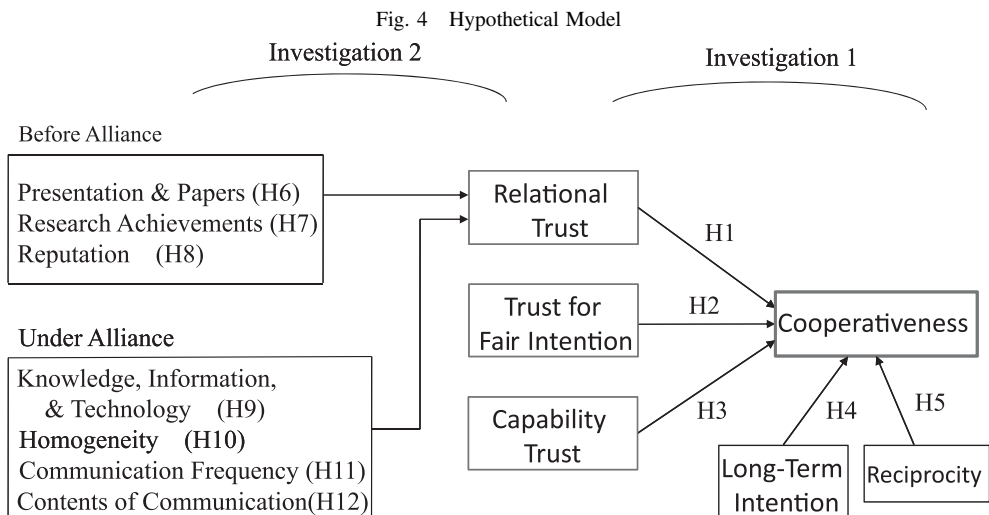
Next, we consider the variables under the alliance. We make “Knowledge, Information, and Technology” one of the variables because it is important to understand the partner’s knowledge and technology during the alliance. We consider the two variables “Communication Frequency” and “Contents of Communication in the Meeting” since Sako (1992) addressed com-

munication as a trust formation factor and Allen (1977) pointed out the relationship between communication frequency and performance. Furthermore, we take a homogeneity variable into consideration. We assume that only hypothesis 10 will become a negative causal relationship because the purpose of the horizontal alliance is to search for the knowledge, which a company does not have with its partner.

- H 9 : During the alliance, “Capability Trust” toward the partner increases so that the partner’s “Knowledge, Information, and Technology” are evaluated highly.
- H 10 : If the partner’s “Homogeneity” is evaluated during the alliance, “Capability Trust” toward the partner becomes low.
- H 11 : During the alliance, if communication frequently occurs with the partner, “Capability Trust” toward the partner increases.
- H 12 : In meetings during the alliance, “Capability Trust” toward the partner increases so that the partner’s “Contents of Communication” are evaluated highly.

The above hypothetical models are summarized in Fig. 4.

We conduct two regression analyses. First, in “Investigation 1,” we include a regression analysis that has a dependent variable “Cooperativeness” and the independent variables that are three trusts, “Long-Term Intention,” and “Reciprocity.” Second, in “Investigation 2,” we include a regression analysis that has a dependent variables “Capability Trust” and independent variable in before alliance and under alliance (total seven variables).



## V-2 Research Method

We made the questionnaire using the five steps of Likert measures, and then distributed the same questionnaire to all the samples. In the domestic alliance, the samples are 51 persons of 10 teams from eight companies. The eight companies are major pharmaceutical companies with the head offices in Japan.<sup>5</sup> We call this “Domestic Data.” We conducted the questionnaire investigation from February through May of 2004.

The Japan–U.S. alliance sample is as follows. We focused on Japanese pharmaceutical companies performing a strategic alliance with a pharmaceutical company with head offices in the U.S., and requested interview and questionnaire investigations to such Japanese companies. Then, we similarly requested an interview and questionnaire investigation of the U.S. companies, which are the alliance partners. Thereby, we conducted questionnaire investigations simultaneously with the teams of those companies from which we got both permissions. In our so-called “Japan Data,” we include samples of 43 persons of seven teams from four Japanese companies, and in “US Data,” we have samples of 38 persons of seven teams from seven U.S. companies that are the alliance partners.

## V-3 Results

The average value and correlation coefficient of each variable are omitted in this paper, because they are shown in Tomita (2006, 2010).<sup>6</sup> However, we show the average value of each variable in Table 3 to compare between the three datasets.

Next, we apply two regression analyses and verify the hypotheses (Table 4). Because we have many hypotheses, we summarize in Table 5 whether each hypothesis is supported.

We first focus on “Investigation 1” that makes “Cooperativeness” the dependent variable. Only “Capability Trust” becomes statistically significant, whereas “Relational Trust” and “Trust for Fair Intention” do not become significant across the three datasets: “Domestic Data,” “Japan Data,” and “US Data.” We discuss this result in the following chapter (argument 1). Similarly, “Reciprocity” also becomes significant across all the datasets. Although these four variables are common to the three datasets, only “Long-Term Intention” differs.

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5 We anticipated the small number of samples, and adjusted the questionnaires to the people whom we interviewed in each team. The small number of samples is mainly because of two reasons. One is that a discovery stage team has few members, and the other is the difficulty with studying a strategic alliance. In strategic alliances, companies release hardly any information to maintain secrecy; companies do not answer investigation requests for fear of an information leak. Although we hope to expand the number of samples in the future, we chose to proceed with the samples that we had.

6 In variables other than “Long-Term Intention” (it has only one question item), Cronbach’s coefficient alpha are in the range of 0.63 to 0.77.

Table 3 Average Value of Each Variable

	Domestic Data	Japan Data	US Data
Cooperativeness	3.98	3.89	3.04
Relational Trust	1.49	2.50	1.71
Trust for Fair Intention	2.41	2.34	1.61
Capability Trust	4.64	4.77	3.80
Long-Term Intention	2.65	3.90	2.29
Reciprocity	3.71	4.21	3.96
Presentation & Papers	3.61	4.01	3.27
Research Achievements	3.06	3.57	3.73
Reputation	3.34	3.41	1.88
Knowledge, Information, & Technology	3.84	3.75	4.10
Homogeneity	2.22	3.65	1.54
Communication Frequency	3.35	3.03	3.79
Contents of Communication	3.92	3.91	4.30

Table 4 Regression Analysis Results

## Investigation 1

Dependent variable : Cooperativeness

	Domestic Data	Japan Data	US Data
Relational Trust	0.80	0.19	-0.03
Trust for Fair Intention	0.01	-0.21	-0.24
Capability Trust	0.36 ***	0.56 ***	0.34 *
Long-Term Intention	0.23	0.47 **	-0.05 **
Reciprocity	0.36 **	0.46 **	0.31 **
Ajusted R2	0.30	0.38	0.22

## Investigation 2

Dependent variable : Capability Trust

	Domestic Data	Japan Data	US Data
Presentation & Papers	0.26 **	0.40 ***	0.11
Research Achievements	0.20	0.30 ***	-0.08
Reputation	0.10	-0.37	0.23
Knowledge, Information, & Technology	0.30 **	0.25 **	0.39 **
Homogeneity	-0.39 **	0.44 **	-0.22
Communication Frequency	0.18	0.19	0.41 ***
Contents of Communication	0.45 ***	0.36 **	0.46 ***
Ajusted R2	0.47	0.44	0.53

Notes : numerical value is standardized regression coefficient.

\* :  $p < 0.1$ , \*\* :  $p < 0.05$ , \*\*\* :  $p < 0.01$ 

“Long-Term Intention” in “Japan Data” and in “US Data” becomes significant. In “Japan Data,”  $\beta = 0.47$ , whereas in “US Data,”  $\beta = -0.05$ . Although it is a small value, it is a negative coefficient. Moreover, in “Domestic Data,” it does not become significant.

“Capability Trust” (H 3) and “Reciprocity” (H 5) are verified in three datasets. Although we can quantitatively verify “Reciprocity,” which Kuwashima (1996) pointed out, only “Japan

Table 5 Table of Hypothesis Testing

	Hypothesis	Domestic Data	Japan Data	US Data
H 1	Relational Trust→Cooperativeness	–	–	–
H 2	Trust for Fair Intention→Cooperativeness	–	–	–
H 3	Capability Trust→Cooperativeness	support	support	support
H 4	Long-Term Intention→Cooperativeness	–	support	–
H 5	Reciprocity→Cooperativeness	support	support	support
H 6	Presentation & Papers→Capability Trust	support	support	–
H 7	Research Achievements→Capability Trust	–	support	–
H 8	Reputation→Capability Trust	–	–	–
H 9	Knowledge, Information, & Technology→Capability Trust	support	support	support
H 10	Homogeneity→Capability Trust	–	–	–
H 11	Communication Frequency→Capability Trust	–	–	support
H 12	Contents of Communication→Capability Trust	support	support	support

Note : The hypothesis which is not supported is written as “–”

Although we obtain the statistically significant result by US Data of H 4 and Japan Data of H 10, they become opposite the positive/negative of the standardized regression coefficient to these hypotheses, and such hypotheses are not supported.

Data” is verified in “Long-Term Intention.” We will discuss the reason that the results of “Long-Term Intention” are different in the following chapter (argument 2).

Next, we focus on “Investigation 2” that makes “Capability Trust” the dependent variable. Although “Reputation” (H 8) is not supported in all three datasets, “Knowledge, Information, and Technology” (H 9) and “Contents of Communication in the Meeting” (H 12) are supported. Most likely, the result that “Knowledge, Information, and Technology” and “Contents of Communication in the Meeting” affect building of “Capability Trust” is appropriate. When we compare the size of standardized regression coefficients, the order is “US Data,” “Domestic Data,” and “Japan Data” on these two variables.

The other hypotheses cause different results between three data. Although “Presentation at Annual Meetings of Academic Association and Papers” (H 6) is supported in “Domestic Data” and “Japan Data,” i.e., Japanese companies, it is not supported in “US Data.” Moreover, “Research Achievements” (H 7) is supported only in “Japan Data.” H 6, H 7, and H 8 are the variables before the strategic alliance, and we obtain different results for them.

Although we do not mention it as a hypothesis in this study, we believe that trust is built from an alliance conclusion or before ; therefore, we consider the independent variables by dividing them into two, before the alliance and under the alliance. However, as a result, the “Presentation at Annual Meetings of Academic Association and Papers” (H 6), “Research Achievements” (H 7), and “Reputation” (H 8), which are variables before the alliance are not supported in “US Data.” Conversely, in “Japan Data,” “Presentation at Annual Meetings of Academic Association and Papers” and “Research Achievements” of the partner companies af-

fect “Capability Trust,” whereas “Presentation at Annual Meetings of Academic Association and Papers” affects “Capability Trust” in “Domestic Data” (argument 3).

“Homogeneity” (H 10) leads to results that differ in three datasets. Although we assume a negative causal relationship, only “Domestic Data” verify the hypothesis. In “Japan Data” it becomes a positive causal relationship, and in “US Data,” although it is negative, it is not statistically significant. We discuss “Homogeneity” in the following chapter (argument 4). On the other hand, “Communication Frequency” (H 11) is supported only in “US Data.”

## VI Discussion

We discuss the four above-mentioned points of argument in order.

### Argument 1 : Difference from other studies

As the variable that affects cooperativeness, only relational trust became statistically significant in Nobeoka and Manabe (2000) and Manabe (2002). On the other hand, in this study, only “Capability Trust” becomes significant in all three datasets, a contrasting result. We realize that the different types of strategic alliance have influenced the mutual results.

Their sample was suppliers of the auto industry, and they investigated the relationship with assemblers, i.e., vertical alliances. Because the company objective of suppliers is to make part products, a good relationship with assemblers is indispensable, and hence they develop a new product through coexistence and co-prosperity. In a vertical alliance, building relational trust becomes important. In contrast, the sample of this study is the horizontal strategic alliance of pharmaceutical companies. In the R&D of a new drug, a company begins research alone at first. In the case of an alliance conclusion, the term is provided in the agreement ; when the term has passed, companies extend the contract of alliance or choose dissolution. Because the members recognize the alliance as a terminable strategy and have a rival relationship from the first, they fulfill only the letter of the statement of the agreement and have a low anticipation of coexistence and co-prosperity. Therefore, they build little relational trust. Under these circumstances, a pharmaceutical company creates a strategic alliance to accomplish more effective and efficient R&D ; it hopes for a capability and a viewpoint, which it does not have. Therefore, in a horizontal alliance, when the partner has such a capability, a company builds capability trust that serves as a factor of cooperativeness. We believe that the difference in the type of alliance has influenced the difference between the two findings.

#### Argument 2 : The difference between the data about “Long-Term Intention”

Hypothesis 4, in which “Long-Term Intention” affects “Cooperativeness,” is supported only by “Japan Data.” At the time of the questionnaire investigation, all seven strategic alliances, which are our samples, had passed a period of one or more years since the alliance began. Although contract terms of the alliances at the time of the agreement is two or three years, when the term ends and the purpose is not attained, Japanese companies tend to extend their contract with U.S. companies. Alternatively, U.S. and Japanese companies in domestic alliances prefer to achieve results during the contract term, without requiring extension of the contract. If this proves impossible, they tend to explore alternatives. Because sales of the drug will occur during the patent period of the new drug, particularly in the U.S., the company urgently progresses new drug development, and is very focused on achieving development within the agreement period. Under a horizontal strategic alliance, the posture of U.S. companies may be more appropriate.

#### Argument 3 : The variables before strategic alliance

“Presentation at Annual Meetings of Academic Association and Papers” is statistically significant to “Capability Trust” in “Domestic Data,” and “Presentation at Annual Meetings of Academic Association and Papers” and “Research Achievements” are strongly effective in “Japan Data.” These variables are before the strategic alliance conclusion ; that is, ascertaining the partner’s qualifications is important for Japanese companies, and when beginning the alliance, the capability trust for the partner has already arisen. Therefore, “Knowledge, Information, and Technology” and “Contents of Communication in the Meeting,” which are variables under strategic alliance, have a relatively weak influence on formation of “Capability Trust.” On the other hand, in the case of “US Data,” a company does not hold “Capability Trust” before the alliance ; the communication activities after the alliance begin, such as “Communication Frequency” and “Contents of Communication in the Meeting” are important to it. During the strategic alliance, capability trust is raised through exchange of knowledge, information, and technology by raising the quantity and the quality of communication with partners.

#### Argument 4 : The difference between the data about homogeneity

We would like to consider the reason for having obtained a positive result, contrary to the hypothesis in “Japan Data.” We thought that hypothesis 10 became a negative causal relationship for finding a capability and a viewpoint which a company does not have, with a partner company in a horizontal alliance of pharmaceutical companies. Only in “Domestic Data,” the



causal relationship is a negative one. In “US Data,” although it is not statistically significant, the standardized regression coefficient is negative. However, we get a positive significant result in “Japan Data.” That is, “Capability Trust” will be raised if Japanese companies estimate that the knowledge, viewpoint on research, and sense of values of U.S. companies are homogeneous. On the other hand, the average value of “Homogeneity” of “US Data” becomes 1.54, a very small value (Table 3). Therefore, U.S. companies seldom feel homogeneity with Japanese companies.

We believe that this contrasting result originates in the capability of each company. From the interview investigation of each company, which we conducted by combining it with a questionnaire investigation, we found that many of the sampled U.S. companies were following up on former basic research from a discovery stage, and that they had abundant knowledge about the illness, biological knowledge, and production technology of organic synthesis and protein. We consider that this was evaluated by Japanese companies as homogeneous knowledge because such knowledge serves as the basis of the discovery stage. In contrast, we conclude that the U.S. companies evaluated that Japanese companies are not homogeneous, but rather heterogeneous because many Japanese companies excel in the capability of screening the lead compounds, and their knowledge and viewpoint differ from each other both between Japan and the U.S., and among individuals.

## VII Conclusion

In this study, we applied regression analysis by dividing our data into three samples : “Domestic Data” in alliances within Japan, and “Japan Data” and “US Data” in Japan–U.S. alliances. We obtained some similar results and some different results across the three samples.

We confirmed the importance of “Capability Trust” in Investigation 1 in all three samples. Because the results differed from Nobeoka and Manabe (2000) and Manabe (2002), we discussed the factors based on the different industry types causing the differences.

Next, in Investigation 2 we obtained different results between three datasets exploring the factors of “Capability Trust.” First, we found that the evaluation before alliance conclusion had affected “Capability Trust” only in Japanese companies (= “Domestic Data” + “Japan Data”). Therefore, the influence that the variables under alliance had on “Capability Trust” became weaker. Alternatively, we determined that the U.S. companies attached more importance to the communication about knowledge, information, and technology under alliance ; they tended not to do initial evaluations before alliance.

Regarding “Knowledge, Information, and Technology,” “Communication Frequency,” and “Contents of Communication in the Meeting,” which are variables under alliance, the average value of variables and the standardized regression coefficients of the U.S. companies showed the greatest relative value. Japanese companies had large values for many of the other variables. First, because the average value of “Cooperativeness” is statistically significant in Japan and the U.S.,<sup>7</sup> to make strategic alliances more effective, Japanese companies have to improve the cooperativeness of the U.S. companies, and therefore, need to raise the capability trust of the U.S. companies. Furthermore, because communications about knowledge, information, and technology under alliance is important for raising capability trust, Japanese companies convey knowledge, information, and technology more strategically through close communication activities.

#### References

- Allen, T. J. (1977), *Managing the Flow of Technology*, Boston : MIT Press.
- Andaleeb, S. S. (1992), “The Trust Concept : Research Issues for Channels of Distribution,” *Research in Marketing*, Vol.11, pp.1–34.
- Andaleeb, S. S. (1995), “Dependence Relations and the Moderating Role of Trust : Implications for Behavioral Intentions in Marketing Channels,” *International Journal of Research in Marketing*, Vol.12, pp.157–172.
- Child, J. and D. Faulkner. (1998), *Strategies of Cooperation*, Oxford : Oxford University Press.
- Das, T. K. and B. S. Teng. (1998), “Between Trust and Control : Developing Confidence in Partner Cooperation in Alliances,” *Academy of Management Review*, Vol.23, No.3, pp.491–512.
- Dodgson, M. (1993), “Learning, Trust, and Technological Collaboration,” *Human Relations*, Vol.46, No.1, pp.77–95.
- Dore, R. (1983), “Goodwill and the Spirit of Market Capitalism,” *British Journal of Sociology*, Vol.34, pp.459–482.
- Doz, Y. L. (1996), “The Evaluation of Cooperation in Strategic Alliances : Initial Conditions or Learning Processes?,” *Strategic Management Journal*, Vol.17, Special Issue, pp.55–83.
- Hamel, G., Doz, Y. L. and C. K. Praharad. (1989), “Collaborate with Your Competitors and Win,” *Harvard Business Review*, Jan–Feb, pp.133–139.
- Lewis, J. L. (1990), *Partnership for Profit*, New York : The Free Press.
- Peterson, R. B. and J. Y. Shimada. (1978), “Sources of Management Problems in Japanese-American Joint Ventures,” *Academy of Management Review*, Vol.3, pp.796–804.
- Ring, P. S. and A. H. Van de Ven. (1992), “Structuring Cooperative Relationships between Organizations,” *Strategic Management Journal*, Vol.13, No.7, pp.483–498.
- Sako, M. (1992), *Prices, Quality and Trust : Inter-firm Relations in Britain & Japan*, Cambridge : Cambridge University Press.
- Smith, K. G., S. J. Carroll, and S. J. Ashford. (1995), “Intra- and Interorganizational Cooperation,” *Academy of Management Journal*, Vol.38, No.1, pp 7–23.
- Webster, F. E. Jr. (1992), “The Changing Role of Marketing in the Corporation,” *Journal of Marketing*, Vol.56,

<sup>7</sup> As shown in Table 3, the average value of “Cooperativeness” in “Domestic Data” is 3.98, that of “Japan Data” is 3.89, and that of “US Data” is 3.04.

No.4, pp 1–17.

Yoshino, M. J. and U. S. Rangan. (1995), *Strategic Alliance : as Entrepreneurial Approach to Globalization*, Boston : Harvard Business School Press.

(in Japanese)

Kuwashima, K. (1996), “*Senryakuteki Teikei* [Strategic Alliance],” In N. Takahashi ed., *Mirai Keisha Genri* [Future Inclination Principle], pp.107–130, Tokyo : Hakutou Shobou.

Kuwashima, K. (2006), *Hukakujitusei no Manejiment* [Management of Uncertainty] Tokyo : Nikkei BP Sha.

Manabe, S. (2002), *Kigyoukan Kyoutyou niokeru Sinrai to Power no Kouka –Nihon Jidousha Sangyou no Jirei–* [The Effects of Trust and Power in Inter-firm Cooperation : The Case of the Japanese Automobile Industry],” *Soshiki Kagaku* [Organizational Science], Vol.36, No.1, pp.80–94.

Manabe, S. (2004), “*Kigyoukan Sinrai no Koutiku to Supplier System : Nippon Jidousha Sangyou no Bunseki* [Building Interfirm Trust in the Japanese Automobile Industry],” *Yokohama Kokuritsu Daigaku Keiei Gakkaï* [Yokohama Business Review], Vol.25, No.2/3, pp.125–144.

Noheoka, K. and S. Manabe. (2000), “*Soshikikan Gakushu niokeru Kankeiteki Shinrai no Yakuwari* [The Role of Relationship-oriented Trust in Inter-firm Learning in the Japanese Automobile Industry],” *Keizai Keiei Kenkyu* [Annals of Economics and Business], *Kobe Daigaku Keizai Keiei Kenkyujo* [Research Institute for Economics and Business Administration Kobe University, No.50, pp.125–144.

Nonaka, I. (1991), “*Senryaku Teikei Josetsu* [Strategic Alliance Introduction],” *Hitotsubashi Business Review*, Vol.38, No.4, pp.1–14.

Odagiri, H. (2001), *Atrashii Sangyo Soshikiron* [New Industrial Organization], Tokyo : Yuhikaku.

Sako, M. (1998), “*Nippon no Supplier Kankei niokeru Shinrai no Yakuwari* [The Role of Trust in the Supplier Relation in Japan],” In T. Fujimoto, T. Nishiguchi, and H. Ito ed., *Supplier System : Atarashii Kigyoukan Kankei wo Tsukuru* [Supplier System : The New Relation between Companies is Made], pp.91–118, Tokyo : Yuhikaku.

Tomita, K. (2006), “*Shinyaku Kaihatsu wo Mokuteki toshita Senryakuteki Teikei niokeru Shinrai* [Trust in Strategic Alliances for New Medicine Developments],” *Shouhin Kaihatsu Kanri Kenkyu* [Association of Product Development and Management], Vol.2, No.1, pp.16–31.

Tomita, K. (2010), “*Nichibei Seiyaku Kigyoukan no Senryakuteki Teikei niokeru Shinrai Kouchiku* [Building Trust in the Strategic Alliance between Japanese-American Pharmaceutical Companies],” *Soshiki Kagaku* [Organizational Science], Vol.43, No.3, pp.18–32.

Yamagishi, T. (1998), *Shinraino Kozo : Kokoro to Shakai no Shinka Game* [Structure of Trust : The Evolutional Game of Heart and Society], Tokyo : University of Tokyo Press.

Wakabayashi. N. (2006), *Nippon Kigyō no Network to Shinrai* [Network of Japanese Companies and Trust], Tokyo : Yuhikaku.

*Gekkan Mix* [Monthly Mix], May, 2001 issue, Tokyo : Mix.

*Kokusai Yakuhin Joho* [International Pharmaceutical Information] from January 14, 1991 issue (No.449) to December 22, 2008 issue (No.880), Tokyo : Kokusai Shougyou.

*Yakuji Handbook 2009* [Pharma Japan Handbook 2009], Tokyo : Jiho.