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**Inter-firm Relationships**  
**in the Telecommunications Industry**

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## **ABSTRACT**

This research discusses inter-firm relationships in the telecommunications industry. The characteristics of the industry, analytical framework of inter-firm relationships and correlated strategic issues for inter-firm relationships in the industry are discussed.

Chapter 1 discusses the introduction and overview of the research.

Chapter 2 reviews general discussions and theoretical bases of inter-firm relationships and identifies the issues for discussing inter-firm relationships in the telecommunications industry.

Chapter 3 first discusses the characteristics of the industry and then identified that equity-based relationships are the dominant over other types of relationships. Three-directional categorization of inter-firm relationships suitable for analyzing inter-firm relationships in the industry is proposed based on the discussions on the characteristics of the industry.

Following the discussions, evaluation of stock market responses for announcements of relationships are provided and differences in market responses correspondent to the dimensions of proposed typology are discussed. The results show the market responses are not favorable as expected. Differences are also found according to the dimension of business diversifications defined in the proposed framework.

Chapter 4 discusses and proposes a framework of understanding inter-firm relationships based on business process analysis and argues that definition of module of business process may be correlated to preferred formation of inter-firm relationships. The framework is positioned as extending the frameworks utilized or deployed in ICT and business architectures for discussing business strategies, and the framework can be deployed as an analytical framework for inter-firm relationships. A validation of the propositions is also conducted by observing inter-firm relationships in the selected industries. These discussions show that the structure of business processes in certain industries - including the telecommunications - strongly correlates to the preferred formation of inter-firm relationships.

Chapter 5 discusses the results of the research discussions and proposed framework will provide managers with implicit information on which type of inter-firm relationship suits their industry when they are developing strategies for inter-firm relationships.

Conclusions and further research issues are mentioned in Chapter 6.

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## CHAPTER 1

### Introduction

Mergers and acquisitions (M&A), joint ventures, and strategic alliances are some of the most important strategic activities for firms. Therefore, the choice of the formations of inter-firm relationships is one of the most important issues for managers. And like companies in other industries, telecommunications firms have formed a considerable number of strategic alliances and equity arrangements, including joint ventures and M&A aimed to enhance market competitiveness. Such relationships had become common by the mid-1980s in the United States; other industrialized countries soon followed this trend with the progress of deregulation in the 1990s (Joshi et al., 1998; Trillas, 2002).

Managers involved in the telecommunications industry must therefore consider forming relationships of these kinds as one of their top-priority strategic activities. Also managers engaged in developing inter-firm relationship strategies must decide whether to form inter-firm relationships and which firms to target as potential partners. Such decisions must offer the opportunities to improve the firm's competitiveness scope, increase profitability, or gain positive acceptance by stakeholders. Therefore, an effective way to establish strategy on such relationships is a key for managers, and also valuable for the academic study of inter-firm relationships.

Based on these understandings, this dissertation discusses on inter-firm relationships focusing the telecommunications industry. In this dissertation, the author defines these arrangements of relationships between firms as *inter-firm relationships* based on the definition by Yoshino and Rangan (1995).

As referred in the later chapters, it is important to note that when many major telecommunications carriers choose new relationships with other corporations, they seem to select M&A or equity-based relationships as strategic activities rather than entering into strategic alliances or other arrangements to expand their competitive edge. These tendencies imply that there exists a common understanding of the characteristics of the telecommunications industry that provides a concept of inter-firm relationship specific to the industry. And therefore the author insists that it is very important for managers and scholars involved in the telecommunications industry to identify the characteristics of the industry and to provide frameworks for analysis on alliances and M&A that is comparative as applied in other industries. Also the author understands that it helpful for managers to be provided implications for establishing strategies on forming inter-firm relationships with other corporation.

Based on these understandings and ideas, this dissertation set focuses on three areas. The first is to review and discuss on inter-firm relationships in the telecommunications industry. The discussions include (1) to discuss the characteristics of the telecommunications industry that may be correlated to regulatory systems in the industry, (2) to identify characteristics and direction of inter-firm relationships in the industry which concentrating to M&A and equity based inter-firm relationships, (3) to propose a framework for understanding inter-firm relationships in the industry that will help managers and scholars to recognize strategic directions for each firm, and (4) to provide evaluations of inter-firm relationships in the industry based on the proposed framework and consequently provide some implications on establishing alliance strategies in the industry.

The second area is to provide a rationale explaining the difference of formation of inter-firm relationships between the telecommunications industry and other industries.

In this research an analytical framework for understanding inter-firm relationships named as “Business process based view” is proposed and discussed. Conception of the view focuses on characteristics of business processes defined or substantially operated in industries, and the view shows correlation between preferred formation of inter-firm relationships (e.g. M&A, strategic alliance, Joint venture etc.) and characteristics of business process (e.g. level of standardization) through observation on business processes in selected industries. Also the adaptability of the view is discussed through comparison of inter-firm relationships in the industry and selected comparable industries.

The third is to discuss on strategy for inter-firm relationships to be examined when manager establish alliance strategy for the purpose of strengthen competitiveness of a telecommunication firm. Discussions in this area include following issues – (1) formation of inter-firm relationships to be chosen based on the characteristics of the industry (2) strategies to be developed correlated to the characteristics business processes recognized in the industry (3) valuation of inter-firm relationships by stakeholders and managers.

This research focuses on inter-firm relationships conducted by the telecommunications firms (telecommunications carriers) and explores the characteristics of the industry. Therefore, discussions in this research do not set focus on relationships including adjacent industries such as discussions by Wilcox et al. (2001) for the purpose of clarifying the characteristics of the telecommunications industry. In addition, this research analyzes and discusses inter-firm relationships conducted within the terms of deregulation in industrialized countries after the 1980s to early 2000s, covering the era of recent regulatory change, which has featured legislation such as the Telecommunications Act of 1996 in the United States and similar changes in other

countries representing the characteristics of the industry.

On these viewpoints of the research, discussions may be raised that differences of market and market structure in each country should be taken into account – e.g. discussed at “Structural Impediments Initiative” (SII) from 1989 through 1990 and “the Japan-United States Framework for a New Economic Partnership” in 1993 between Japan and the United States and focused on procurements by carriers and correlated issues. The author insists, however, that the framework proposed and discussed in this research may be meaningful as one of the alternatives of analyzing and discussing characteristics of the industry from a different aspect from these discussions.

This dissertation consists of 6 chapters including this introduction. In the following chapter, preceding research on inter-firm relationships in the telecommunications and some selected industries are reviewed. Also theoretical frameworks for discussing inter-firm relationships are reviewed.

Chapter 3 discusses characteristics of the telecommunications industry and characteristics of inter-firm relationships in the industry. The discussions also include a proposal of typology and evaluation of inter-firm relationships in the industry based on the proposed typology. In Chapter 4 a newly introduced conception business process based view is proposed. Strategies for inter-firm relationships in the industry will be discussed in Chapter 5. Chapter 6 provides the conclusion. Next chapter reviews discussions on the proceeding research correlated to the purpose of this paper.

## CHAPTER 2

### Inter-firm Relationships

This chapter reviews preceding researches and discussions on focused areas of this dissertation. The areas are, general discussions on theoretical bases of inter-firm relationships and formations of inter-firm relationships focused on the telecommunications and comparative industries

With regard to the first area, scholars have discussed inter-firm relationships, and various aspects have been proposed in order to analyze them. They have provided categorizations, performance valuations by analytical frameworks mainly based on a resource-based view (RBV), and transaction cost-based theories. In connection to those issues, this research focuses on how or why a firm selects some specific formation of inter-firm relationship when establishing alliance strategies. The author insists that this issue is also to be more developed and discussed.

On the second area, rather few discussions and analysis are found covering similar issues to the focus of this research compared to other comparative industries such as airlines and pharmaceutical industries.

Following subsections review preceding researches according to the above focuses.

#### **2-1 Resource based view (RBV) and the transaction cost theory**

Firms usually enter into strategic alliances, joint ventures, equity investment, or M&A for the purpose of strengthening their ability to compete. They choose one or more of these alternatives depending on their strategic purposes, market environment, products, and technological capabilities (Doz and Hamel, 1998). For example, a firm

might use M&A to control a counterpart firm, whereas a strategic alliance is a relationship in which each firm can maintain its independence.

Yoshino and Rangan (1995) and Mocker (1997) defined strategic alliances as inter-firm relationships that two or more independent firms use on a continuing basis to contribute to one or more key strategic areas. The firms share the benefits of their teamwork while remaining independent. Although various kinds of inter-firm relationship exist, the definition provided by Yoshino and Rangan (1995) is one of the most typically referred to categorizations of inter-firm relationships (Figure 1). The next issue, then, is which inter-firm formation should be pursued when managers in the industry hope to strike up relationships with other telecommunications carriers in order to improve their competitiveness within the industry.

The resource-based view (RBV) or transaction-cost theories are often applied to discuss or analyzing alliances.

The former was originally named by Wernerfelt (1984), supplemented by himself later (Wernerfelt 1985) and later developed by Barney(1986a, 1986b, 1991) on strategic factor markets and the role of expectations. And other scholars discussed on the motivations and structures of alliances are often explained based on the view (Das and Teng 2000, Peng 2001, Harrison et al 2001, Hoffmann and Schlosser 2001). And this view provides recognition of alliance as a means of obtaining additional resources,

Transaction cost theory was originated by Coase (1960) and developed mainly by Williamson (1981, 1985, 1996). The theory focuses on costs of transactions between firms and defines alliances in terms of the minimization of transaction costs between organizations.

RBV and the transaction cost theory are used to discuss and analyze mainly strategic alliances. This is based on the perception that forming alliances is an allocation and

exchange of corporate resources (Yoshino and Rangan 1995, Doz and Hamel 1998) and these theoretical frameworks work very well for non-equity based inter-firm relationships. In addition, these allocations or exchanges target only a portion of the corporate resources possessed by each firm.

On the other hand, equity-based inter-firm relationships, in particular M&A, are not discussed compatibly as exchanges of resources, as discussed by scholars (Yoshino and Rangan, 1995). However, when managers consider an inter-firm relationship as a corporate strategic activity, they may take into account a broad range of alternatives including both equity-based relationships and non-equity based ones, and may decide which type of formation to use after studying these alternatives. Therefore, from a managerial standpoint, the author insists that there is a need of discussing inter-firm relationships covering a broad range of formations. This is one of the issues to be overcome when discussing inter-firm relationships based on RBV and transaction cost theories. Another issue is the application methodologies of RBV and transaction cost-based theories. Many scholars, such as Chen and Chen (2003) and Yasuda (2005), used these theories to analyze many cases and provided valuable implications on inter-firm relationships in targeted industries. However, the author set another contention whether RBV and transaction cost theories can provide frameworks for establishing inter-firm relationships covering broad range of formations.

This issue was pointed out by Gulati et al. (2000) and they proposed a new framework called the 'Strategic Network'. The framework attempted to comprehend inter-firm relationships by combining the industry's structure, positioning within the industry, the inimitable firm resources and capabilities, the contracting and coordination costs, and the dynamic network constraints and benefits. This framework is not completely different from the other existing theories such as the RBV and transaction

cost theories, but it provides a manifold aspect for understanding inter-firm relationships. This framework also is useful in that an analysis based on this framework contains information or implications on which formation of inter-firm relationships can be built and on which partners would be valuable to the firm.

However, from a managerial standpoint, another implication is required for establishing the strategies for forming inter-firm relationships – which formation should be chosen and/or which partner will bring the most value to the firm. Then, another issue is understood that framework is needed useful for determination of formations inter-firm relationships and this issue is set as one of the most important issues to be discussed in this research.

### **2-2 Formation of inter-firm relationships**

With regard to formation of inter-firm relationships, Gulati (1998) provided a suggestive discussion. His definition of a formation is the combination of three elements - the choice of partner, the contract-type of the alliance, and the evolvement of the alliance and the partners' participation over time. The focus of the discussion was on strategic alliances, but equity-based inter-firm relationships were not included.

In this research, however, alliance formation is defined as different focus than that defined by the discussion. This research defines alliance formation as the 'structure of governance' in inter-firm relationships, and this is similar to that outlined by Yoshino and Rangan (1995). This definition is used to discuss the broad range of inter-firm relationships, and the choice of the governance structure is also one of the most important issues for managers when building inter-firm relationships.

Based on the above understandings and the managers' standpoints, this research understands that an alternative framework for inter-firm relationships is desired, and

therefore, this research attempts to provide discussions based on a different perspective.

Many researches were conducted regarding the correlation between alliance formation and various factors. Chen (2003) tried to explain and analyze the factors involved in a firm's choice of alliance form based on six hypotheses, addressing issues such as environment, nationality, and number of partners. Garette and Dussauge (2000) also provided hypotheses and empirical tests for the correlation between environment, partner characteristics, and alliance forms. In addition, Schoenberg and Reeves (1999) discussed factors that determine acquisition activities, and Hopkins (1999) discussed M&A motives (strategic, market, economic, and personal).

Although many researchers tried to explain a firm's choice of alliance formation based on empirical analysis (Eisenhardt and Schoonhoven, 1996; Hennart and Reddy, 1997; Chen and Chen, 2003), there does not seem to be any sufficient research based on the theoretical determinations of alliance formation, particularly in the choice of strategic alliances or M&A in the telecommunications industry. Although these discussions may be applied to discuss formation of inter-firm relationships in the telecommunications industry, the author understands the need to find an alternative factor other than factors discusses in these researches.

Furthermore, as Barney (2002) illustrated, strategic alliance, joint venture, and M&A are usually defined as distinct alternatives in researches and discussions. And this understanding of the distinction is well accepted. Therefore, strategic alliances and other inter-firm relationships such as M&A or equity-based relationships have usually been discussed separately and independently of one another. However, a different perspective on this categorization may be appropriate when we observe actual formations of inter-firm relationships in the telecommunications industry.

Therefore, another issue is identified in this research. A framework of understanding inter-firm relationships and rationale is required which can be applied to discuss selection of specific formation when forming an inter-firm relationship within a wide range of alternatives including strategic alliances and M&As.

As discussed in former section, scholars tried to give rationale for explaining the motivation, formation, and performance valuations for making inter-firm relationships. Those scholars mostly used the resource-based view (RBV) and transaction cost theories frameworks for discussing inter-firm relationships, but there are restraints on utilizing these theories. Equity-based inter-firm relationships, such as M&A, can be defined as transactions or trades of the whole firm, not just as partial transactions of the resources possessed by a firm. Therefore, the author recognize that there are difficulties of finding discussions and analyses, based on the RBV or transaction cost theories, dealing with a broad range of inter-firm relationships, including the M&A or similar equity-based relationships.

### **2-3 Inter-firm relationships in the telecommunications and other industries**

With regard to discussions on inter-firm relationships in the telecommunications industry, researchers frequently analyzed issues related to strategic activities in the industry, with a focus on specific cases of inter-firm relationships. For example, Wilcox et al. (2001) discussed the effect of M&A by U.S.-based carriers, Trillas (2002) analyzed European carriers, Baroncelli (1998) studied the case of alliance between AOL and Time Warner, and Faulhaber (2002) discussed Telecom Italia case. Other scholars have also studied the regulatory environment of the industry in specific countries and areas such as discussion by Hudson (2004). Researchers discussed industries other than telecommunications, with useful analyses and frameworks for understanding and

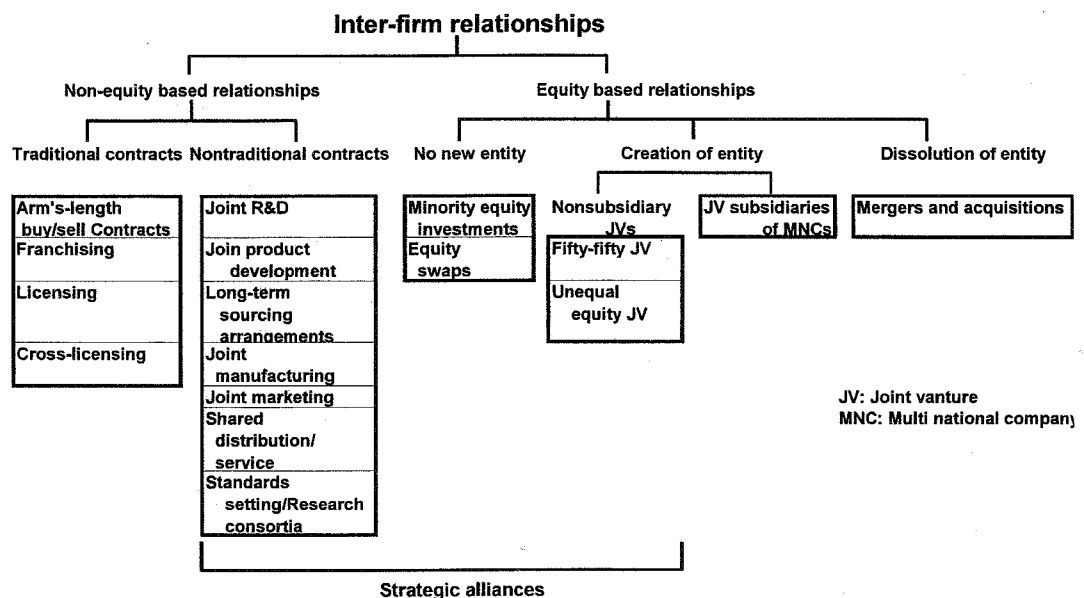
establishing strategies (e.g. Gudmundsson and Rhoades, 2001; Hill, 1997; Rhodes and Lush, 1997; Yasuda, 2005, Yasuda and Iijima, 2005; Achilladelis and Antonakis, 2001; Amesse et al., 2004). These studies focused on inter-firm relationships within each industry. The frameworks and methodologies used by these scholars for categorizing alliances are also useful in identifying the characteristics of each industry.

However, the problem is that it difficult to find research dealing with inter-firm relationships in the telecommunications industry that discusses typology and alliance strategies. In addition, it can be recognized that discussions of inter-firm relationships in the telecommunications industry have usually not distinguished strategic alliances from M&A (Oh, 1996; Chan-Olmsted and Jamison, 2001; Curwen, 2001; Jamison and Chan-Olmsted, 2002).

Apart from inter-firm relationships, the characteristics of the industry have been analyzed and discussed mainly from economic and regulatory environment standpoints (Brock, 1998; Kahn, 1997; Laffont and Tirole, 2001; Vogelsang and Mitchell, 1997). The author therefore proposes to discuss inter-firm relationships correlating to these characteristics.

Regarding the viewpoint, two characteristics of the industry that seem to strongly affect a firm's strategic behavior and choice of inter-firm relationships have been identified (Shiraishi and Iijima 2008). The first is that firms wish to expand their networks and services. This is due to the nature of telecommunications services, much like other public utility businesses, where economies of scale and scope in providing services cause the telecommunications market to behave much like a natural monopoly (Vogelsang and Mitchell, 1997). The second characteristic of the industry is regulatory systems, which developed because of the first characteristic. Regulatory systems affect each firm's strategic behavior and choices of inter-firm relationships. In the past, the

telecommunications market was defined as a combined market—local, long distance (including or excluding international connectivity), and mobile services. Strict barriers were drawn between each market, and firms were legally restricted to one or limited types of service. These regulatory systems also created barriers preventing new firms from entering each market and restricting foreign investors. Still, it is important to take into account deregulation initiatives such as the Telecommunications Act of 1996 in the United States and further deregulation efforts in the EU, Japan, and other countries.



**Figure 1** Inter-firm relationships (Categories defined by Yoshino and Rangan, 1995).

## CHAPTER 3

### Typology and Evaluations of Inter-firm Relationships

This chapter focuses on characteristics of inter-firm relationships in the telecommunications industry. As declared in Chapter 1, this chapter discusses following issues. First is to identify the characteristics of the telecommunications industry that may be correlated to regulations in the industry. Second is to identify characteristics and direction of inter-firm relationships in the industry that concentrates to M&A and equity based inter-firm relationships. And the third issue is to propose a framework for understanding inter-firm relationships within the industry that will help managers and scholars recognize strategic directions for each firm. The last is to provide evaluation of inter-firm relationships in the industry based on the proposed framework which leads to providing implications on establishing alliance strategies in the industry.

#### 3-1 Characteristics of the telecommunications industry

This section addresses the distinguishing characteristics of the telecommunications industry and strategies chosen by the firms. Scholars have mainly analyzed the industry's characteristics from economic and regulatory environment standpoints (Brock, 1998; Kahn, 1997; Laffont and Tirole, 2001; Vogelsang and Mitchell, 1997). These researchers identified the scale and scope, network externality, bottleneck monopolies, and correlated regulatory systems as distinctive features of the industry. Kahn (1997) and Vogelsang and Mitchell (1997) used a definition of economics of scale and scope to argue that the production of telecommunications services and the costs for providing services will be lower if a firm acquires a considerable scale of business and

substantial product lines. These scholars also suggested that network externality makes a fully interconnected network the most efficient supply structure.

One of the most significant characteristics of the industry is the existence of the “bottleneck” (Laffont and Tirole, 2001; Vogelsang and Mitchell, 1997). Telecommunications services are generally standardized and common to almost all carriers, with no technological alternatives available to competitive telecommunications carriers seeking to acquire some of the bottlenecked resources. In the past, telecommunications services were provided by secure monopolies or regulated private corporations in most countries. Even after deregulation and privatization, the market structure has been such that long-distance telecommunications services have to utilize the loops, switches, and interoffice transmission facilities of local exchange carriers. In this case, the local loop is identified as a bottleneck. Given this situation, interconnection between telecommunications and incumbent carriers is one of the most important factors in assuring fair competition in the industry. In addition, the structure of telecommunications has led to regulatory systems that differ from those of other industries. Brock (1998) provided an alternate description of the condition that highlights the economic characteristics of the industry and identified three characteristics—network externality, revenue sharing between firms participating in a telephone call through network interconnection, and the structure of the telephone industry itself—as a vertically integrated effective monopoly controlled by a dominant firm.

With regard to the regulatory issue, Crandall (1997) provided a convincing argument that a complete deregulation might not be feasible or easy to accomplish, and Styliadou (1997) wrote from a similar standpoint. Joshi et al. (1998) and Laffont and Tirole (2001) proposed the significant view that the industry is clearly split into three

groups: (a) firms providing local connectivity; (b) firms offering long-distance services, including international calling; and (c) firms offering cellular or paging services. This definition sheds light on the argument between carriers and regulatory bodies that led to the AT&T divestiture undertaken in 1984. Although the above typology of firms in the industry is based on conditions in the United States, many regulators in other countries have introduced similar concepts and systems. As illustrated in the researchers' discussions, two characteristics of the industry seem to affect a firm's strategic behavior and choices of inter-firm relationships.

The first characteristic is the nature of telecommunications services. As with other public utility businesses, the economics of scale and scope in providing services leads the telecommunications market into a natural monopoly (Vogelsang and Mitchell, 1997). In particular, researchers have generally agreed that local telephone service is a natural monopoly (Kahn, 1997). This tendency toward monopolies is correlated with two other aspects of the industry. One is that telecommunications firms have to provide standardized services and the other is that network externality exists. In such an environment, a natural monopoly, accompanied by a fully interconnected network, is the most efficient and competitive business decision (Vogelsang and Mitchell, 1997). Therefore, firms in the industry have naturally been interested in expanding their networks or their telecommunications services.

The second characteristic of the industry that affects a firm's strategic behavior and its choice of inter-firm relationships is the regulatory system. In the past, the telecommunications market was defined as a combined market—local, long-distance (including or excluding international connectivity), and mobile services. Strict barriers were drawn between individual markets, and firms were legally restricted to services of one type or several of each type. These regulatory systems also set barriers preventing

new companies from entering each market and restricting foreign investors.

Starting in the 1980s, regulatory bodies in many countries began to introduce policies for competition into the telecommunications market, resulting in the relaxation of many regulations (Vogelsang and Mitchell, 1997). In many cases, these policies were introduced into the long-distance and international markets at an early stage and only later introduced into other market segments. Examples of these deregulations include the Federal Communications Commission policy (FCC, 1980), which represents the decision to introduce competition into the long-distance market as a result of the suit by MCI against AT&T. MCI sought to gain fair interconnection with AT&T's local networks in the United States from 1974 through 1980, in Japan from the middle of the 1980s, and in EU countries in the 1990s. It is also important to be aware of subsequent deregulation initiatives such as the Telecommunications Act of 1996 in the United States and further deregulations in the EU, Japan, and other countries. By the mid-1990s, these policies had been introduced into almost all categories of the telecommunications industry. This trend of regulatory changes is dramatic; this research offers the hypothesis that the regulatory trend affects the alliance strategies of firms in the industry.

The next section discusses the characteristics of inter-firm relationships based on these historical and regulatory aspects, reviewed theories, and industry trends.

### **3-2 Characteristics of inter-firm relationships**

As shown in section 3-1, the industry has two distinctive characteristics: a tendency toward monopolies and the presence of a regulatory environment. These characteristics explain why, relative to companies in other industries, telecommunications firms have less opportunity to acquire competitiveness through strategic means. Therefore, it can

be noted that telecommunications firms usually have an incentive to expand their networks. This incentive consequently drives firms to apply strategic activities to their business scales.

Before the introduction of deregulation into the telecommunications market in industrialized countries, strict limitations were in effect in areas such as market entrance, acquisitions, and foreign investments. Therefore, telecommunications firms had few choices in inter-firm relationships during this era. Under such conditions, when a firm intended to expand its network and business scale, one of its few alternatives was to interconnect its network with those of other telecommunications firms. Even after the process of deregulation, this trend continued. In modern times, almost all telecommunications firms' networks are interconnected with those of other telecommunications firms; firms without network interconnection are scarce.

Although such interconnection would not necessarily be defined as a strategic alliance in the context of other industries, network interconnection in the telecommunications industry is one of the most efficient ways for a firm to expand its business and acquire new customers and markets. For this reason, network interconnections can be defined as one type of inter-firm relationship in the telecommunications industry.

In fact, it is easy to find various types of network interconnections among operators of long-distance, international, local, fixed-line, and mobile services. These interconnections are made so that each firm acquires the advantages of network externality.

Network interconnection with a local telephone has always been identified as a major regulatory issue. The basis of the argument is that a local telephone network was always understood to be an essential facility; networks remain dominant because

telecommunications operators in most countries started their businesses as primary companies owned or designated by the government (Vogelsang and Mitchell, 1997).

After the 1980s, when deregulation was brought into the telecommunications industry in industrialized countries, barriers to entering the market, forming joint sales and ventures, and investing in other telecommunications firms began to be abolished. World Partners (AT&T, Singapore Telecom, and KDD), Global One (France Telecom, Deutsche Telecom, and Sprint), Concert (British Telecom and MCI), and Unisource (Telia, KPN, Swisscom, and Telefonica) are examples of the outcome of deregulations in industrialized countries.

In addition, Mitchell and Mulherin (1996) suggested that the environment of an industry is strongly related to firms' acquisition or takeover strategies. Schoenberg and Reeves (1999) argued that deregulation is the single most important factor determining acquisition activity at the industry level. Although these researchers do not directly focus on the telecommunications industry, their works may provide suggestions relevant to it.

On the basis of the characteristics of the industry reviewed above, telecommunications firms naturally focus their business growth by network expansion. Research by Mitchell and Mulherin (1996) and Schoenberg and Reeves (1999) imply that the number of equity-based inter-firm relationships will increase as regulatory systems change. Therefore, it can be expected that telecommunications firms naturally aim to expand their networks by establishing inter-firm relationships with their counterparts. They will additionally seek to establish equity-based inter-firm relationships as regulatory systems change.

### **3-3 Trends of inter-firm relationships**

To discuss whether the trend illustrated above is pertinent, this research analyzed a selection of actual inter-firm relationships. Cases that occurred from 1980 through 2002 were chosen from the *Financial Times* database. Although the selected time frame seems not to cover very recent years, this research chose it to cover the period of deregulation movements in the targeted countries discussed in the above sections and in other major countries. To facilitate the observation of industry trends, the selected cases depict telecommunications firms with revenue scales that exceed 100 million U.S. dollars and with headquarters located in OECD countries. The conditions were set because the cases had to be selected in deregulated countries in order to verify the effects of deregulation and ensure the reliability of disclosed information.

Consequently, 121 inter-firm relationships were selected, with all relationships occurring after 1985. The trend in the number of inter-firm relationships and the proportion of equity-based inter-firm relationships within the observed term are shown in Table 1. Although sales alliances and joint ventures were conducted after the 1990s, 115 out of 121 cases were equity-based—either investments or M&A. It can be noted that M&A or equity-based inter-firm relationships were the main forms of inter-firm relationship in the telecommunications industry throughout the observed term. Furthermore, the number of equity-based inter-firm relationships has increased since the end of the 1990s, which explains that the number of these relationships may be correlated with the trend of deregulation.

Another important phenomenon can be identified—there has been no change in the trend that equity-based inter-firm relationships were most preferred throughout the observed period, within which time several types of dramatic regulatory changes occurred. This phenomenon runs counter to the original expectations based on a

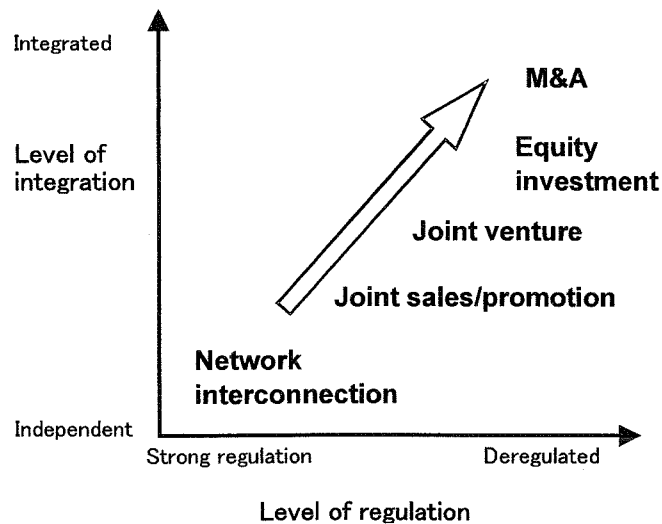
regulatory point of view.

In addition, the preference of telecommunications firms for inter-firm relationships seems to differ from conditions in other industries, such as the airline industry (Rhodes and Lush, 1997), in spite of the existence of a strong regulatory system there.

On the basis of the above discussions, the author proposes a model as described in Figure 2 that illustrates the trend of network and business integration in the telecommunications market. This figure shows that the network integration of telecommunications firms evolves from interconnection through joint ventures, equity-based relationships, and finally M&A, reflecting the state of the regulatory system.

**Table 1** Inter-firm relationships in the telecommunications industry

| Year                           | 1980-1984 | 1985-1990 | 1991-1994 | 1995-1999 | 2000-2002 | Total |
|--------------------------------|-----------|-----------|-----------|-----------|-----------|-------|
| Equity based relationships     | 0         | 18        | 19        | 40        | 38        | 115   |
| Non-equity based relationships |           |           | 1         | 1         | 4         | 6     |
| Total                          |           | 18        | 20        | 41        | 42        | 121   |



**Figure 2** Streamlining of inter-firm relationships.

### **3-4 Typology of inter-firm relationships in the telecommunications industry**

#### **3-4-1 Typology**

Inter-firm relationships can be categorized in a variety of ways. For example, Yoshino and Rangan (1995) proposed as Figure 1 concentrating mainly on equity, and U.S. Federal Trade Commission defines category focused on the direction of M&A—such as vertical, horizontal, product and market extension, and conglomerate (Barney, 2002). Such typologies could be applicable to the telecommunications industry, but managers and researchers would benefit even more if an additional industry-oriented methodology could be provided. Indeed, several bodies of research have proposed such analytical frameworks.

Graack (1996) described the differences between strategies in European countries, pointing out that national-level competition plays an important role in the international market structure. Joshi et al. (1998) proposed an analytical framework based on the U.S. telecommunications industry but did not extend it to other geographical areas, perhaps because of differences in categorization and coding of the industry. Styliadou (1997) showed an example of a typology for inter-firm relationships of firms based in European countries.

However, these typologies are mainly aimed at explaining the results of a firm's strategy and activities, and they seem unsuitable as methodologies for managers establishing strategies for inter-firm relationships. Thus, managers and scholars will receive maximum benefit if this paper can provide a different analytical framework or typology for inter-firm relationships in the telecommunications industry. This research then aims to propose a new analytical framework fit to the industry.

To develop a framework, this research focused on two frames of references – consistent to generally accepted frameworks or discussions on inter-firm relationships and reflecting characteristics of the telecommunications industry.

With regard to the first aspect, Porter (1985) and Barney (1986, 1991, 2002) provided aspects on discussions on inter-firm relationships. They pointed out the aims of forming alliances or acquisitions as to strengthen the ability of firms to compete. Also they defined elements and factors in establishing strategies to gain and sustain competitive advantages as cost, differentiation, technologies, and several other aspects. They also pointed out that the most relevant to market structure is “business diversification” among the factors they set forth.

These discussions on business diversification may be correlated to the discussion by Ansoff (1957) and can be tied to product-market strategies for business growth strategies known as the “Product-Market Growth Matrix”. The matrix identified four types of product-market strategy - the market penetration, market development, product development and diversification. The discussion defines market penetration as an effort to increase company sales without departing from an original product-market strategy, market development as a strategy in which the company attempts to adapt its present product line to new missions, product development on the other hand, retains the present mission and develops products that have new and different characteristics that will improve the performance of the mission, and diversification as simultaneous departure from the present product line and the present market structure. The author here attempts to define a framework taking into account of the basic idea of the matrix.

|                        | <b>Existing Product</b>                                                                       | <b>New Product</b>                                                                                                    |
|------------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| <b>Existing Market</b> | <b>Market Penetration</b><br>Sales without departing from an original product-market strategy | <b>Product development</b><br>Retain present mission and develop products that have new and different characteristics |
| <b>New Market</b>      | <b>Market Development</b><br>Present product line to new missions                             | <b>Diversification</b><br>Simultaneous departure from the present product line and the present market structure       |

**Figure 3** Product-Market Growth Matrix (Ansoff 1957).

With regard to the characteristics of the industry, attention should be paid to the fact that the market structure of the industry and products by carriers are strongly correlated to the regulatory systems (Vogelsasng and Mitchell 1997, Kahn 1997).

Three characteristics of the industry can be identified for discussing diversification strategies in the industry. First is that the telecommunications market is defined by the regulatory systems. As discussed in section 3-1, regulatory systems in countries usually separate telecommunications market to three segments – local, long-distance or international and mobile market. This characteristic has to be reminded in developing strategies for business diversifications in the telecommunications industry. The second point is the correlations between products lines and regulatory-defined market segments. Vogelsasng and Mitchell (1997) also pointed out that physical and logical networks of incumbent carriers are the essential resources in supply chain in the industry and the facts are set as the justification of the regulatory systems in the industry. In other words, it can be noticed that products and technical conditions provided to end-users by each carrier are mainly affected by the network and business condition of incumbent carriers. The third and important issue is the existence of dominant firms (incumbent carriers) in

each market. These incumbent carriers in general had been found or owned by governments and are still in dominant positions in their markets at present. In addition, the reasoning of recent regulatory systems is to ensure competitive conditions for firms with these carriers (Vogelsasng and Mitchell, 1997; Kahn, 1997). For these carriers therefore, there may be little possibilities for developing strategies of “market penetration” and only way to expand their business scale is to enter into different segment or expand areas of business provisioning from the present area. These discussions indicate that carriers are not fully capable of developing and provisioning products when these products are correlated to network structure or technologies (which means core products of telecommunications carriers), and consequently product portfolios of telecommunications carriers are strongly correlated to the regulatory-based category of the market. This point suggests that “product development” in the industry is directly correlated to a strategy of entering into other category of the market in the industry, and “market development” is also directly correlated to a strategy of product development for the same reason.

The discussions from the two aspects provide directions for establishing a new framework in order to understand the telecommunications industry - although diversification of businesses in the telecommunications can be understood relying on the Product-Market Growth Matrix proposed by Ansoff (1957), the direct application of the matrix may not suitable as an analytical framework for the telecommunications industry because of the existence of regulatory systems, market structure and product portfolios correlated to the regulatory systems. In particular, elements in the matrix “market development” and “product development” may not be separated clearly because of the existence of segmentation of the market defined by regulatory systems and “market penetration” may not applied for incumbent carriers.

Reflecting these discussions, the author proposes three categories of business development directions corresponding to the directions of strategic relationships. The first is that a firm may form relationships designed to expand its business size as simply as possible. In this direction, strategic relationships are formed between firms in the same category of the telecommunications market—e.g., mergers between two long-distance firms or two mobile firms—by expanding internationally in order to increase the firms' geographical area of business. This category is called as *geographical expansion*.

The second is that relationships can aim to expand a firm's business toward a different category of the market within the telecommunications industry (e.g., a strategic relationship between a long-distance firm and a local or mobile telecommunications firm). In this direction, the firms aim to acquire synergistic effects from the combination of their market knowledge and customer bases with firms that have different business experience. This type of direction is called as *segment expansion*.

The third is that relationships may focus on entry into an adjoining market (e.g., a telecommunications firm entering into a software or content delivery business). This type of relationship aims to acquire a different kind of synergetic effect from the previous two directions. This type of direction is called as *business diversification*. Although the author names this category as business diversification, it is noted that the definition of the direction is different than that by Ansoff. Telecommunications carriers, in the proposed categorization, are defined as entering into adjoining markets and developing new products. It does not include directly entering into new telecommunications market or developing telecommunications products. These three directions are independent of each other and every alliance can be categorized by using these three categories. Therefore, this research calls this typology the *three-directional*

*categorization* for the industry (Figure 3). This categorization will help managers and researchers develop or analyze the strategies of alliances in telecommunications industry.

|   | Category                        | Direction of business                                                                                    |
|---|---------------------------------|----------------------------------------------------------------------------------------------------------|
| 1 | <b>Geographical Expansion</b>   | Retain present segment of market and entering into different region or area.                             |
| 2 | <b>Segment Expansion</b>        | Retain present business region or area and entering into different segment of telecommunications market. |
| 3 | <b>Business Diversification</b> | Develop new markets or products adjoining to telecommunications carriers' businesses.                    |

Figure 4 Three-directional categorization.

### 3-4-2 Observed inter-firm relationships

The 121 inter-firm relationships discussed in the preceding section are categorized in Table 2 according to the earlier discussion. 43 were categorized as the first type, with the intent to expand their businesses geographically; 26 were recognized as following the second direction, intending to expand their businesses into a different category in the telecommunications industry; and 50 were categorized as moving in the third direction, in which firms intend to enter into adjoining businesses outside the telecommunications industry. Out of all these cases, only two could not be categorized due to a lack of

**Table 2** Inter-firm relationships by direction

| Direction                | Year 1980-1984 | 1985-1989 | 1990-1994 | 1995-1999 | 2000-2002 | Total |
|--------------------------|----------------|-----------|-----------|-----------|-----------|-------|
| Geographical Expansion   |                | 2         | 9         | 16        | 16        | 43    |
| Segment Expansion        |                | 1         | 4         | 12        | 9         | 26    |
| Business Diversification |                | 15        | 8         | 12        | 15        | 50    |
| (Not identified)         |                |           |           |           | 2         | 2     |
| Total                    | 0              | 18        | 20        | 41        | 42        | 121   |

accurate information about the firms. These results show that inter-firm relationships between telecommunications carriers can be categorized as explained. In addition, the results assist a firm to evaluate the practicality of forming future inter-firm relationships through analysis based on this proposed typology.

### **3-5 Evaluation of inter-firm relationships**

#### **3-5-1 Focuses and methodology**

Managers engaged in developing inter-firm relationship strategies must decide whether to form inter-firm relationships and which firms to target as potential partners. Such decisions must offer the opportunity to improve the firm's competitiveness scope, increase profitability, or gain positive acceptance by stakeholders. Therefore, an effective way to evaluate inter-firm relationships is a key tool for such managers. Such a tool would also be valuable for the academic study of inter-firm relationships.

This section describes target relationships and the methodology for analyzing inter-firm relationships and its application. First, this research focused on inter-firm relationships conducted by mega-carriers with annual revenues exceeding 100 million U.S. dollars, or those with businesses of equivalent size. This focus was based on access to information by businesses in inter-firm relationships and the international comparability of cases.

Various methodologies may be proposed for the purposes of evaluating relationships. However, managers in this field expect such methodologies to provide objective data based on disclosed information because they are accountable to shareholders. For this reason, this research adopts a methodology of valuation based on financial information. Such information may include sales/revenue variations, profitability, asset-utilization efficiency, variations in market valuations, or other related

information. Among these methodologies the author adopts evaluation based on stock market response information, which is one of the most frequently discussed and applied measure for evaluating inter-firm relationships such as research by Ely and Song (2000) and Hart and Apilado (2002). In addition, to employ stock market information may have merit to evaluate direct responses for targeted events as MacKinlay(1997) discussed. In contrast, other information such as revenue, profit are disclosed at most every quarter period and do not necessarily reflect direct effects of targeted alliances or M&A, but may reflect factors such as other announcement or other corporate activities. These comparisons also support adopting a methodology based on stock market responses.

This research evaluates inter-firm relationships by observing stock market responses of the buyer in M&A, investor in capital investment relationships and contractor or initiator of relationships in other type of inter-firm relationships. Inter-firm relationships are evaluated based on event study methodology - whether the share prices of involved firms rose or fell after the relationship is announced compared to the prices over a particular preceding term. The reason of applying event study is that the methodology is well developed and one of the most applied evaluation of corporate value for inter-firm relationships in other industries (Kale et al. 2002).

There may be an argument that telecommunications market structures and characteristics in countries may considerably differ with each other, and those differences should be examined when discussing issues regarding these market. In fact, Boylaud and Nicolettil (2000) analyzed and discussed market structures of OECD countries employing the country-specific factors. Therefore, it is appropriate to take into account the aspect when discussing issues correlated to telecommunications industry or market in these countries.

With regard to this research, main focus here is to evaluate firm's strategies on inter-firm relationships. (Main focus of this research is to evaluate firm's strategies on inter-firm relationships and to propose a methodology based on stock market responses to firms' strategies.) It is noted that stock of major telecommunications firms are usually listed in US or UK market and all the stock of targeted firms in this research are listed in US market as referred in later section. This fact may give rationale to adopt the methodology as one of the alternative for evaluating firms' strategies in the sense that evaluating stock market responses is to compare firms' strategies based on investors' viewpoints.

However, although regulatory changes in countries are introduced in similar directions such as privatization of incumbent carriers, relief of legal conditions of market entry and price regulations (Vogelsasng and Mitchell, 1997; Boylaud and Nicolettil, 2000), there are still differences in historical base. The regulatory systems started to change in U.S. and Canada early 1980s and followed by other major countries in late 1980s.

Based on these discussions, the author recognizes the value to evaluate the differences in the market responses of US/Canada-based carriers and the responses of non-US/Canada based firms in addition to the proposed typology. If there are differences in those responses, the results may reveal differences of large telecommunications markets. This was also justified by the fact that two-thirds of the carriers involved in the selected cases were headquartered in the United States, with most of the remainder headquartered in EU countries.

### **3-5-2 Hypotheses**

To evaluate inter-firm relationships, this research set three hypotheses.

The first was correlated to general responses to inter-firm relationships not limited to the telecommunications industry. Researches in other industries, such as financial and pharmaceutical industries, have shown that alliances and M&A activities create value. In other words, market responses to public announcements of alliances or M&A are generally positive and the market value has increased (Andrade et al., 2001; Elayan, 2006; Hill, 1997; Kelm et al., 1995; Mitchell et al., 1996). Inter-firm relationships are generally aimed at strengthening firms' competitiveness and business performance, and consequently increasing returns to shareholders. Within this context, the first hypothesis can be established where the market response to announcements of inter-firm relationships in the telecommunications industry will usually be positive as well as in other industries.

*Hypothesis H3-1: Inter-firm relationships are positively valued by the stock market*  
*– stock prices will rise after the announcement of such*  
*relationships.*

The second hypothesis established was correlated to the typology of inter-firm relationships in the industry. As discussed in the preceding section, the authors introduced a three-dimensional model of expansion and defined the directions of expansion based on the geography, segment of the industry, and business. This model demonstrates that managers choose to form inter-firm relationships within the category of the proposed typology when establishing strategies for them. It is therefore important to evaluate whether there are any differences in the stock market responses in any of the directions in the proposed typology.

The telecommunications industry is generally considered a natural monopoly, and regulatory systems governing it are mainly designed to overcome problems arising from

this characteristic (Kahn, 1997; Vogelsang and Mitchell, 1997).

Within the directions of geographical expansion, segment expansion, and business diversification, the characteristics of the first direction mean that telecommunications carriers aim at simply enhancing their business scale by entering into new areas in the same businesses. However, segment expansion and business diversification can be likened to entering different businesses. Wilcox et al. (2001) found useful results from telecommunications firms entering different business areas. Although their target of discussion was different, they found that market responses to telecommunications firms entering extremely different businesses were less valued than them entering business categories that were more closely related.

These findings imply that geographical expansion seems the most effective way of enhancing business opportunities by exploiting the nature of the industry. Our second hypothesis therefore was that the market response to announcements of inter-firm relationships enabling geographical expansion will be positive.

*Hypothesis H3-2: Geographical expansion is positively valued by the stock market – stock price will rise the most after announcement of an inter-firm relationship enabling geographical expansion.*

The third hypothesis that was established was correlated to the additional focus explained in the section above. It is therefore important to find whether stock-market responses in the U.S.A and Canada differ from those in other countries.

Deregulation in the telecommunications industry started in the U.S., Canada and then spread to other countries, and many telecommunications firms involved in past inter-firm relationships have been based in the U.S. and Canada. It is therefore natural

to assume that conditions in the telecommunications industries in these countries make it more probable for the firms involved to enter into inter-firm relationships to strengthen their competitiveness and business performance compared to other countries. Although there have been no comparative evaluations in other countries, the authors based their hypothesis on the fact that market responses to announcements of inter-firm relationships by U.S./Canada firms are more positively valued than those by firms based elsewhere.

*Hypothesis H3-3: The inter-firm relationships of US/Canada firms will be more positively valued by the stock market than those of firms in other countries – The share price of US/Canada firms will rise more than that of other firms after the announcement of an inter-firm relationship.*

The following sections describe our evaluation methodology and explain how this research tested these hypotheses.

### **3-5-3 Evaluation and discussions**

To evaluate inter-firm relationships in the telecommunications industry, the focus was on the inter-firm relationships (equity-based alliances and M&A combinations) of mega-carriers with annual revenues exceeding one billion U.S. dollars, or those with equivalent-size businesses, from 1985 to 2002. The data were collected from the *Financial Times* database. Although the selected time frame may not seem very recent, it did cover the periods of deregulation in the targeted countries discussed earlier and in other significant countries as in our previous research. The daily stock-price data for all carriers, combined with data on alliance announcements, were gathered from the

stock-market data. Constraints in collecting the data included problems with unlisted companies and inadequate information on price adjustments. In total, data were collected for 40 companies, all of which were listed on the U.S. stock exchange, and the S&P 500 was selected as the market index to calculate the market model. This research focused on market reactions as those that were reflected in the stock prices of firms being bid for or being acquired, as they assumed that the market response would be more directly related to the prospects of these firms. Evaluations were done according to where individual firms' headquarters were located, in addition to the proposed typology, taking into consideration the characteristics of the gathered data.

This study used the market model and an event-study methodology with daily stock-price data. The event-study methodology was originally developed for studying financial businesses (MacKinlay, 1997; Campbell et al., 1997), and is often used to evaluate market responses. Rad and Van Beek (1999) and Bessler and Murtagh (2002) are example researchers who applied this methodology. However, very few studies in the telecommunications industry have been done using such quantitative evaluations; the research by Wilcox et al. (2001) being one of the few cases where event-study methodology has been applied to this industry.

Stock-price data as well as the dates all alliance and M&A events were announced were collected from the Financial Times database for this research. This database was chosen because the authors aimed to focus on evaluating market responses based on firms' announcements disclosed to the public. Also, this data source was both directly connected with such information and is recognized as being one of the most reliable sources on this topic. Other major journals and academic databases could be considered as potential data sources, but the database offered the best single access to financial viewpoints regarding events in which the authors were interested.

Daily stock-price data were used to calculate daily returns. Price data from periods ranging from 120 to 6 trading days prior to each announcement date were used to estimate the market model representing the average normal return for each stock. All stock-price data were adjusted to reflect dividends and stock splits. Various periods have been used to estimate the market model in previous studies, e.g., Davidson and Worrell (1992) used a period of 9 months, while Koh and Venkataraman (1991) used one of two days. However, most studies have used several months of data (e.g., Kelm et al., 1995; Wilcox et al., 2001), and the authors used a similar term in this research.

The test period (event window) for evaluating the market response to each announcement was set comparing -1 and 0 through +5 days from the day of announcement, and additionally set comparing -5 and 0 through +5 days. These periods was used to calculate the abnormal return (AR) and the cumulative aggregated abnormal return (CAAR).

AR is defined as the difference between the actual return and the estimated normal return calculated by the market model,

$$AR_j = R_{jt} - (\alpha_j + \beta_j R_{mt})$$

where  $R_j$  is the return for stock  $j$  on day  $t$ , and  $R_{mt}$  is the return for the market on day  $t$ .  $\alpha_j$  and  $\beta_j$  are parameters defined for each stock  $j$  that are calculated from daily stock price data.

The CAR for each stock is calculated based on daily abnormal returns:

$$CAR_j(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_{jt}$$

Aggregate CAR across firms was obtained as

$$CAAR(t_1, t_2) = \frac{1}{n} \sum_{j=1}^n CAR_j(t_1, t_2)$$

where  $n$  is the number of firms in the aggregated group of stock  $j$ .

This research used both the  $t$ -statistic test and. Although  $t$ -statistics are commonly in event studies in general, this study added Wilcoxon's signed-rank test because of the limitation of numbers of gathered cases and consequently variance of AR, CAR, AAR and CAAR may not be assumed as equally distributed.

### **3-5-4 Market response and discussion**

(1) The market reaction to firms categorized with our three-dimensional model of expansion is listed in Table 3 and CAAR changes within the test period are plotted in Figure 5. Although the CAAR values during the test period were slightly positive for the geographical-expansion cases and negative for the segment-expansion cases, these values were not recognized as statistically significant. In contrast, the CAAR values for business diversification were negative and recognized as statistically significant. This indicates a negative response to alliances directed toward business expansion.

Table 4 and Figure 6 compare the CAAR values between U.S./Canada-based firms and non-U.S./Canada-based (European) firms. The CAAR values for U.S./Canada-based firms were negative and recognized as statistically significant, while the values for non-U.S./Canada-based carriers were not recognized as statistically significant.

Table 5 and Figure7 show the CAAR values of U.S./Canada-based carriers categorized with the three-dimensional expansion model. There are distinct differences between the three categories in their CAAR values; the CAAR values for the segment-expansion cases were the most negative and may be recognized as statistically

significant. The CAAR values for the business-diversification cases were also negative, but statistically significant in several cases. The CAAR values were not statistically significant for geographical expansion.

Table 6 and Figure 8 show the CAAR values for non-U.S./Canada-based carriers. The CAAR values for geographical expansion and segment expansion were not statistically significant, while the CAAR values for business diversification were negative and may be recognized as significant in some cases.

A comparison of Tables 4, 5 and 6 indicates that the market responses to U.S./Canada-based carriers differed from those to non-U.S./Canada-based carriers. Segment expansion by U.S./Canada-based carriers and business diversification by non-U.S./Canada-based carriers were negatively valued by the market.

### **3-5-5 Evaluation of the hypotheses**

The event-study analysis based on daily stock-price data led us to the following findings regarding our three hypotheses.

First, the results in Table 3 and Figure 5 do not support hypothesis *H3-1*. These demonstrate the uniqueness of market responses to inter-firm relationships in the telecommunications industry which is different to that in other industries such as in financial and banking businesses as previously discussed. The reason for the difference has not yet been identified. However, the results indicate that investors do not necessarily appreciate inter-firm relationships conducted by firms in the telecommunications industry at least from the viewpoints of short-term investment or arbitrage. It can therefore be stated that investors seem to recognize some uniqueness in the characteristics of the telecommunications industry.

At this point, the author focuses on the business environment and correlated

peripheral amenities. Therefore, consequently their businesses are composed of larger numbers of operations. As the author have already discussed and will be discussed further in Chapter 4, these business processes are not well standardized within the industry in contrast to other comparative industries (Shiraishi and Iijima, 2008b). In such an environment, the numbers of procedures should be identified and conducted to accomplish planned inter-firm relationships. These transitions may also require much longer periods compared to that in other industries. The author assumes that the investors and stakeholder of telecommunications carrier firms are aware of these business environments and characteristics, and they therefore do not appreciate announcements of inter-firm relationships in the industry at least within short term. Middle or long-range market responses by the market should be analyzed for verification of the assumption.

Table 3 and Figure 5 have the results for hypothesis *H3-2*. Although they indicate that geographical expansion seems to be more favorably evaluated than other types of relationships, the differences between the responses for each type are not statistically meaningful, and only responses to business diversification can be identified as meaningfully negative. In addition, we need to note that business diversification is negatively valued and is statistically supported. This does not represent a clear difference in market responses between the three types of relationships, but the results indirectly indicate the possibility of a difference. Table 3, Figure 5, Table 4 and Figure 6 show the results for the hypothesis from a different aspect, i.e., analysis separated into U.S./Canada-based and non-U.S./Canada-based carriers. There are distinct differences between the CAAR values for U.S./Canada-based carriers and non-U.S./Canada-based carriers. The segment-expansion alliances of U.S./Canada-based carriers are negatively valued, while the business-diversification alliances of non-U.S./Canada-based carriers

are negatively valued. Responses to geographical expansion are generally not significant.

These results imply that there may be a possibility of supporting hypothesis *H-2*, but this is not certain. It is understood that these results are also correlated to the discussion on *H3-1* in that short-term market responses are generally not favorable to inter-firm relationships in the industry.

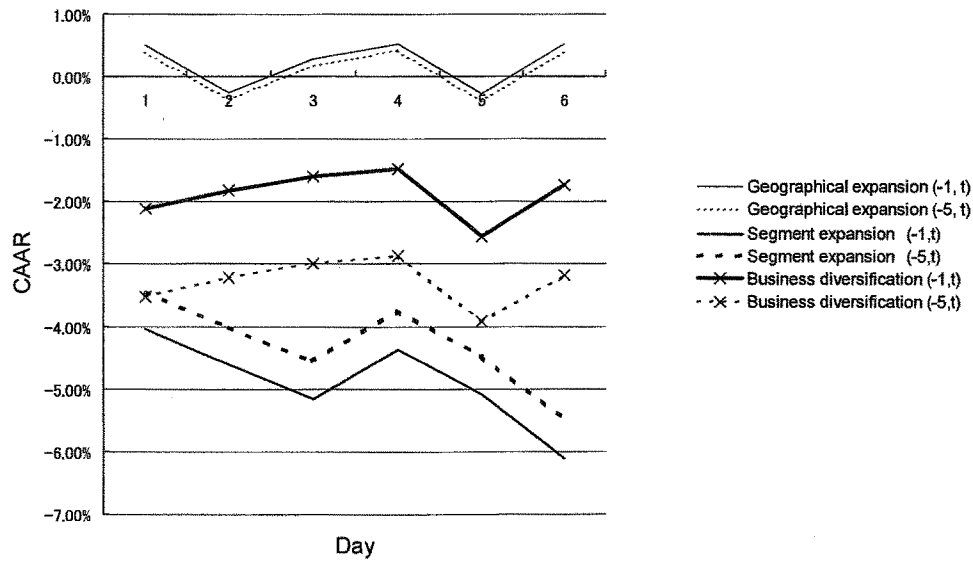
The differences in market responses between U.S./Canada-based and non-U.S./Canada-based firms may reflect differences between their respective market environments. Statistically significant negative responses were obtained regarding inter-firm relationships by U.S./Canada-based firms, which refute hypothesis *H3-3*. This is the opposite to what the author expected and the author recognize that there is a need for discussion on the relationships between business and regulatory environments, investors' expectations and the intentions of corporate managers.

Further discussions on strategies for inter-firm relationships in the telecommunications are provided in Chapter 5 based on these results and implications.

**Table 3** Returns by business expansion/diversification patterns

|                  | Geographical expansion |         |             | Segment expansion |          |             | Business diversification |          |             |
|------------------|------------------------|---------|-------------|-------------------|----------|-------------|--------------------------|----------|-------------|
|                  | Return                 | t-value | Rank test Z | Return            | t-value  | Rank test Z | Return                   | t-value  | Rank test Z |
| CAAR (-1, 0)     | 0.50%                  | 0.47    | 1.00        | -4.05%            | -1.58    | 1.16        | -2.12%                   | -2.59 ** | 4.12 ***    |
| CAAR (-1, 1)     | -0.25%                 | -0.19   | 1.00        | -4.61%            | -1.74    | 1.16        | -1.83%                   | -1.72    | 2.06 **     |
| CAAR (-1, 2)     | 0.28%                  | 0.19    | 1.66        | -5.16%            | -1.83    | 0.39        | -1.59%                   | -1.70    | 2.75 ***    |
| CAAR (-1, 3)     | 0.52%                  | 0.37    | 1.66        | -4.36%            | -1.81    | 1.93        | -1.48%                   | -1.55    | 1.37        |
| CAAR (-1, 4)     | -0.27%                 | -0.21   | 1.00        | -5.08%            | -1.91    | 1.93        | -2.56%                   | -1.92    | 3.44 ***    |
| CAAR (-1, 5)     | 0.52%                  | 0.37    | 0.33        | -6.10%            | -2.11 ** | 2.70 ***    | -1.73%                   | -1.06    | 1.16        |
| CAAR(-5, 0)      | 0.39%                  | 0.29    | -0.20       | -3.44%            | -1.23    | -0.58       | -3.52%                   | -2.01    | -1.88 **    |
| CAAR(-5, 1)      | -0.37%                 | -0.26   | -0.09       | -4.01%            | -1.42    | -0.49       | -3.22%                   | -1.63    | -1.63 ***   |
| CAAR(-5, 2)      | 0.17%                  | 0.12    | -0.43       | -4.55%            | -1.50    | -0.93       | -2.98%                   | -1.67    | -1.63 ***   |
| CAAR(-5, 3)      | 0.41%                  | 0.28    | -0.54       | -3.76%            | -1.42    | -0.84       | -2.88%                   | -1.49    | -1.57 ***   |
| CAAR(-5, 4)      | -0.39%                 | -0.30   | -0.31       | -4.48%            | -1.63    | -1.02       | -3.92%                   | -1.91    | -1.69 **    |
| CAAR(-5, 5)      | 0.41%                  | 0.31    | -0.65       | -5.49%            | -1.84    | -1.38       | -3.19%                   | -1.57    | -1.57 **    |
| # of observation | 15                     |         |             | 11                |          |             | 14                       |          |             |

\*\* statistics at the 5% significant level, \*\*\* 1% level

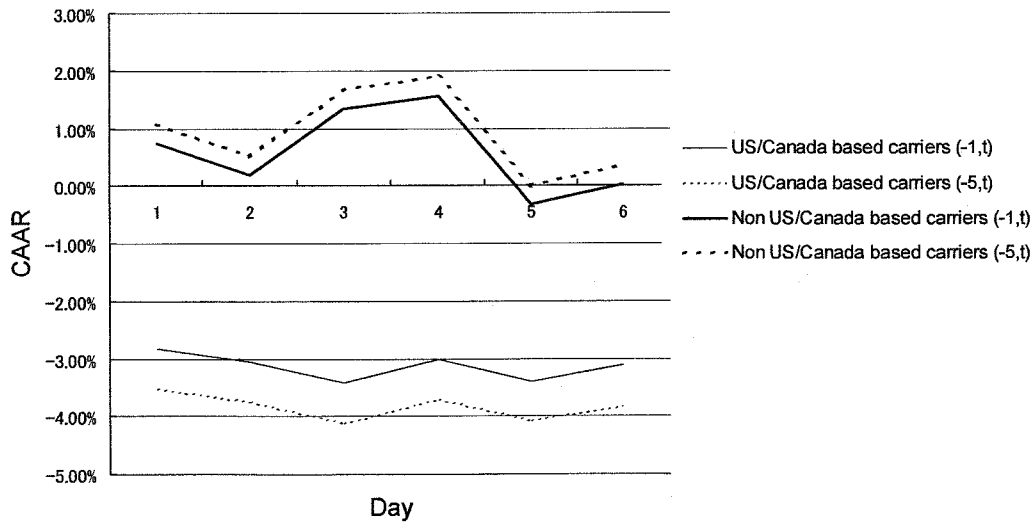


**Figure 5** CAAR by business expansion/diversification patterns.

**Table 4** Returns by US/Canada vs. non-US/Canada carriers

|                  | US/Canada based carriers |          |             | Non US/Canada based carriers |         |             |
|------------------|--------------------------|----------|-------------|------------------------------|---------|-------------|
|                  | Return                   | t-value  | Rank test Z | Return                       | t-value | Rank test Z |
| CAAR (-1, 0)     | -2.83%                   | -2.45 ** | 2.25        | 0.75%                        | 0.70    | 1.07        |
| CAAR (-1, 1)     | -3.06%                   | -2.35 ** | 2.25 **     | 0.18%                        | 0.17    | 1.07        |
| CAAR (-1, 2)     | -3.42%                   | -2.58 ** | 2.25        | 1.34%                        | 1.02    | 1.78        |
| CAAR (-1, 3)     | -3.00%                   | -2.50 ** | 2.75 **     | 1.56%                        | 1.40    | 2.49 **     |
| CAAR (-1, 4)     | -3.40%                   | -2.55 ** | 3.74 ***    | -0.33%                       | -0.24   | 1.07        |
| CAAR (-1, 5)     | -3.11%                   | -1.96    | 3.25 ***    | 0.02%                        | 0.19    | 0.36        |
| CAAR(-5, 0)      | -3.53%                   | -2.54 ** | -2.17 **    | 1.08%                        | 0.67    | -0.49       |
| CAAR(-5, 1)      | -3.75%                   | -2.49 ** | -2.03 **    | 0.51%                        | 0.35    | -0.56       |
| CAAR(-5, 2)      | -4.11%                   | -2.69 ** | -2.25 **    | 1.67%                        | 1.29    | -1.19       |
| CAAR(-5, 3)      | -3.70%                   | -2.62 ** | -2.13 **    | 1.89%                        | 1.25    | -1.05       |
| CAAR(-5, 4)      | -4.08%                   | -2.71 ** | -2.20 **    | 0.00%                        | 0.00    | -0.63       |
| CAAR(-5, 5)      | -3.84%                   | -2.28 ** | -2.01 **    | 0.35%                        | 0.32    | -0.21       |
| # of observation | 27                       |          |             | 13                           |         |             |

\*\* statistics at the 5% significant level, \*\*\* 1% level



**Figure 6** CAAR by US/Canada vs. non-US/Canada carriers.

**Table 5** Returns by expansion/diversification patterns (US/Canada based carriers)

|              | Geographical expansion |         |             | Segment expansion |          |             | Business diversification |         |             |
|--------------|------------------------|---------|-------------|-------------------|----------|-------------|--------------------------|---------|-------------|
|              | Return                 | t-value | Rank test Z | Return            | t-value  | Rank test Z | Return                   | t-value | Rank test Z |
| CAAR (-1, 0) | -0.63%                 | -0.34   | 1.43        | -5.64%            | -2.12    | 1.79        | -1.93%                   | -1.48   | 2.69 ***    |
| CAAR (-1, 1) | -1.02%                 | -0.45   | 0.48        | -6.18%            | -2.29    | 2.69        | -1.79%                   | -0.89   | 1.79        |
| CAAR (-1, 2) | -1.02%                 | -0.43   | 0.48        | -7.30%            | -2.57 ** | 1.79        | -1.77%                   | -1.08   | 1.79        |
| CAAR (-1, 3) | -0.72%                 | -0.29   | 0.48        | -6.36%            | -2.50 ** | 2.69 ***    | -1.71%                   | -1.10   | 1.79        |
| CAAR (-1, 4) | -1.32%                 | -0.67   | 0.48        | -6.89%            | -2.29    | 2.69 ***    | -1.86%                   | -0.59   | 1.79        |
| CAAR (-1, 5) | -0.30%                 | -0.12   | 0.48        | -7.73%            | -2.30    | 2.69 ***    | -1.11%                   | -0.35   | 1.79        |
| CAAR(-5, 0)  | -0.48%                 | -0.20   | -0.25       | -4.82%            | -1.52    | 0.42        | -4.41%                   | -2.65   | -2.09 **    |
| CAAR(-5, 1)  | -0.87%                 | -0.32   | -0.59       | -5.36%            | -1.63    | 0.42        | -4.28%                   | -2.19   | -1.91       |
| CAAR(-5, 2)  | -0.87%                 | -0.31   | -0.08       | -6.48%            | -1.90    | 1.27        | -4.25%                   | -2.37   | -2.00 **    |
| CAAR(-5, 3)  | -0.57%                 | -0.21   | -0.08       | -5.54%            | -1.89    | 1.27        | -4.20%                   | -2.32   | -1.91       |
| CAAR(-5, 4)  | -1.17%                 | -0.50   | -0.25       | -6.07%            | -1.94    | -1.54 **    | -4.34%                   | -1.90   | -1.56       |
| CAAR(-5, 5)  | -0.15%                 | -0.06   | -0.25       | -6.91%            | -1.98    | 1.27        | -3.60%                   | -1.53   | -1.56       |

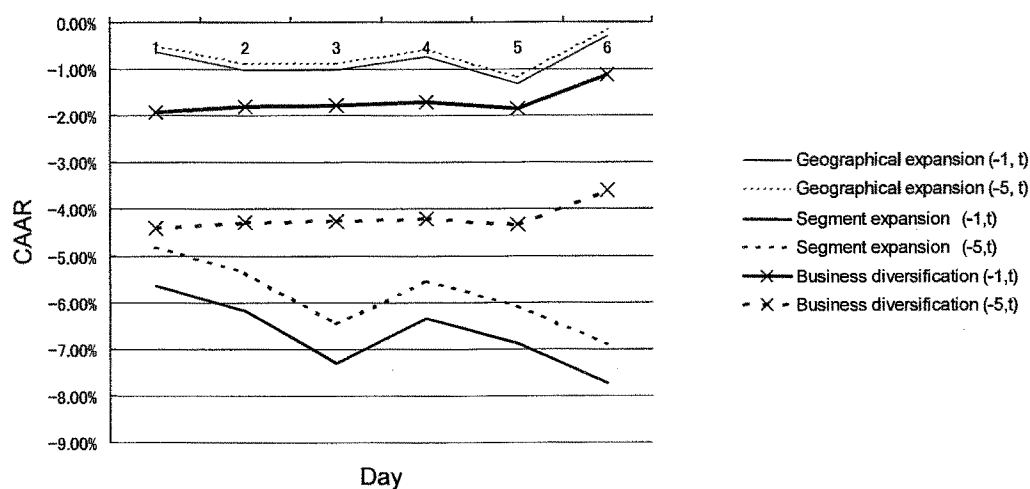
# of observation

7

9

11

\*\* statistics at the 5% significant level, \*\*\* 1% level



**Figure 7** CAAR by expansion/diversification patterns (US/Canada based carriers).

**Table 6** Returns by expansion/diversification patterns (non US/Canada based carriers)

|              | Geographical expansion |         |             | Segment expansion |         |             | Business diversification |           |             |
|--------------|------------------------|---------|-------------|-------------------|---------|-------------|--------------------------|-----------|-------------|
|              | Return                 | t-value | Rank test Z | Return            | t-value | Rank test Z | Return                   | t-value   | Rank test Z |
| CAAR (-1, 0) | 1.49%                  | 1.28    | 0.00        | 3.10%             | 0.79    | 0.70        | -2.80%                   | -2.87 **  | 3.08 ***    |
| CAAR (-1, 1) | 0.42%                  | 0.26    | 0.90        | 2.46%             | 3.38    | 2.09        | -1.95%                   | -1.65     | 1.03        |
| CAAR (-1, 2) | 1.42%                  | 0.72    | 1.79        | 4.45%             | 2.02    | 2.09        | -0.93%                   | -1.42     | 2.05 **     |
| CAAR (-1, 3) | 1.61%                  | 1.00    | 1.79        | 4.61%             | 1.02    | 0.70        | -0.61%                   | -1.07     | 0.00        |
| CAAR (-1, 4) | 0.64%                  | 0.36    | 1.79        | 3.05%             | 0.65    | 0.70        | -5.16%                   | -3.39 *** | 3.08 ***    |
| CAAR (-1, 5) | 1.23%                  | 0.74    | 0.90        | 1.24%             | 0.02    | 0.70        | -4.00%                   | -2.46     | 2.05 **     |
| CAAR(-5, 0)  | 1.15%                  | 0.74    | -0.49       | 2.74%             | 0.57    | —           | -0.23%                   | -0.04     | 0.70        |
| CAAR(-5, 1)  | 0.08%                  | 0.06    | -0.21       | 2.10%             | 1.50    | 1.63        | 0.62%                    | 0.10      | 0.70        |
| CAAR(-5, 2)  | 1.08%                  | 0.83    | -0.91       | 4.10%             | 2.60    | 1.63        | 1.64%                    | 0.33      | 0.70        |
| CAAR(-5, 3)  | 1.27%                  | 0.92    | -0.91       | 4.26%             | 4.74    | 1.63        | 1.96%                    | 0.32      | 0.70        |
| CAAR(-5, 4)  | 0.30%                  | 0.21    | -1.05       | 2.70%             | 2.92    | 1.63        | -2.59%                   | -0.45     | 0.70        |
| CAAR(-5, 5)  | 0.89%                  | 0.78    | -0.49       | 0.88%             | 0.51    | —           | -1.43%                   | -0.35     | 0.70        |

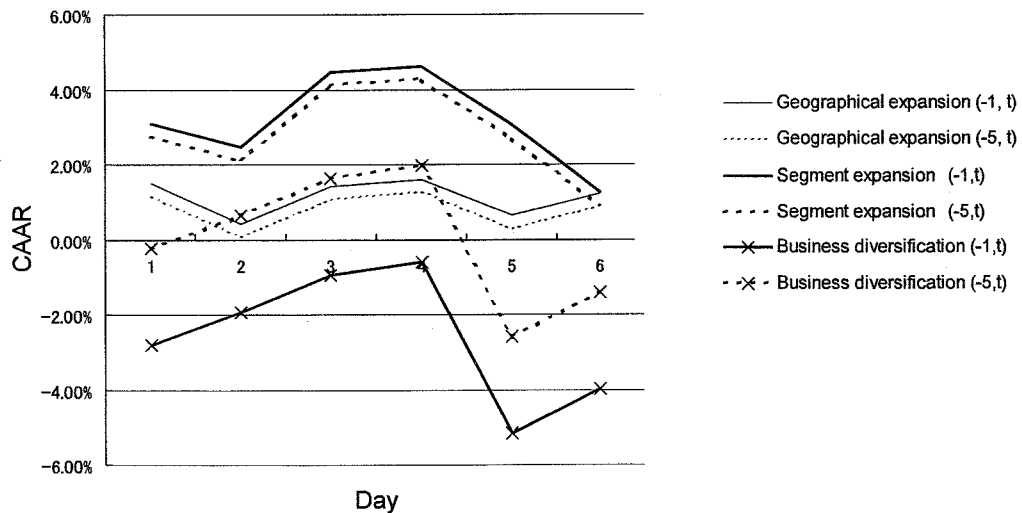
# of observation

8

2

3

\*\* statistics at the 5% significant level, \*\*\* 1% level



**Figure 8** CAAR by expansion/diversification patterns (non- US/Canada based carriers).

## **CHAPTER 4**

### **Business Process Based View of Inter-firm Relationships**

This chapter discusses a new analytical framework of inter-firm relationships that may be suitable to understand relationships in the telecommunications industry, which could be applied to further general researches on inter-firm relationships.

A new analytical framework based on business processes will be proposed and the relationships between the preferred formation of inter-firm relationships and the identified characteristics of the structure of business processes in each industry are discussed in this chapter.

#### **4-1 Overview**

Chapter 2 reviewed that RBV and the “transaction cost theories” are widely used to discuss and analyze mainly strategic alliances and these theoretical frameworks work well for non-equity based inter-firm. On the other hand, there are few discussions on inter-firm relationships in the telecommunications industry based on these theories where many equity-based inter-firm relationships, such as M&A and investments are found. The phenomena imply that these theories are not suitable in discussing the inter-firm relationships at least when focusing on the telecommunications industry. In addition, although the author proposed an analytical framework for inter-firm relationships in the telecommunications industry in Chapter 3, the framework showed category of business diversifications or partner selections but did not deal with formation of inter-firm relationships. Therefore, the author recognizes the expectation for finding an alternative framework in order to discuss formation of inter-firm

relationships covering both strategic alliances and equity based inter-firm relationships, and selection of formation in inter-firm relationship.

In regard to the viewpoint for discussing inter-firm relationships, RBV and transaction cost theories are mainly focused on developing business strategies or corporate structures. The framework proposed by the author in Chapter 3 was also based on the similar viewpoint.

In contrast, Dos and Hamel (1998) and Barney (2002) provided alternative aspects. They pointed out that planning and controlling the execution and operations are the key factors for success comparative to the importance of developing strategies of alliances and M&A. Dos and Hamel (1998) also provided another discussions that they set operational scope as one of the key among four important features for alliance design. And the arguments are strongly tied to the discussions on operational processes of corporate businesses by Gulati and Singh (1998) based on similar viewpoints. These discussions suggest that there is a possibility of discussing inter-firm relationships based on the operational perspectives and correlated frameworks.

Along with the discussion by Dos, Hamel and Barney, the author recognizes the value of discussing inter-firm relationships based on pursuing and execution standpoints for further discussions.

One of the typical perspectives of execution and pursuing inter-firm relationships is the discussions on information systems by McKiernan and Merali (1995). They pointed out that although partner selection of M&A are usually based on assessments on strategic aspect, managers of parties involved M&A recognize that integration of information systems of the parties is one of the most important success factors in managing M&A processes.

Ciacomazzi et al. (1997) and Robbins and Stylianou (1999) also discussed that integration of business processes, information systems, and diverse information technologies of parties are the key factors for success for alliances and M&A. In addition, Rao (2001) clearly pointed that inter-firm technology alliances parallels the ICT revolution, and Bruque-Camara and Moyano-Fuentes, (2006) also insisted that ICT issues are the inevitable to be examined in establishing alliance strategies.

These discussions imply that it meaningful to discuss inter-firm relationships based on a perspective utilized in discussions on information systems or correlated technologies..

### **4-2 Business process perspectives**

With regard to perspectives correlated to information systems or information and communications technologies, there are many researches discussed by scholars. Although not decisively discussed for inter-firm relationships, correlations between inter-firm relationships and information systems have been suggested since the 1960s, such as discussion by Kauffman (1966). His discussion raised the concept of information systems crossing corporate boundaries and suggested that the concept can be correlated to inter-firm relationships. There are similar discussions developed by scholars. For example discussions by Suomi (1988, 1992) proposing the concept of 'Inter Organization Information Systems' and Gulati et al. (2000) discussed the correlations the concept and alliances. These researches and discussions were developed and lead up to researches by scholars such as McKiernan and Merali (1995).

These discussions focused only on managing integration of information systems and technologies issues in execution of alliances and M&A, or to set these issues as

criteria in evaluating potential partners. In other words, much of researches and discussions on information systems and technologies are focused on information systems and correlated technologies themselves, and few discussions pointed out correlations between them and business processes. The author then proposes to discuss to analyze alliances and M&A (inter-firm relationships) based on a viewpoint correlated business processes.

#### 4-3 DSM, modularity and inter-firm relationships

To discuss and analyze business processes, “Design Structure Matrix” (DSM) originally proposed by Warfield (1973) can be reminded as one of the most potent methodologies. Its theoretical background was given by Kudryavtsev (1976), developed by Eppinger et al. (1994), Yassine and Falkenburg,(1999) and refined by Eppinger (2001) and Browning(2001).

|           |  |           |   |   |   |   |   |   |   |   |  |
|-----------|--|-----------|---|---|---|---|---|---|---|---|--|
|           |  | Providing |   |   |   |   |   |   |   |   |  |
|           |  | A         | B | C | D | E | F | G | H | I |  |
| Element A |  | —         |   |   |   |   |   |   |   |   |  |
| Element B |  | x         | — | x | x |   |   |   | x |   |  |
| Element C |  | x         | x | — |   | x |   |   | x |   |  |
| Element D |  | x         | x |   | — | x |   | x |   | x |  |
| Element E |  | x         |   | x | x | — |   | x |   |   |  |
| Element F |  |           | x | x |   |   | — |   |   |   |  |
| Element G |  |           |   |   | x | x |   | — |   |   |  |
| Element H |  |           | x | x | x | x |   |   | — |   |  |
| Element I |  | x         |   | x |   | x |   |   |   | — |  |

**Figure 9** Design Structure Matrix.

Figure 9 shows an example of DSM. DSM is a tool to display relationships between components of a system. In this research the elements represent “tasks” defined in certain business processes. Each row and column and label represents an element of

system and mark “x” represents relationships between each elements. In this example element (task) B provides output to elements C, D, F and H, and it receives or depends on output from elements A, C, D, and H. If the elements are arranged according to timing of execution in this figure, “x” marked under diagonal line represent forward mark that output of a element sends to lower positioned element and “x” marked upper diagonal line represent “feedback” mark that output of a element sends to higher positioned element.

DSM is utilized for developing further framework of understanding businesses correlated to business processes. Researches and discussions by Baldwin and Clark (2000), Schilling (2000) and Schilling and Steensma (2001) are useful examples, and they established the conception of modularity. They discussed correlation between firms’ business structure and characteristics of tasks utilizing the DSM methodology. Origin of these discussions ascends to the research by Orton and Weick (1990) proposing the conception of “loosely coupled systems”. The author set focuses on the conception and aim to discuss relationships between formation of inter-firm relationships and business process structure utilizing the basic methodologies of the conception. Discussions on modularity define relationships between components. Each component is loosely coupled with other component in a system and is able to connect or substituted by others with a standardized interface. Baldwin and Clark (2000) defined module as units in a large system and defined module based on DSM methodology. In their discussions they call the similar matrix as TSM (Task Structure Matrix). They originally analyzed products design in manufacturing firms and defined operators of modules as splitting, substituting, augmenting, excluding, inverting and porting and the whole structure of products or corporate systems can be described by utilizing these

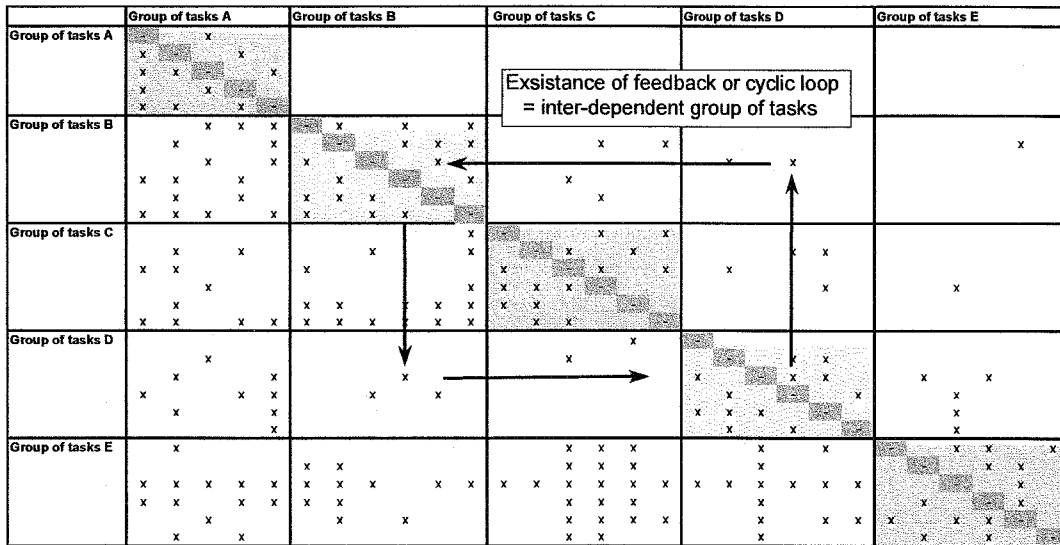
operators. This idea is extended to the conception of SMS (Standard Modular System) and they pointed out that SMS is modularization of a design and the corresponding task structure and that the modular created by SMS is process modules. This conception was expanded to discuss on “Modular Clusters”, by which they meant a group of firms and makers that play host of a set of modular designs of products. Discussions on module clusters represent that manufacturing functions of a module of products or correlated tasks can be split from lines of tasks, and functions can be substitute by other firms.

The importance of their argument is that the modularity value is *splitting* and *substitution*. Miozzo and Grimshaw (2005) presented an example for discussion that reflected such a viewpoint, and they presented a business process and a business model and some inter-firm relationships, such as outsourcing that referred to the modularity concept. In addition, Egony et al. (1997) provided a useful viewpoint. They focus on the relationships between the business processes and the module of the processes and their work seems to be based on a similar standpoint of modularity and the author also focused on this concept.

#### **4-4 Process structure and hypothesis**

An example of Task Structure Matrix (TSM) based on methodology and discussions by Warfield (1973), Baldwin and Clark (2000) is shown as Figure 10. The figure describes relationships between the groups A to E, each with different tasks such as design, production of product parts, testing, and integration within a manufacturing business. The figure also describes feedback relationships between tasks in Group B and tasks in Group D as explained in the preceding section. Also, there maybe some cyclic loop within tasks in these groups. In this case, tasks in Group B and Group D cannot be

executed separately, and the relationships between those groups are not identified as loosely coupled defined by Baldwin and Clark. Also, parts of a product represented by tasks of Group B and D cannot be produced or developed separately, and consequently the product is not modularized. Therefore, relationship between these parts are not split or substituted.



**Figure 10** Task Structure Matrix of non-modularized design.

On the other hand, based on the discussions of modularity, if modules of a product are designed so that corresponding groups of tasks will not be feedback or cyclic loop, the product is defined as modularized. Figure 11 shows an example of TSM with aligned group of tasks. Parts corresponding to process A, B, C and D are modularized to module A, B, C and D, and there are splitting and substitution relationships between each part of the product. Also in this case, processes corresponding to module A, B, C and D can be executed independently which will enable manufacturing firm to split out and distribute these processes to other firms.

One of the most important characteristics of the discussions on modularity is that

they did not focus on tasks or group of tasks as a main target of discussions. Their main focus is on relationships between parts of products corresponding to these tasks. In particular, it is noted that they set and defined phases of establishing design rules and phases of testing and integration. In other words, discussions on modularity set it important to establish processes so that relationships between processes are described as Figure. 11.

|                      | Formulate Design Rules | Tasks in modules (Work on Hidden Modules) |   |   |   |   |   |   |   |   |   | Test and Integration |
|----------------------|------------------------|-------------------------------------------|---|---|---|---|---|---|---|---|---|----------------------|
| Design Rules         | X                      | X                                         | X |   |   |   |   |   |   |   |   |                      |
| Module A             | X                      | X                                         | X | X | X | X | X | X | X | X | X |                      |
| Module B             | X                      | X                                         | X |   |   |   |   |   |   |   |   |                      |
| Module C             | X                      | X                                         | X |   |   |   |   |   |   |   |   |                      |
| Module D             | X                      | X                                         | X |   |   |   |   |   |   |   |   |                      |
| Test and Integration | X                      | X                                         | X | X | X | X | X | X | X | X | X | X                    |

**Figure 11** Task Structure Matrix of modularized design.

In contrast, the author focuses on conditions of enabling relationships between modules of products to be split and substituted (modularization). The important point is that the conditions of modularization are the conditions of the relationships between tasks or groups of tasks. The author focuses on this point and proposes to discuss structure of processes utilizing DSM methodology as analytical frameworks of business processes in firms and industries.

The advantage of focusing the discussion only on structure of tasks or processes is that the methodology can be applied to analyzing not only manufacturing firms but

non-manufacturing firms and industries. The reason is that modules of products in non-manufacturing industries are usually not defined. There are difficulties in applying the discussions on modularity to these industries. In particular, the author recognizes that this argument is well applied to the telecommunications industry.

Based on the above discussions, it is suggested that inter-firm relationships and tasks and group of tasks can be tied with each other. And the discussions lead to a hypothesis as follows;

*Hypothesis 4-1: If the “module of tasks” within business process in an enterprise is defined, an exchange of module of tasks between firms can be accomplished. This type of inter-firm relationship is defined as non-equity based contractual arrangement.*

The hypothesis means that if the group of tasks are organized and aligned as described in Figure 12 and relationships between these groups are not feedback or

|           | Process A | Process B | Process C                                                                     | Process D | Process E |
|-----------|-----------|-----------|-------------------------------------------------------------------------------|-----------|-----------|
| Process A |           |           | <div>Modularized process structure<br/>-Removed feed-back/cycling loops</div> |           |           |
| Process B |           |           |                                                                               |           |           |
| Process C | x         | x         |                                                                               |           |           |
| Process D | x         |           | x<br>x                                                                        |           |           |
| Process E | x         |           |                                                                               | x         |           |

**Figure 12** Modularized process structure.

cyclic loop like, these groups of tasks (module of process) can be easily split and substituted and consequently formation of inter-firm relationships can be different from equity based.

Besides modularity, another and similar discussion can be suggested. With regard to the structures of business systems, and not discussing inter-firm relationships, Suomi (1988) insisted that information systems can be recognized as products. And this idea can be tied to recent discussions on Service Oriented Architectures (SOA). This research also proposes here to discuss the formations of inter-firm relationships correlating to the concept of SOA.

The SOA concept is deployed in various information systems. Cohen (2007) defines SOA as “*A component approach to building integrated systems*” and that “*SOA automates business processes by building composite applications that use a set of data services*”. The key conception in SOA is ‘Service’, and service can be defined as a group of system functions, including the components, system components, or subsystems, that do not depend on any specific technology, such as a programming language or other methodology. In addition, a business process is defined by using a combination of services and a standardized interface between each service. The basic characteristic of SOA is the presupposition that each defined service can be substituted by another services that provides the same functions.

These discussions can be deemed as very similar to the discussions on modularity in that split and substitution are the key conceptions in their theories and the words in the hypothesis “module of tasks” may be defined as “subsystem”

**4-5 Industry discussions**

The purpose of this research is to identify the characteristics of inter-firm relationships in the telecommunications industry and find some decisive factor of formations in the industry. For that purpose, the author has chosen two industries to discuss the difference from the telecommunications industry. Besides telecommunications, airlines, and pharmaceutical industry were chosen. Within the pharmaceutical industry, this research focused on the field of drug development using the clinical studies phase in pharmaceutical industry. Three conditions for selecting these industries were set from the standpoint of performing an analysis as objectively as possible— the information concerned with entering into an alliance and/or other inter-firm relationships are clearly disclosed, the products provided by the represented firms in each industry are simple and understandable, and that the firms in the given industry have a similar business structure or business procedures.

To examine each industry, first this research analyzed the structure of business processes (tasks) in the telecommunications industry. The analysis followed the DSM shown in preceding section. The targeted model of business processes for the analysis was set to “eTOM Business Process Framework” developed by TM Forum (TM Forum 2008), the industry based organization. This definition was reflected to ITU-T (2004) recommendation, therefore the framework is understood to well reflect the current structure of business processes in the industry.

The framework provides, the Forum announces, widely deployed and accepted model and framework for business processes in the communications industry and therefore the author recognized the model an appropriate to analyze.

To analyze the structure of processes, two steps are set. First step is to identify the

relationships between input/output information and tasks or grouped tasks. For this purpose a matrix was drawn representing the relationships. This matrix can be called as Process-Information Matrix (PIM) and the example is shown as Figure 13.

Next step is to analyze the relationships between processes and create matrix similar to the DSM. Figure 14, named as Process-Process Matrix (PPM), shows the relationships between processes (tasks) in the telecommunications industry based on the definition of processes. This matrix is correspondent to the matrix in DSM methodology and TSM in discussions on modularity. As Baldwin and Clark (2000) discuss, elimination of feedback loop relationships are the key whether module of tasks can be easily created. However, as easily recognized, analysis indicates that it very difficult to create module or split out some part of processes.

On the other hand, in pharmaceutical industry, processes and group of processes are clearly defined by regulatory bodies such as FDA (United States Food and Drug Administration) in the U.S. and basic procedures are usually common in each country (FDA 2008). In addition, input and output information on each process are also defined by the regulatory systems. The author analyzed the tasks in the industry mainly focused on drug development business based on the process model defined by FDA (FDA 2008).

Figure 15 shows a PPM for drug development stage in the industry. As easily understood, tasks or group of tasks are simply ordered and almost no “feedback loop” can be found in the PPM. This figure means that module of tasks in the industry may easily be identified.

With regard to the airline industry, although the regulatory systems for operating businesses are very strict and common to almost every country, there seem no

standardized definitions of business processes in the industry. The author then attempted to define processes and find relationships between processes based on the discussions and analysis on alliances by Rhodes and Lush (1997). Figure 16 consequently shows the overview of the result. There are several processes accompanied with feedback loop and portions without such loops. With regard to the modularization of processes, the analysis identifies 25% of processes can be modularized and the rest may not be easily lined and modularized. It must be noted that there remains constraint of the analysis. There are no officially standardized definitions of processes and analysis based on a different view may bring different result.

Summary of these discussions on modularization of business processes in the industries are as follows.

In the telecommunications industry, although there are many standards for network components or interfaces, they are strictly limited to the engineering field. In addition, no regulated or industry-based business process de-facto standards can be found in the industry.

With regards to the pharmaceutical industry, there are strictly defined procedures that are set by governments for the entire clinical study phase (e.g. Section 312 of the Code of Federal Regulations in the U.S) and there is an industry de-facto standardized phase for the drug discovery phase.

For airlines industry, as Rhodes and Lush (1997) discussed, has de-facto standardized business components in several area and each firm seems to exchange services with each other. Examples are seen in cases such as an airline providing ground service, or catering to other airlines. In that sense, interfaces are also to be understood as standardized and consequently module of processes in the industry may also identified

in several areas.

Based on these discussions, Table 7 illustrates the summary of the evaluations and another hypothesis can be made using the observation of the conditions of these industries and by combining it with the discussion in Section 4-2.

*Hypotheses 4-2: Non-equity based– contractual arrangements are observed in the airlines and pharmaceutical industries when compared to the telecommunications industry. Contrastingly, equity-based inter-firm relationships are the main formation and observed in the telecommunications industry.*

Consequently two hypotheses are defined. The relationship between the proposition shown in the preceding section and this hypothesis is that the hypothesis is focused on specific industries and the typology of the inter-firm relationships is limited to equity-based and non-equity-based. This research is an initial attempt to discuss the correlation between business processes and the formation of inter-firm relationships. This research attempted to verify the hypothesis and it can be used as precedence for the verification of the proposition.

**Table 7** Module of processes and interfaces

| Industry                                           | Definition | Modules of processes definition | Standardized interface definition |
|----------------------------------------------------|------------|---------------------------------|-----------------------------------|
| Telecommunications                                 |            | None                            | None                              |
| Airlines                                           |            | De-facto based                  | De-facto based interface          |
| Pharmaceutical<br>(Drug discovery and development) |            | Regulated procedure             | Regulated report system           |

# BUSINESS PROCESS BASED VIEW OF INTER-FIRM RELATIONSHIPS

| Process                           | Customer Relationship Management |     |             |         | Service Management & Operations |             |    |     | Resource Mgmt. & Operations |             |    |     | Supplier/Partner Relationship Mgmt. |             |    |     |
|-----------------------------------|----------------------------------|-----|-------------|---------|---------------------------------|-------------|----|-----|-----------------------------|-------------|----|-----|-------------------------------------|-------------|----|-----|
|                                   | Op                               | S&R | Fulfillment | Billing | Assurance                       | Fulfillment | Op | S&R | Assurance                   | Fulfillment | Op | S&R | Assurance                           | Fulfillment | Op | S&R |
| Data/Information                  |                                  |     |             |         |                                 |             |    |     |                             |             |    |     |                                     |             |    |     |
| Product                           |                                  |     |             |         |                                 |             |    |     |                             |             |    |     |                                     |             |    |     |
| Product Specification             | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Product Offering                  | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Product Usage Statistics          | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Product Performance               | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Strategic Product Portfolio Plans |                                  |     |             |         |                                 |             |    |     |                             |             |    |     |                                     |             |    |     |
| Customer                          |                                  |     |             |         |                                 |             |    |     |                             |             |    |     |                                     |             |    |     |
| Customer statistics               | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Customer bill                     | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Customer Interaction              | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Customer Problem                  | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Customer Order                    | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Customer SLA                      | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Service                           |                                  |     |             |         |                                 |             |    |     |                             |             |    |     |                                     |             |    |     |
| Service specification             | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Service Capacity                  | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Service Plan                      | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Service Usage                     | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Service Quality                   | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Service Test                      | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Service Trouble                   | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Service Performance               | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Resource                          |                                  |     |             |         |                                 |             |    |     |                             |             |    |     |                                     |             |    |     |
| Resource Specification            | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Resource Topology                 | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Resource Trouble                  | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Resource Usage                    | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Resource configuration            | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Resource Performance              | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Resource Plan                     | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Marketing/SI Market Segment       |                                  |     |             |         |                                 |             |    |     |                             |             |    |     |                                     |             |    |     |
| Market Strategy & Plans           | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Contact/Lead/Prospect             | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Sales Statistics                  | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Sales Channel                     | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Competitor                        | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Marketing Campaign                | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Supplier/Par Supplier/Partner     |                                  |     |             |         |                                 |             |    |     |                             |             |    |     |                                     |             |    |     |
| S/P Product                       | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| S/P Strategy                      | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| S/P Bill                          | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| S/P Interaction                   | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| S/P Order                         | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| S/P SLA                           | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| S/P Statistics                    | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| S/P Payment                       | X                                | X   | X           | X       | X                               |             |    |     |                             |             |    |     |                                     |             |    |     |
| Enterprise                        |                                  |     |             |         |                                 |             |    |     |                             |             |    |     |                                     |             |    |     |
| Financial Status                  |                                  |     |             |         |                                 |             |    |     |                             |             |    |     |                                     |             |    |     |
| Workforce                         |                                  |     |             |         |                                 |             |    |     |                             |             |    |     |                                     |             |    |     |
| Supply Chain Strategy             |                                  |     |             |         |                                 |             |    |     |                             |             |    |     |                                     |             |    |     |
| Industry Compliance               |                                  |     |             |         |                                 |             |    |     |                             |             |    |     |                                     |             |    |     |

Figure 13 Process - Information Matrix (PIM) - Telecommunications.

# BUSINESS PROCESS BASED VIEW OF INTER-FIRM RELATIONSHIPS

|                                     | Customer Relationship Management |     |             |           | Service Management & Operations          |                                          |                                                        |                                | Resource Mgmt. & Operations                   |                                              |                                   |                            | Supplier/Partner Relationship Mgmt. |                     |             |           |
|-------------------------------------|----------------------------------|-----|-------------|-----------|------------------------------------------|------------------------------------------|--------------------------------------------------------|--------------------------------|-----------------------------------------------|----------------------------------------------|-----------------------------------|----------------------------|-------------------------------------|---------------------|-------------|-----------|
|                                     | Opex                             | S&R | Fulfillment | Assurance | Opex                                     | S&R                                      | Fulfillment                                            | Assurance                      | Opex                                          | S&R                                          | Fulfillment                       | Assurance                  | Opex                                | S&R                 | Fulfillment | Assurance |
| Customer Relationship Management    |                                  |     |             |           | CRM Operations Support & Process Mgmt.   | CRM Operations Readiness                 | Sales & Channel Mgmt.                                  | Marketing Fulfillment Response | Order Handling                                | Problem Handling                             | Customer QoS/SLA Mgmt.            | Billing & Collection Mgmt. | Customer Interface Mgmt.            | Retention & Loyalty |             |           |
|                                     |                                  |     |             |           |                                          |                                          |                                                        |                                |                                               |                                              |                                   |                            |                                     |                     |             |           |
|                                     |                                  |     |             |           |                                          |                                          |                                                        |                                |                                               |                                              |                                   |                            |                                     |                     |             |           |
|                                     |                                  |     |             |           |                                          |                                          |                                                        |                                |                                               |                                              |                                   |                            |                                     |                     |             |           |
|                                     |                                  |     |             |           |                                          |                                          |                                                        |                                |                                               |                                              |                                   |                            |                                     |                     |             |           |
|                                     |                                  |     |             |           |                                          |                                          |                                                        |                                |                                               |                                              |                                   |                            |                                     |                     |             |           |
|                                     |                                  |     |             |           |                                          |                                          |                                                        |                                |                                               |                                              |                                   |                            |                                     |                     |             |           |
|                                     |                                  |     |             |           |                                          |                                          |                                                        |                                |                                               |                                              |                                   |                            |                                     |                     |             |           |
|                                     |                                  |     |             |           |                                          |                                          |                                                        |                                |                                               |                                              |                                   |                            |                                     |                     |             |           |
|                                     |                                  |     |             |           |                                          |                                          |                                                        |                                |                                               |                                              |                                   |                            |                                     |                     |             |           |
| Service Management & Operations     |                                  |     |             |           | SM&O Support & Process Mgmt.             | SM&O Support & Process Mgmt.             | Service Configurations & Activation                    | Service Problem Mgmt.          | Service Quality Analysis, Action & Reporting  | Service & Specific Instance Rating           |                                   |                            |                                     |                     |             |           |
|                                     |                                  |     |             |           |                                          |                                          |                                                        |                                |                                               |                                              |                                   |                            |                                     |                     |             |           |
|                                     |                                  |     |             |           |                                          |                                          |                                                        |                                |                                               |                                              |                                   |                            |                                     |                     |             |           |
|                                     |                                  |     |             |           |                                          |                                          |                                                        |                                |                                               |                                              |                                   |                            |                                     |                     |             |           |
|                                     |                                  |     |             |           |                                          |                                          |                                                        |                                |                                               |                                              |                                   |                            |                                     |                     |             |           |
| Resource Mgmt. & Operations         |                                  |     |             |           | RM & O Process Mgmt.                     | Resource Mgmt. & Operations Readiness    | Resource Provisioning & Allocation to Service Instance | Resource Problem Mgmt.         | Resource Quality Analysis, Action & Reporting | Resource Data Collection, Analysis & Control |                                   |                            |                                     |                     |             |           |
|                                     |                                  |     |             |           |                                          |                                          |                                                        |                                |                                               |                                              |                                   |                            |                                     |                     |             |           |
|                                     |                                  |     |             |           |                                          |                                          |                                                        |                                |                                               |                                              |                                   |                            |                                     |                     |             |           |
|                                     |                                  |     |             |           |                                          |                                          |                                                        |                                |                                               |                                              |                                   |                            |                                     |                     |             |           |
|                                     |                                  |     |             |           |                                          |                                          |                                                        |                                |                                               |                                              |                                   |                            |                                     |                     |             |           |
| Supplier/Partner Relationship Mgmt. |                                  |     |             |           | S/PRM Operations Support & Process Mgmt. | S/PRM Operations Support & Process Mgmt. | S/PRM Relationship Mgmt. Operations Readiness          | S/PRM Buying                   | S/PRM Purchase Order Mgmt.                    | S/PRM Problem Reporting & Mgmt.              | S/PRM Settlements & Billing Mgmt. | S/PRM Interface Mgmt.      |                                     |                     |             |           |
|                                     |                                  |     |             |           |                                          |                                          |                                                        |                                |                                               |                                              |                                   |                            |                                     |                     |             |           |
|                                     |                                  |     |             |           |                                          |                                          |                                                        |                                |                                               |                                              |                                   |                            |                                     |                     |             |           |
|                                     |                                  |     |             |           |                                          |                                          |                                                        |                                |                                               |                                              |                                   |                            |                                     |                     |             |           |
|                                     |                                  |     |             |           |                                          |                                          |                                                        |                                |                                               |                                              |                                   |                            |                                     |                     |             |           |

Figure 14 Process - Process Matrix - Telecommunications.

# BUSINESS PROCESS BASED VIEW OF INTER-FIRM RELATIONSHIPS

|                       |                                            | Pre clinical Research                           |   |   |   |   |           |   |   |   |   | Clinical Studies  |   |   |   |   |                         |   |   |   |   | New Drug Application    |   |   |   |   |                |   |   |   |     |                       |   |   |   |   |
|-----------------------|--------------------------------------------|-------------------------------------------------|---|---|---|---|-----------|---|---|---|---|-------------------|---|---|---|---|-------------------------|---|---|---|---|-------------------------|---|---|---|---|----------------|---|---|---|-----|-----------------------|---|---|---|---|
|                       |                                            | Drug discovery                                  |   |   |   |   | Screening |   |   |   |   | Pre-clinical test |   |   |   |   | Phase 1 clinical trials |   |   |   |   | Phase 2 clinical Trials |   |   |   |   | Phase 3 Trials |   |   |   |     | Biolog. License Appl. |   |   |   |   |
| Pre Clinical Research | Drug discovery                             | Determination of Target disease                 | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X | X |
|                       |                                            | Develop hypothesis for a mechanism of treatment | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
|                       |                                            | Evaluation of hypothesis                        | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
|                       |                                            | Determination of feasibility                    | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
|                       |                                            | Develop a pharmacological profile of the drug   | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
| Pre Clinical Research | Screening                                  | Combination Chemistry                           | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
|                       |                                            | High throughput Screening                       | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
|                       |                                            | Combination Chemistry                           | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
|                       |                                            | develop a pharmacological profile of the drug   | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
|                       |                                            | Evaluation of selected compound                 | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
| Pre Clinical Research | Pre-clinical Testing                       | Determination of feasibility                    | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
|                       |                                            | Evaluation of hypothesis                        | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
|                       |                                            | Develop hypothesis for a mechanism of treatment | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
|                       |                                            | Determination of Target disease                 | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
|                       |                                            | Develop a pharmacological profile of the drug   | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
| Pre Clinical Research | IND Application (Investigational New Drug) | Combination Chemistry                           | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
|                       |                                            | High throughput Screening                       | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
|                       |                                            | Combination Chemistry                           | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
|                       |                                            | develop a pharmacological profile of the drug   | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
|                       |                                            | Evaluation of selected compound                 | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
| Clinical Studies      | Phase 1 Clinical Trials                    | Determination of Target disease                 | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
|                       |                                            | Develop hypothesis for a mechanism of treatment | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
|                       |                                            | Evaluation of hypothesis                        | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
|                       |                                            | Develop a pharmacological profile of the drug   | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
|                       |                                            | Evaluation of selected compound                 | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
| Clinical Studies      | Phase 2 Clinical Trials                    | Determination of Target disease                 | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
|                       |                                            | Develop hypothesis for a mechanism of treatment | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
|                       |                                            | Evaluation of hypothesis                        | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
|                       |                                            | Develop a pharmacological profile of the drug   | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X   | X                     | X | X | X |   |
|                       |                                            | Evaluation of selected compound                 | X | X | X | X | X         | X | X | X | X | X                 | X | X | X | X | X                       | X | X | X | X | X                       | X | X | X | X | X              | X | X | X | X</ |                       |   |   |   |   |

Figure 15 Process - Process Matrix - Pharmaceutical industry.

# BUSINESS PROCESS BASED VIEW OF INTER-FIRM RELATIONSHIPS

|                              | Marketing/Sales                                                                                                                                        | Customer operation                                                                                                                                     | Flight operation                                           | Airframe/Facility                                                                       | Ground operation                                                                                                                                       | Mgmt. operation                                                           |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|-----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Marketing/Sales              | Product development plan<br>Airbone availability planning<br>Seat arrangement planning<br>Regulatory procedure<br>Sales promotion                      | Product development plan<br>Airbone availability planning<br>Seat arrangement planning<br>Regulatory procedure<br>Sales promotion                      | Flight schedule<br>Flight assignment<br>Flight supervising | Planned Maintenance<br>Trouble shooting<br>Maintenance planning<br>Condition monitoring | Catering schedule/arrangement<br>Cleaning<br>Fuel supply<br>Catering arrangement(port of call)<br>Cleaning(port of call)<br>Fuel supply (port of call) | Accounting<br>Financing<br>Insurance<br>Revenue/flight<br>Investment plan |
| Customer operation           | Reservation/inquiry<br>Customer status control<br>Boarding procedure<br>Baggage management<br>FFP management                                           | Reservation/inquiry<br>Customer status control<br>Boarding procedure<br>Baggage management<br>FFP management                                           | Flight schedule<br>Flight assignment<br>Flight supervising | Planned Maintenance<br>Trouble shooting<br>Maintenance planning<br>Condition monitoring | Catering schedule/arrangement<br>Cleaning<br>Fuel supply<br>Catering arrangement(port of call)<br>Cleaning(port of call)<br>Fuel supply (port of call) | Accounting<br>Financing<br>Insurance<br>Revenue/flight<br>Investment plan |
| Flight operation             | Flight schedule<br>Flight assignment<br>Flight supervising                                                                                             | Flight schedule<br>Flight assignment<br>Flight supervising                                                                                             | Flight schedule<br>Flight assignment<br>Flight supervising | Planned Maintenance<br>Trouble shooting<br>Maintenance planning<br>Condition monitoring | Catering schedule/arrangement<br>Cleaning<br>Fuel supply<br>Catering arrangement(port of call)<br>Cleaning(port of call)<br>Fuel supply (port of call) | Accounting<br>Financing<br>Insurance<br>Revenue/flight<br>Investment plan |
| Airframe and maint. Facility | Planned Maintenance<br>Trouble shooting<br>Maintenance planning<br>Condition monitoring                                                                | Planned Maintenance<br>Trouble shooting<br>Maintenance planning<br>Condition monitoring                                                                | Flight schedule<br>Flight assignment<br>Flight supervising | Planned Maintenance<br>Trouble shooting<br>Maintenance planning<br>Condition monitoring | Catering schedule/arrangement<br>Cleaning<br>Fuel supply<br>Catering arrangement(port of call)<br>Cleaning(port of call)<br>Fuel supply (port of call) | Accounting<br>Financing<br>Insurance<br>Revenue/flight<br>Investment plan |
| Ground operation             | Catering schedule/arrangement<br>Cleaning<br>Fuel supply<br>Catering arrangement(port of call)<br>Cleaning(port of call)<br>Fuel supply (port of call) | Catering schedule/arrangement<br>Cleaning<br>Fuel supply<br>Catering arrangement(port of call)<br>Cleaning(port of call)<br>Fuel supply (port of call) | Flight schedule<br>Flight assignment<br>Flight supervising | Planned Maintenance<br>Trouble shooting<br>Maintenance planning<br>Condition monitoring | Catering schedule/arrangement<br>Cleaning<br>Fuel supply<br>Catering arrangement(port of call)<br>Cleaning(port of call)<br>Fuel supply (port of call) | Accounting<br>Financing<br>Insurance<br>Revenue/flight<br>Investment plan |
| Managerial operation         | Accounting<br>Financing<br>Insurance<br>Revenue control<br>Investment plan                                                                             | Accounting<br>Financing<br>Insurance<br>Revenue control<br>Investment plan                                                                             | Flight schedule<br>Flight assignment<br>Flight supervising | Planned Maintenance<br>Trouble shooting<br>Maintenance planning<br>Condition monitoring | Catering schedule/arrangement<br>Cleaning<br>Fuel supply<br>Catering arrangement(port of call)<br>Cleaning(port of call)<br>Fuel supply (port of call) | Accounting<br>Financing<br>Insurance<br>Revenue/flight<br>Investment plan |

Figure 16 Process - Process Matrix - Airlines industry.

#### **4-6 Data and results**

To verify the hypothesis 4-1, this research collected the necessary information and data from the targeted industries. For the telecommunications industry, this research focused and used the same information as Chapter 3. The ideal scope for analyzing the industry was to cover the entire telecommunications industry, but there were constraints when attempting to gather accurate amounts of disclosed information and this research had to adapt the results accordingly. For the airline industry, this research collected data from the *Thomson Reuters* covering press information of airline firms in major countries. For the inter-firm relationship data on the pharmaceutical industry, this research focused on the major firms in the U.S., EU, and Japan, and the data was originally collected from the Deloitte Database.

The time frame for the survey of each industry focused on the inter-firm relationships made within the 1990s, and the time frame for strong deregulations was also considered for each industry. Although the selected time frames did not include information from the past few years, this research chose it to cover the periods of deregulation. In particular, it included the telecommunications industry in the targeted countries discussed in the above sections and in other major countries.

Two categories in each inter-firm relationship are observed - equity-based and non-equity-based. And consequently, observed the inter-firm relationships are shown in Table 7 and Figure 17. The table and figure shows that there was a difference in inter-firm relationship formation between each industry. Most of the observed inter-firm relationships in the telecommunications industry were equity-based, and contrastively, there were few equity-based inter-firm relationships in the airlines industry. In the pharmaceutical industry, the ratio of equity-based and non-equity-based inter-firm relationships varied year by year.

Null hypotheses were set for evaluating the differences of ratio of equity-based and non-equity based relationships between selected industries and chi-square tests were conducted. The null hypotheses set in the tests are as follows;

- *Ratios of equity/non-equity-based inter-firm relationships between the telecommunications industry and airline industry are not different*
- *Ratios of equity/non-equity-based inter-firm relationships between the pharmaceutical industry and the telecommunications industry are not different.*

The tests are conducted on total number of the inter-firm relationships within the selected timeframe and also on inter-firm relationships for each year. Obtained chi-square numbers for these tests are all quite small (<10-13). Therefore it can be said that the differences in the ratios of equity/non-equity-based inter-firm relationships between these industries are statistically meaningful.

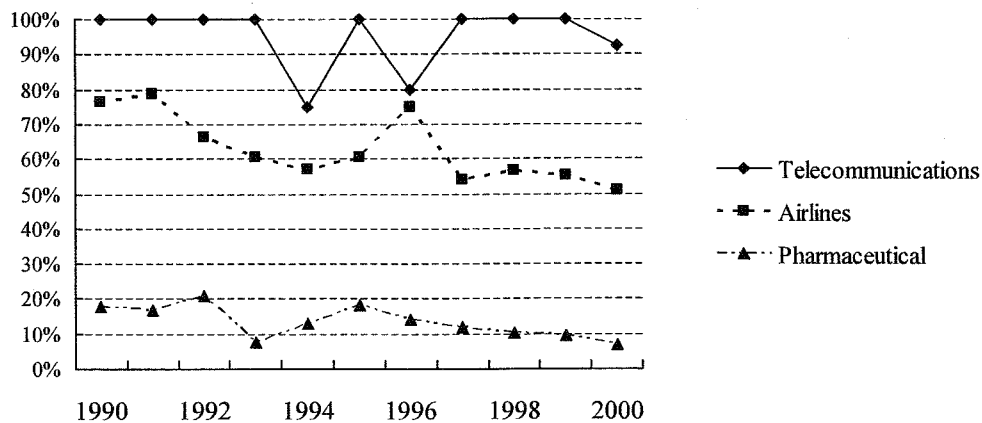
It is noted that more researches on the correlation between characteristics of business process in an industry and the formation of inter-firm relationships are expected, and to be conducted for further developing the proposed process.

Through discussions and the observation on inter-firm relationships in the selected industries, the hypothesis H4-1 and H4-2 set in previous sections can be meaningfully supported. Although the targeted number of inter-firm cases and the industries are limited in this research, the author insists that there are certain correlations between formation of inter-firm relationships and the characteristics of business processes defined in each industry. However, this result also shows that there are differences in the ratios between the three industries with each other. The reason of difference between airlines industry and pharmaceutical industry seems to reflect the level of modularization of processes shown in 4-5, further analysis are remained to be executed.

In addition, as discussed in Chapter 3, negative responses for the announcements by stock market indicate that shareholders and investors recognize the difficulties of organizational integration processes in pursuing M&A in the industry. The author insists that these phenomena also support the low level of standardization of business processes in the telecommunications industry.

**Table 8** Ratio of equity-based and non equity inter-firm relationships

| Industry           | Category              | 1,990  | 1,991  | 1,992  | 1,993  | 1,994  | 1,995  | 1,996  | 1,997  | 1,998  | 1,999  | 2,000  | Total  |
|--------------------|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Telecommunications | No. of observed cases | 7      | 3      | 2      | 4      | 4      | 6      | 5      | 4      | 5      | 21     | 26     | 87     |
|                    | Equity-based          | 7      | 3      | 2      | 4      | 3      | 6      | 4      | 4      | 5      | 21     | 24     | 83     |
|                    | Non-equity-based      | 0      | 0      | 0      | 0      | 1      | 0      | 1      | 0      | 0      | 0      | 2      | 4      |
|                    | Ratio of equity based | 100.0% | 100.0% | 100.0% | 100.0% | 75.0%  | 100.0% | 80.0%  | 100.0% | 100.0% | 100.0% | 92.3%  | 95.0%  |
| Airlines           | No. of observed cases | 175    | 239    | 178    | 152    | 186    | 146    | 120    | 133    | 191    | 205    | 187    | 1,912  |
|                    | Equity-based          | 134    | 188    | 118    | 92     | 106    | 88     | 90     | 72     | 108    | 113    | 95     | 1,204  |
|                    | Non-equity-based      | 41     | 51     | 60     | 60     | 80     | 58     | 30     | 61     | 83     | 92     | 92     | 708    |
|                    | Ratio of equity based | 76.57% | 78.66% | 66.29% | 60.53% | 56.99% | 60.27% | 75.00% | 54.14% | 56.54% | 55.12% | 50.80% | 62.97% |
| Pharmaceutical     | No. of observed cases | 129    | 139    | 182    | 249    | 310    | 304    | 321    | 306    | 312    | 249    | 208    | 2,709  |
|                    | Equity-based          | 23     | 23     | 38     | 19     | 40     | 56     | 45     | 36     | 32     | 24     | 14     | 350    |
|                    | Non-equity-based      | 106    | 116    | 144    | 230    | 270    | 248    | 276    | 270    | 280    | 225    | 194    | 2,359  |
|                    | Ratio of equity based | 17.83% | 16.55% | 20.88% | 7.63%  | 12.90% | 18.42% | 14.02% | 11.76% | 10.26% | 9.64%  | 6.73%  | 15.71% |



**Figure 17** Ratio of Equity-based inter-firm relationships.

## CHAPTER 5

### **Strategies for Inter-firm Relationships in the Telecommunications Industry**

This research aims to derive useful implications for developing inter-firm relationships in the telecommunications industry through previous discussions and the author has conducted research and discussions based on two types of approaches.

First attempt is to evaluate inter-firm relationships by conducting event study analysis as shown in Chapter 3. The obtained results may be used in two ways- (1) it provides an analysis of how stock markets tend to respond to the announcement of inter-firm relationships in the industry, and the results have important implications for managers seeking to develop strategies; methodology also offers a framework for further research (2) confirmation of the generally accepted characteristics of the telecommunications industry, as discussed earlier, demonstrating the usefulness of the framework and typology that this research has applied.

The second is to discuss correlations between formation of inter-firm relationships and characteristics of the industry, in particular, the characteristics of business processes in the industry. Following point out the issues to be considered by managers when developing inter-firm relationships in the industry based on these standpoints.

The findings from this research from Chapter 3 enable a better understanding of stock market responses to inter-firm relationships and strategies. Although a considerable number of alliances and M&A events were took place, the empirical results obtained in this research shows that investors do not always respond favorably in the short-term to these inter-firm relationships. In addition, the market reactions differ depending on the directions of each alliance, and depending on whether

U.S./Canada-based firms or non-U.S./Canada-based firms were involved. Managers in the telecommunications industry should take these findings into consideration when studying strategic alliances or M&A opportunities.

Through scrutinizing the results, evaluations, and discussions in Chapter 3, the author focuses on several aspects for managers that are required to establish inter-firm-relationship strategies in the telecommunications industry.

The first issue to be identified is the correlation between managers' intentions and expectations by investors or stakeholders in firms. Firms usually enter into inter-firm relationships to strengthen their competitiveness and therefore it is natural that managers involved in the decisions expect favorable responses or evaluations by investors or shareholders. As Barney (2002) and Jongmoo, et al. (1999) noted, the stock price or market value of firms reflects investors' expectations about real economic variables in the future. The CAAR values may reflect the market view of the future performance of individual firms. The results demonstrated in this research, however, indicate that shareholders' expectations differ at least within short-term windows. Several types of circumstances that create these kinds of results can be suggested—(1) managers misunderstand shareholders' responses, (2) managers enter into these relationships with expectations of such results, and (3) positive shareholder responses can be expected in the middle or long term but not in the short term. There is no clear evidence explaining which of these ((1)–(3)) are correct. Analysis and discussion are expected on these issues in further research.

However, the fact that shareholders and investors do not necessarily evaluate announcements of inter-firm relationships being formed positively at least in the short term, implies that managers have to develop inter-firm strategies by understanding the

stock market environment and their accountability to the market.

The second aspect correlated to the characteristics of the industry has been identified and has already been referred in Chapter 3 and Chapter 4. A long time and a large number of procedures may required to accomplish inter-firm relationships particularly pursuing M&A in the telecommunications industry because of the scale of assets and correlated required activities and non-standardized business processes as referred in Chapter 4. This circumstance may result from its nature and characteristics. In addition, the results of the event study demonstrated that investors may recognize this circumstance and do not expect improvements in the corporate value at least within the short term. Managers have to understand such behaviors by investors' responses and therefore strategies need to be derived to respond to market behaviors from two aspects.

The first is for managers to respond directly to the stock market. They have to demonstrate that inter-firm relationships are based on long-range strategies. It is necessary to provide explanations of middle- and long-term strategies and transition plans for the purpose of pursuing inter-firm relationships.

Second, managers who establish strategies for accelerating transition processes required for pursuing inter-firm relationships will be positively evaluated by the stock market. How to harmonize business processes with their counterpart in inter-firm relationships and standardize business processes within the industry are key factors regarding this issue. These are derived from the discussions Chapter 4 based of the preceding research (Shiraishi and Iijima 2008b).

With regard to different responses for U.S./Canada-based carriers and non U.S./Canada-based carriers described in Chapter 3, a negative valuation of segment expansion by U.S./Canada-based firms suggests that these are not recognized as

preferred strategies by shareholders. Most likely, investors have recognized that a firm specializing business in one segment will not have any special advantage or capacity for business in a different segment; in other words, firms operating in each of the local, long-distance, and mobile telecommunication markets are assumed to have distinct capabilities by investors in U.S. and Canadian markets. Investors looking non-U.S./Canadian markets may believe, in contrast, that segment expansion is more akin to entering a similar business. Although the reason for such differences between the two market areas is unclear, managers should take into account the likely market response when they consider segment expansion in the U.S./Canadian market or business diversification in either the U.S./Canadian markets or markets in other countries.

In addition to these areas, discussions in Chapter 3 and 4 provide the importance of strategies focused on business processes. The structure of business processes in the telecommunications industry is one of the key factors for prompt organizational integration in M&A or alliances and managers have to establish strategies on business processes – e.g. to evaluate and analyze business processes or operations of potential partners in due diligence procedures, or to review firm's business process and operations and plan transition programs to establish modularized process structures. This standpoint may also important for regulatory and promoting bodies. That improving standardization of business processes and operations in the industry may encourage firms to conduct various types of inter-firm relationships and consequently growth of the industry may be expected. The author insists that the regulatory bodies should review current regulatory system from the standpoint.

## CHAPTER 6

### Conclusions and Future Research Issues

The contribution of this research may be in two areas. First, this research identified characteristics of the telecommunications industry and delivered implications for inter-firm relationships in the industry. Second is that this research proposed an alternative framework for understanding and categorization of inter-firm relationships based on business processes called “Business process based view of inter-firm relationships”.

In the first area, this research aimed to identify the characteristics of the telecommunications industry and proposed a typology for these relationships. In addition, the research included an evaluation of inter-firm relationships based on the typology. Contributions from this research are as follows.

It described the characteristics of the telecommunications industry from the standpoint of the formation of inter-firm relationships. This research showed the characteristics of the forms of inter-firm relationships in the industry and that equity-based inter-firm relationships, including M&A, are the most preferred forms in the industry. Although inter-firm relationships in the industry seem strongly correlated with regulatory systems, preferred inter-firm strategies used by managers seem to have remained the same before and after significant regulatory changes in the telecommunications industry. This phenomenon seems to be different from that observed in other regulated industries, such as the airline and pharmaceutical industries (Rhodes & Lush, 1997; Achilladelis, & Antonakis, 2001), where various types of alliances are seen. The phenomenon may therefore be correlated with the nature of the telecommunications industry, which implies that the formation of inter-firm

relationships may not be directly correlated with regulatory schemes in the industry but with the characteristics of business processes as referred below. In addition, this research provides a typology for inter-firm relationships and attempted evaluation of inter-firm relationships to help managers develop alliance strategies, and the typology can be applied to categorize inter-firm relationships in the industry.

Regarding the second area of the contribution, this research proposed to adapt the framework of understanding inter-firm relationships based on business process analysis and showed the validation of the proposition by observing the data from the inter-firm relationships in several industries. In other words, this research proposed extending the frameworks utilized or deployed in ICT and business architectures for discussing business strategies, and the framework can be deployed as an analytical framework for inter-firm relationships.

Based on the discussions in this research, it may be implied that the structure of business processes in certain industries correlates to the preferred formation of inter-firm relationships. In addition, the proposed framework will help managers on which type of inter-firm relationship suits their industry when they are developing strategies for inter-firm relationships and may also be helpful for regulatory bodies for establishing policies.

Further research is expected to discuss the correlations between each type of formation of inter-firm relationship and the ICT and business architecture concepts. These discussions will not be limited to equity or non-equity-based inter-firm relationships. Also, further analyses of industries other than the telecommunications, airlines, and pharmaceutical industries are expected.

Besides these issues, several issues still warrant further research.

First, this research has focused on alliances and M&A events by the telecommunications firms where both of the partners in the relationships were telecommunications carriers. However, many alliances initiated by telecommunications firms are targeted towards firms in other industries. Although such relationships have been analyzed (Wilcox et al., 2000), further research focusing on wider aspects of the telecommunications business would be valuable. In addition, the cases and data used in our research were based on a single media source. There is a possibility of bias in the information used to evaluate the inter-firm relationships. Therefore, this study expects to be complemented by research based on other data sources.

Second, as referred in the preceding chapter, the methodology for evaluating stock market responses can be refined. This research evaluated short-term responses. The analysis of medium- and long-term responses will provide more complete findings regarding the value of inter-firm relationships from both practical and academic perspectives.

Third, this research did not delve into correlations between telecommunications firms' preferring equity-based inter-firm relationships and the regulatory issues related to this preference. Although research on this topic has been done for other industries, such as that by Carette and Dussauge (1999), the telecommunications industry has not yet been examined in this regard. An examination of these matters with respect to the telecommunications industry, in comparison to other industries, could lead to important findings. In addition, discussions are needed to verify which type of regulatory system is most desirable in the telecommunications industry, and this can be facilitated by comparison with trends in other regulated industries from the competitive and growth standpoints.

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