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Noriaki Shiraishi

Tokyo Institute of Technology, wstone@pop13.odn.ne.jp

Junichi Iijima

Tokyo Institute of Technology, iijima.j.aa@m.titech.ac.jp

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BUSINESS PROCESS-BASED VIEW OF INTER-FIRM RELATIONSHIPS

Shiraishi, Noriaki, shiraishi-n@pro.odn.ne.jp, Tokyo Institute of Technology
Iijima, Junichi, ijijima.j.aa@m.titech.ac.jp, Tokyo Institute of Technology
2-12-1 Ookayama, Meguro-ku, Tokyo, 152-8550, Japan

Abstract

A business process based view of inter-firm relationship is proposed and discussed in this paper. The authors define inter-firm relationships as a broad range of relationships including strategic alliances, joint ventures, and mergers and acquisitions (M&A) or other equity-based relationships in this paper.

Inter-firm relationships are some of the most important strategic activities in the present business environment. In addition, the formation and selection of a partner is the most essential issue for managers when arranging inter-firm relationships, and also very important for scholars when conducting researches.

Resource-based views and transaction cost theories are the most utilized methodologies for analyzing inter-firm relationships, but they seem to face constraints when discussing the formation of inter-firm relationships.

Therefore, the authors propose to introduce a business process-based view for discussing the formation of inter-firm relationships. The authors also examine the existence of a correlation between the characteristics of the business processes of an industry and the preferred formation of inter-firm relationships using an analysis of several business areas.

Keywords: *alliance, formation, SOA, modularity*

1 INTRODUCTION

Mergers and acquisitions (M&A), joint ventures, and strategic alliances are some of the most important strategic activities for firms, and the choice of the formations of inter-firm relationships is one of the most important issues for managers. In this paper, we define inter-firm relationships using the definition given by Yoshino & Rangan (1995).

Many scholars have discussed inter-firm relationships, and various aspects have been proposed for analyzing them. They have provided categorizations, performance valuations, analytical frameworks mainly based on a resource-based view (RBV), and transaction cost-based views.

They have also had discussions on inter-firm relationships that focused on each focused industry. For example Chan-Olmsted & Jamison (2001) focused on the telecommunications industry, Hill (1997) on the pharmaceutical industry, Rhodes & Lush (1997) on the airlines industry and Yasuda and Iijima (2005) on the semiconductor industry.

As will be discussed in a later section, it is noted that managers seem to prefer M&A or equity-based relationships over entering into strategic alliances or other non-equity-based relationships in many industries and different preferences are observed in other industries. These tendencies imply that there are given characteristics for each industry. However, it has been difficult to find research that deals with such phenomenon, and therefore, we are now attempting to discuss it.

We are proposing a new analytical framework for inter-firm relationships that is based on business processes, and discuss the relationships between the preferred formation of inter-firm relationships and the identified characteristics of the business processes in each industry.

In the following section, we review theoretical frameworks, and also present the constraints and important issues of existing inter-firm relationships. In the third section, a business process-based view is proposed as a new analytical framework for inter-firm relationships. The fourth section discusses the frameworks of the business processes and hypothesis is shown. The fifth section presents a comparative overview of the selected industries based on the proposed framework, and introduces the hypothesis for the preferred formations of each industry. Section six presents the validation of the hypothesis by using the observed data from actual inter-firm relationships. The final section discusses our further research issues and our conclusion.

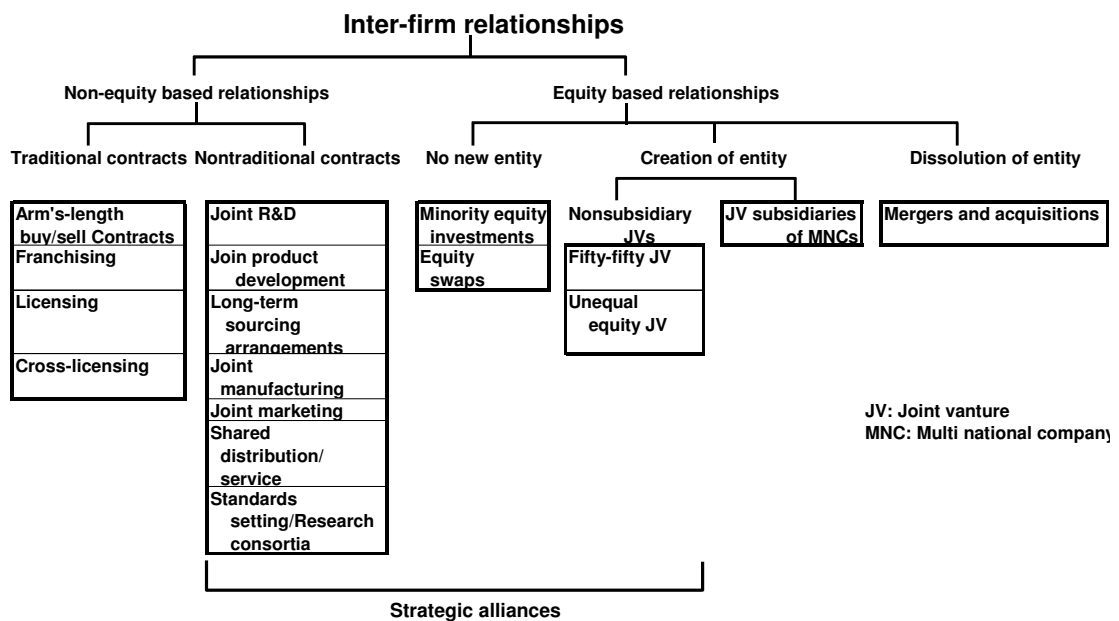


Figure 1. Inter-firm relationships categories based on definition by Yoshino & Rangan

2 THEORETICAL FRAMEWORKS OF INTER-FIRM RELATIONSHIPS AND CONSTRAINTS

Scholars have tried to give a rationale for explaining the motivation, formation, and performance valuations for making inter-firm relationships.

For these discussions and analyses, these scholars have mostly used the resource-based view (RBV) (Das, & Teng, (2000)) and transaction cost theories (Hoffmann & Schlosser, (2001)) frameworks.

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 & Rangan (1995), Doz & 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, such as M&A, are not discussed compatibly as exchanges of resources, as discussed by scholars (Yoshino & Rangan (1995)). 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, it is understood that it is difficult to find discussions and any analyses dealing with a broad range of inter-firm relationships, including the M&A or similar equity-based relationships that are based on the RBV or transaction cost theories.

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, it is necessary to discuss inter-firm relationships by covering a broad range of formations. This is one of the constraints of RBV and transaction cost-based theories when discussing inter-firm relationships.

Another issue is the application methodologies of RBV and transaction cost-based theories. Many scholars, such as Chen & Chen (2003) and Yasuda (2005), have mainly used these theories to analyze specific and accomplished cases, to give rationale for individual cases, or give rationale trends for the inter-firm relationships in targeted industries, but the RBV and transaction cost theories in each seem to be insufficient for the purpose.

In that sense, RBV and transaction cost theories are not used for developing inter-firm relationships and frameworks that can be used for developing strategies.

This was pointed out by Gulati, Nohria, and Zaheer (2000) and they proposed a new a framework called the 'Strategic Network'. The framework attempted to understand 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 is useful in that an analysis based on this framework contains information or implications on which the formation of inter-firm relationships can be built and on which partners would be valuable to the firm. However, from a managerial standpoint, the information or implications that are necessary for establishing the strategies for forming inter-firm relationships are which formation should be chosen and/or which partner will bring the most value to the firm. Then, the third issue is understood that framework is needed useful for determination of formations inter-firm relationships.

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

In this paper we define alliance formation using a different focus than that by Gulati (1998). We define 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, we understand that an alternative framework for inter-firm relationships is needed, and therefore, we attempt to discuss our process based on a different perspective.

3 ICT, business processes, and alternative frameworks

There have been discussions on inter-firm relationships from different perspectives. Doz and Hamel (1998) provided a suggestive discussion- "*cooperation designs important operational scope, configuration and valuation of contribution, alliance governance, alliance interface*". Their work assumed that governance configurations and operations are to be designed to establish inter-firm relationships. Their discussion seems to be strongly tied to the operational processes of corporate businesses and Gulati and Singh (1998) had similar viewpoints. These discussions suggest that there is the possibility for discussing inter-firm relationships based on the operational process perspectives and correlated frameworks. It should be noted that a business process perspective can be strongly correlated to the ICT research area. We, therefore, focused on discussing inter-firm relationships based on an ICT perspective and business processes.

In particular, although not decisively discussed for inter-firm relationships, correlations between inter-firm relationships and information systems have been suggested since the 1960s, and a discussion by Kauffman (1966) seems to be the first. His discussion raised the concept of information systems crossing corporate boundaries and suggested that the concept can be correlated to inter-firm relationships. In fact, similar concepts have been developed by scholars. In particular, Suomi (1988, 1992) proposed the concept of 'Inter Organization Information Systems (IOS)' and Gulati, Nohria, & Zaheer (2000) discussed the correlations between IOS and alliances. In addition, Bruque-Camara & Moyano-Fuentes, (2006) also discussed this issue. These discussions support the idea of inter-firm relationships from an ICT perspective.

Based on these discussions, we now recognize a firm's businesses as systems and attempt to discuss the formation of inter-firm relationships correlating with the characteristics of a firm's business system structures and consequently their business processes.

With regard to the system structures of business systems, and not discussing inter-firm relationships, Suomi (1988) insists that information systems can be recognized as products and this idea can be tied to recent discussions on Service Oriented Architectures (SOA).

We also propose 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*".

Through these definitions, it should be noted that the key concept in SOA is probably '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.

With regard to business processes, Egony et al. (1997) provided a useful viewpoint. They focus on the relationships between the business processes and the module of the processes. Their work seems to be based on a similar standpoint to the concept of modularity and we also focused on this concept. The concept of modularity is tied to the viewpoint of Egony et al. and therefore, it seems to be one of the most suitable viewpoints for discussing business processes. Modularity was originally discussed and

developed by Baldwin and Clark (1999), and they defined modularity as a useful concept in many fields and that two subsidiary ideas were submitted in the general concept– “interdependence within and independence across modules”, and “abstraction, information hiding, and interface.”

The concept was originally developed to discuss manufacturing firms’ products and targeted the design of these products (e.g. Watanabe & Ane (2004) and Dowlatshahi, S. & Cao (2006)). This was followed by discussions on ICT industries (Kodama (2004)) and the concept was generally understood as a tool for discussing and/or analyzing the structure of tangible products. However, Baldwin and Clark (1999) discussed that,

“SMS (Standard Modular System) was not merely a conceptual decomposition of artifact. It was a true and effective modularization of a design and the corresponding task structure.” “The modular created by SMS were process modules. In other words, they were units that performed the tasks of production, distribution, inventory management, and field service for the company as a whole.”

Therefore, the concept focused not only on tangible products, but also on intangible products or the business processes correlated to these products. The importance of their argument was that they insisted that the modularity value was splitting and being substituted. Miozzo & 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.

4 FRAMEWORK FOR UNDERSTANDING INTER-FIRM RELATIONSHIPS AND HYPOTHESIS ON FORMATION OF INTER-FIRM RELATIONSHIPS

These two concepts are very similar in that the standardized portions (service, module) are defined and that a standardized interface between the portions in firms’ information systems or business processes exists, and this leads to the possibility of splitting and the substitution of each portion.

When we look back at the previous discussions on inter-firm relationships, although the range of targeted formations differs from our scope, both the RBV and transaction cost theories presume the existence of a firm’s resources and the inter-firm relationships are assumed to be the exchange of resources.

Based on the discussions on the SOA, modularity, and RBV or transaction theories for inter-firm relationships, we firmly believe that the SOA and modularity concepts and understandings frameworks correlate with each other and can be extended to a framework for better understanding and analyzing inter-firm relationships. Figure 2 illustrates the framework for better understanding the correspondence between SOA, modularity, and the framework for inter-firm relationships.

In the figure, the ‘service’ for SOA corresponds to the ‘module’ defined by the conception of modularity, and these are correlated to the subsystem of a corporate enterprise. In addition, the combinations of the services (SOA) and modules (modularity) compose an corporation’s entire system. To better understand inter-firm relationships, we introduce the concept of a ‘subsystem of enterprise’ entity, which corresponds to a service or module. Although the entity is not clearly defined by scholars, we define the entity as a business process or group of business processes composed of all the business activities of a firm.

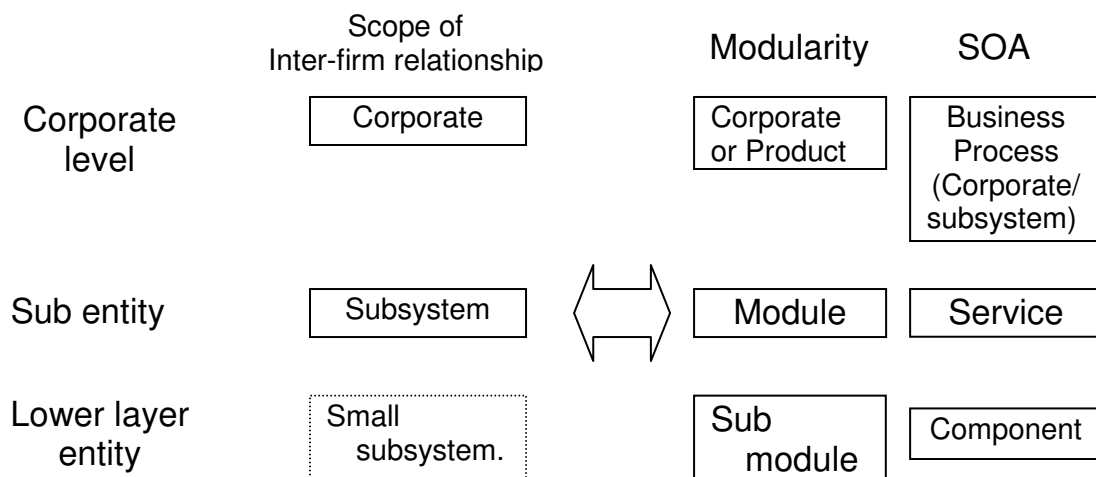


Figure 2. Analytical framework for inter-firm relationships– correspondence to SOA and modularity

We have stated that the concepts of SOA and modularity are strongly correlated to the standardization of the services in information systems or the business process/products within a corporation. In addition, we have stated that splitting or substitution between services and modules can be accomplished if an interface between the services and modules is standardized. In this context it can therefore be supposed that if the ‘subsystem’ is clearly defined and an interface between subsystems is standardized, the splitting and substitution targeted to the subsystem will easily occur. In other words, under such conditions, an exchange of enterprise subsystems between firms can be seen. This type of inter-firm relationship is defined as a category in non-equity based relationships.

Therefore we set the proposition that, *“If the ‘subsystem’ of an enterprise is defined, and the interfaces between subsystems are standardized, an exchange of enterprise subsystems between firms can be accomplished. This type of inter-firm relationship is defined as a non-equity based– contractual arrangement.”*

Our next issue then is to verify the argument about inter-firm relationships. To verify the proposition, we chose three industries and observed the numbers of actual inter-firm relationships.

5 VERIFICATION BY INDUSTRY ANALYSIS

We chose three industries– telecommunications, airlines, and pharmaceutical. For the pharmaceutical industry, we focused on the field of drug discovery 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.

We then examined each industry and set another hypothesis for these industries. The key discussion issue to conduct the evaluation is how to evaluate the existence of subsystems and the standardized interfaces between the defined subsystems.

In this research, we set some metrics for the issue of the existence of industry-based and regulatory-based business procedures, and the existence of standardized interfaces between the subsystems.

Table 1 illustrates the summary of our evaluations.

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.

The airline industry on the other hand, as Rhodes & Lush (1997) discussed, has de-facto standardized business components 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.

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.

Industry	Definition	Subsystem (procedure) definition	Standardized interface definition
Telecommunications		None	None
Airlines		De-facto based subsystem	De-facto based interface
Pharmaceutical		De-facto based subsystem Regulated procedure	De-facto based interface Regulated report system

Table 1. Evaluation of industries– subsystems and interfaces

Another hypothesis can be made using the observation of the conditions of these industries and by combining it with the discussion in Section 3,

Hypotheses: 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 proposition and 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. We attempted to verify the hypothesis in this research, and this verification can be used as a precedence for the verification of the proposition.

6 DATA AND OBSERVED RESULTS

To verify the hypothesis, we collected the necessary information and data from the targeted industries. For the telecommunications industry, we focused on the carriers that exceeded 1 billion U.S. dollars, or those of equivalent business size in OECD countries and the data were collected from the *Financial Times* database. 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 we had to adapt this research accordingly. For the airline industry, we collected data from the annual survey data presented by the *Airline Business* journal, which covered airline firms in major countries. For the inter-firm relationship data on the pharmaceutical industry, we focused on the major firms in the U.S., EU, and Japan, and the data was originally collected from the ReCap’s Biotech Alliance 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, we 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.

We set two categories in this research to categorize each inter-firm relationship- equity-based and non-equity-based inter-firm relationships.

Consequently, we observed the inter-firm relationships shown in Table 2. The table 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.

We set null hypotheses for evaluating the differences of ratio of equity-based and non-equity based relationships between selected industries and conducted chi-square tests.

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.

We recognize that more researches on the correlation between the business process characteristics in an industry and the formation of inter-firm relationships are expected to be conducted for further developing our process.

Industry	Category	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	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	27	18	24	63	38	30	23	48	60	51	77	459
	Equity-based	0	0	1	3	1	1	1	2	0	1	0	10
	Non-equity-based	27	18	23	60	37	29	22	46	60	50	77	449
	Ratio of equity based	0.0%	0.0%	4.2%	4.8%	2.6%	3.3%	4.3%	4.2%	0.0%	2.0%	0.0%	2.2%
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	17.8%	16.5%	20.9%	7.6%	12.9%	18.4%	14.0%	11.8%	10.3%	9.6%	6.7%	15.7%

Table 2. Ratio of equity-based and non-equity-based inter-firm relationships.

6. CONCLUSION AND FURTHER RESEARCH ISSUES

We proposed to adapt the concept of SOA and modularity for discussing inter-firm relationships and showed the validation of the proposition by observing the data from the inter-firm relationships in several industries. In other words, we proposed to extend the frameworks 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 the preceding sections, it can be noticed that the structure of business processes in certain industries correlates to the preferred formation of inter-firm relationships. In addition, the proposed framework will provide managers with implicate information on which type of inter-firm relationship suits their industry when they are developing strategies for inter-firm relationships.

Further research is expected discussing the correlations between each type of formation, but will not be limited to equity or non-equity-based inter-firm relationships and the ICT and business architecture concepts. In addition, analyses of industries other than the telecommunications, airlines, and pharmaceutical industries are expected.

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