

GLOBAL STRATEGY OF
JAPANESE INFRASTRUCTURE FIRMS:
Statistical Analysis for
Petrochemical Plant Engineering Industry

35132018-5 TANABE OSAMU
MANAGEMENT STRATEGY AND
INDUSTRY EVOLUTION

C.E. PROF. ASABA SHIGERU
D.E. PROF. AIBA KOJI D.E. PROF. HIRANO MASAOKI

Summary

This research particularly analyzes the globalization strategy of Japanese infrastructure related business firms to be subjected by its capability to get awarded for infrastructure projects in the global petrochemical industry. It also identifies the key success factor or phenomena for related other Japanese firms considering globalization in the field.

Japan had long been a growing market and requirements of high quality of products and services for many industries, and it is not an exception for infrastructure businesses. Many infrastructure related business firms had benefited from its stable and relatively large size of home market; therefore it was not mandatory for them to expand business for overseas markets. However, the external environments had radically changed over the past decades after the collapse of a bubble economy in the 90s and global financial crisis in 2008. Suffering from the economical long term downturn in the matured domestic market, the Japanese infrastructure firms have struggled to win overseas projects including petrochemical related plants, power stations and desalination plants etc. in emerging markets where demands are still growing. It is believed that Japanese firms have high potentials for leveraging their technologies and products in the global market.

Yet the reality is quite different and the market has already been competitive by emerging competitors. Korean general constructions firms have been very active in such market and Chinese equipment manufacturers are already listed on the vendor list in some countries where Japanese firms long been thought the stronghold for them. It is one of characteristics of the industry where a simple project or a simple product exports require a large number of labors not only in home country but also in local country. In the petrochemical infrastructure market, there are various other reasons for potential Japanese firms finding difficulties to be competitive. The difference between Japanese industry standard is just one example. Some Japanese firms have overcome these problems and been aggressive in the emerging markets. Thus it is important to understand the factors causing Japanese firms to be successful in those markets.

By taking data for the petrochemical sector, this study statistically analyzed the factors which influence the number of project awards in foreign countries. The outcome implies that, in petrochemical industry, firms should have a clear regional strategy whereas localization in terms of human resources is not important. Domestic based resources and capabilities of firms are required to succeed in the global market but aggressiveness is more important. Forming alliances with appropriate partners leads to winning successful project awards. Therefore Japanese firms should understand the effective way to enter overseas markets and leverage the resources, capabilities and technologies they have.

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CHAPTER 1. INTRODUCTION

The demands of investment on the infrastructure business around the globe increased significantly in the past two decades. Its market size was about four-hundred billion USD in 2000 and has still been increasing rapidly. This is caused by many factors; the market in the developed countries became saturated whereas many emerging markets in developing countries are still growing, emerging competitors from developing countries gained capabilities etc. Therefore Japanese construction firms had necessities for entering global market and winning project awards in order to increase their revenues and to sustain their growth. Some statistical data shows that in terms of the occupied market size of infrastructure business, South Korean firms are not as much in the dominant positions as heard in the media in any region except Middle East market where they aggressively participated in the biddings of many national projects. Chinese construction firms show the strong presence in almost all developing regions. Among all these increasing in intensive competition, it seems that Japanese firms are losing its home owned competitive advantage in most regions, only with the exception in Asian countries, in spite of the fact that they have competitive advanced technology ,knowhow, and accumulated experiences.

The research objective is to focus on the global strategy of Japanese construction firms in petrochemical industry to examine how they become globalized in particular in emerging markets, as well as developed markets. In this study, two processes of global strategy were considered, localization and cross border alliances, as these two were believed to be important global strategies in labor intensive industry. Here are three research questions.

RQ 1: How important for successful Japanese firms to implement localization process and regional diversification strategy?

RQ 2: Is competitive advantage in the domestic market more important or firms having aggressiveness to enter foreign markets more important?

RQ 3: How do successful Japanese firms choose partnership in which form of entering overseas markets?

These research questions yield some hypotheses such that firms having greater localization, greater capabilities and good strategic alliance policies would have more successful winning project awards. They are described in later chapter in detail.

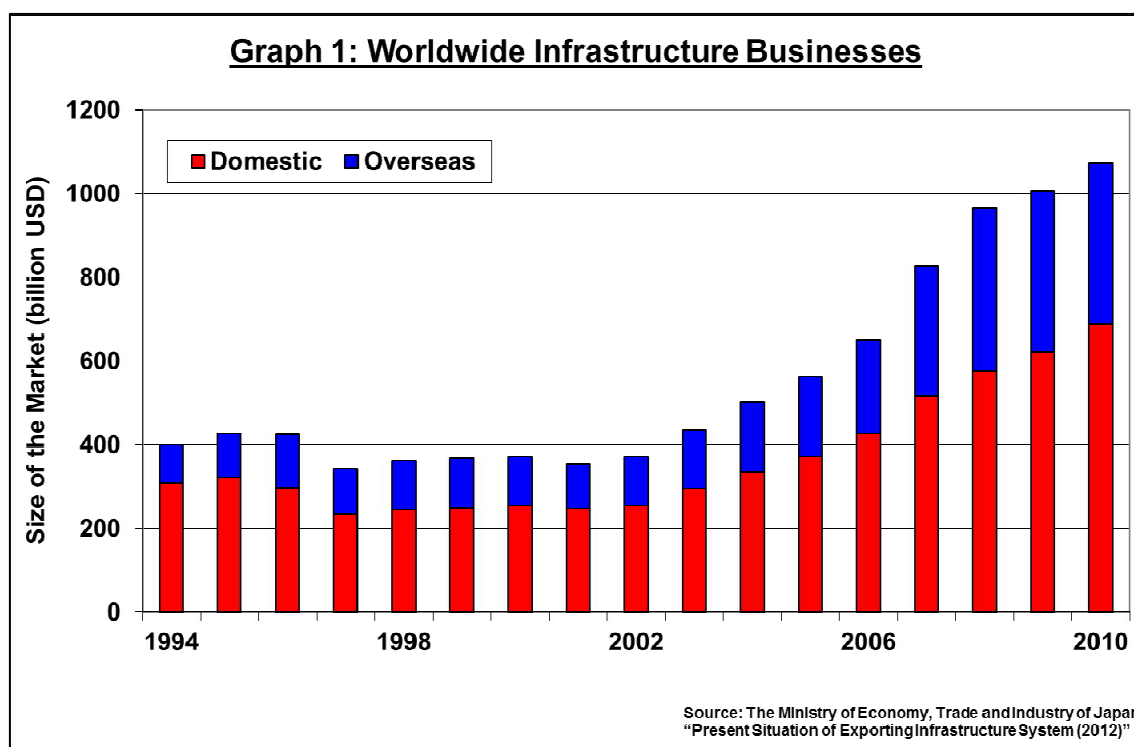
Detailed information of each infrastructure project is strictly confidential and not available in public. The study is based on the available data of Japanese construction firms which experienced the winning awards in the year between 2009 and 2013. Statistical approach, negative binominal correlation analysis is implemented accordance with the data acquired. From this study, firms in related industries may understand the behaviors and globalization process that imply some tendencies for winning successful projects award in oversea markets.

Chapter 1 is the introduction of the study describing the overall study briefly. Chapter 2 describes the history of Japanese construction firms and overall view of the industry. The Chapter particularly focuses on key crucial historical events in Japanese construction industry, industrial characteristics and structure, project management and specific standards in petrochemical industry. Chapter 3 provides some classical and modern ideas and arguments on studies by others. The chapter is divided into three parts, global strategy in general, localization, and cross border alliances. Based on these global strategy theories, some hypotheses are outcomes. Chapter 4 describes the analytical method of acquired data and analytical methods implemented according to each research question. Chapter 5 is the description of outcomes of statistical analysis described in the previous chapter. Then it brings some implications with regards to the research questions. Chapter 6 brings further discussion explaining the possible reasons where hypotheses are not evidently supported. Then it provides further implication for both practice and academic sides. Chapter 7 is the overall conclusion.

CHAPTER 2. INFRASTRUCTURE INDUSTRY

Section 1. GLOBAL INFRASTRUCTURE INDUSTRY

The demands of investment on the infrastructure business around the globe increased significantly in the past two decades. Its market size was about four-hundred billion USD in 2000 and has been increasing with the amount of ninety billion USD on average each year, surpassing in trillion USD in 2009. During the 90s, roughly a quarter of the investment was accounted for overseas projects whereas about forty percent of the total investment was spent for overseas project after 2010 (see **Graph 1**). This is caused by many factors; the market in the developed countries became saturated whereas many emerging markets in developing countries are still growing, emerging competitors from developing countries gained capabilities, in particular in natural resources based industry, discovery of new type of resources changed the demand and supply balance in the global market. Therefore Japanese construction firms had necessities for entering global market and winning project awards in order to increase their revenues and to sustain their growth.



Some statistical data shows that the size of the market of infrastructure business that includes fields of transportations, petroleum, building, power, water sectors, is distributed moderately in each region (see **Table 1**). Among them, Europe is the biggest market and Asia, Middle East, Africa etc. Not surprising that nearly half of the European market is dominated by European construction firms but also in the African, South American and Caribbean market. In term of the occupied market size, South Korean firms are not as much in the dominant positions as heard in the media in any region except Middle East market where they aggressively participated in the biddings of many national projects by creating strong network in regions and relationships with local governments. Chinese construction firms show the strong presence, other than Europe and North America, in almost all developing regions. Among all these increasing in intensive competition, it seems that Japanese firms are losing its home owned competitive advantage in most regions, only with the exception in Asian countries including its home market. This is strongly influenced by the legacy of the globalization of Japanese infrastructure firms more than a half century ago, as will be discussed in the next section.

Table 1: Regional Market Structure, 2010 (Unit: billion USD)						
Contractors	Europe	N. America	Asia	M. East	S. America & Caribbean	Africa
France	211	50	-	-	-	59
Spain	156	-	-	-	108	-
Germany	61	96	168	-	-	-
Italy	24	-	-	54	61	100
USA	-	96	97	117	35	-
Japan	4	19	78	42	5	8
S. Korea	-	5	36	111	7	22
China	24	4	174	100	33	235
Others	485	187	213	299	91	182
Total	941	457	766	723	340	606

*Adapted by author.
Source: The Ministry of Economy, Trade and Industry of Japan, "Present Situation of Exporting Infrastructure System (2012)"*

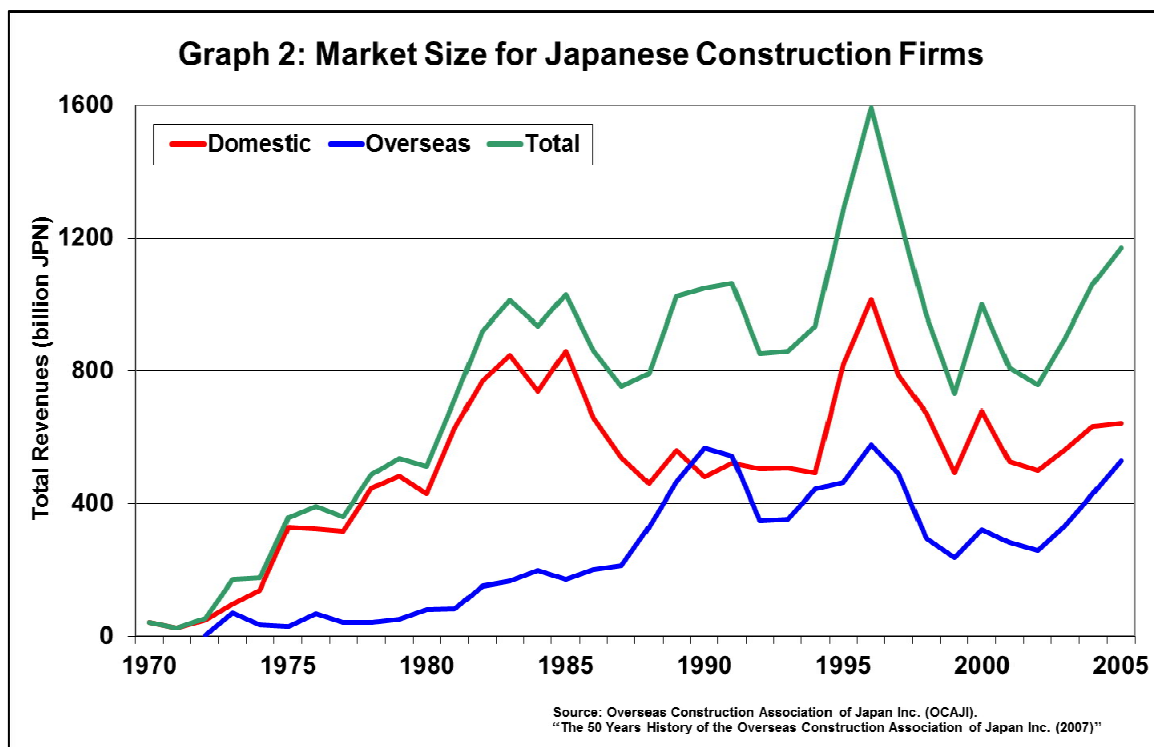
Section 2. GLOBALIZATION OF JAPANESE CONSTRUCTION FIRMS

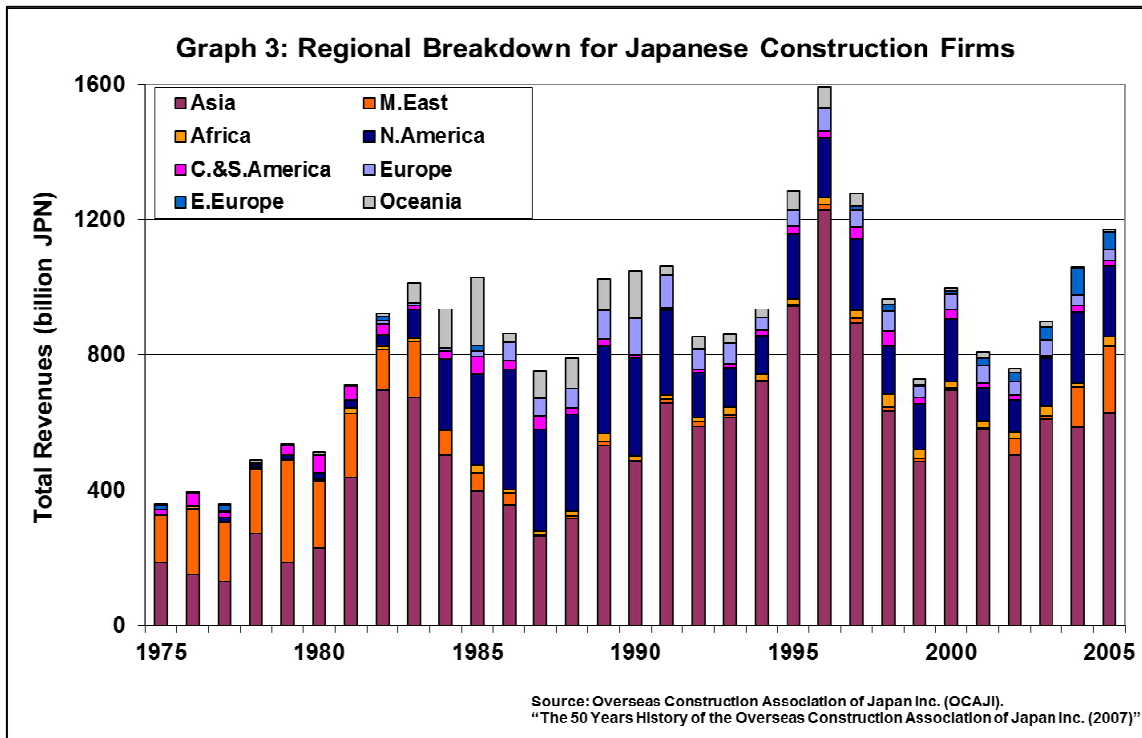
This section provides a summary of history of Japanese construction firms going global based on the book published by Overseas Construction Association of Japan Inc. (OCAJI 2007). Some important topics are selected and each paragraph is divided accordance with the timeline, pre-WWII, first project after WWII, and approximately each decade.

Prior to WW II, the first infrastructure project executed by Japanese construction firms is the railway in Korean peninsula at the end of nineteen century. A few years later, another railway project was executed in Taiwan. Several other projects including hydraulic power stations, mining, airports etc. was executed in many counties, such as the mainland of China, Vietnam, Thailand, Mexico, and Brazil until the end of WW II. However, the globalization of the construction firms at this time had different characteristics from the one seen nowadays, and was closely related to incidents and wars such that the purchasers are usually governmental institutions controlled by Japanese imperial military. All those oversea business had experienced tough situation in isolated environment in many geographically diversified areas and had finally turned into none as their assets at local were all confiscated by local governments at the end of the war, yet the survived engineers in some firms preserved the technologies.

After WW II, as the Japanese economy had started recovering from the barren and impoverished condition of postwar period, the construction industry became relatively stable. The first oversea project after the war was the U.S. military base in Okinawa Island. This project was an opportunity for all Japanese engineers to learn about more advanced modern construction machines rented by the U.S. forces. Japanese firms also learned about American contract forms which made the execution management more rational and convenient. This project was a particularly remarkable in the Japanese construction history because this was the first project that Japanese firms experienced in the form of a joint venture (also known as a “consortium”) where four American parties and three Japanese parties were involved. This historical event implies a key idea regarding RQ 3.

In general, the globalization of Japanese firms activities can be categorized into four phases, each accompanied with a crucial event in the external environment (see **Graph 2**). The first phase began after the World War II as a part of its compensation liability for those countries in South East Asia in order to rebuild the political relationships between them. Therefore the majority, around seventy percent, of their work was focused on the basic hard infrastructures in public sectors in those counties including Indonesia, Thailand, and Singapore etc. but also includes Japanese domestic market (see **Graph 3**). Japanese firms did not face any competitions in these countries as all payments were guaranteed by Japanese government. At that time, firms simply operated from the head offices in their home countries instead of establishing their own subsidiaries. Compared to the size of the home market, the overseas projects were still minor. Therefore many firms focused on the domestic market and eventually led to a lack of information of foreign competitors. Therefore regarding RQ 2, aggressiveness of firms is influenced by domestic market.





The second phase began during the 70s accompanied by the oil shock leading an increase of numbers of projects in the Middle East region. During these years, the energy resource in Japan was highly depended on the imported crude oil from the Middle East. This event made Japanese construction firms to recognize that all construction materials in the domestic market had soared dramatically and they had to support the infrastructure development in the Middle East. In order to increase the total output capacity and efficiency of the refineries, the size of each project became large. This phenomenon was also seen in the other infrastructures projects in the Middle East. American and European competitors were already participating in this market actively, by utilizing the historical relationships with local governments and supports from many consultants. South Korean government established KOCC, the national enterprise specialized in overseas construction projects, focusing on the Saudi Arabian market. In contrast, Japan was struggling with a lack of a system for such large amount of financial investments, warrants, export insurances, and management and policy of foreign exchange. Overall activity of Japanese firms in the Middle East became temporarily, most of them still operated from their home countries. Political instability and turmoil in some countries such as Iran were the major causes. Again regarding RQ 1, firms did not consider

localization process within the competition.

In the third phase during the middle of 80s, after the Plaza Accord in 1985, Japan entered into bubble economy. Prior to this event, total overseas projects awarded by Japanese firms exceeded one trillion JPN (see **Graph 3**), shifting the main market from the Middle East to Asia. They had already built high reputations in many countries, attributed from integrity regarding the contract, compliance with the lead time, reliable high technologies and qualities. All these factors gave them an international competitive advantage. Thereafter Japanese firms aggressively entered North American market and as a result they award many projects in the USA increasing their total sales dramatically (see **Graph 3**). Their subsidiaries drove the majority of the total revenue during this period as the headquarters operation focused on the public sectors whereas their subsidiaries were majored in the public sectors and those project initiated by Japanese-American firms. These satisfactorily activities led to another remarkable event during this era. The domestic market became open to foreign construction firms as the Japanese government was under severe pressure of the trade conflict between Japan and America. In order to compensate the change in the domestic market conditions, Japanese firms continuously went abroad seeking market opportunities. During this period, the characteristics of globalization of Japanese firms differed from each other depending on the countries where they could utilize the accumulated know-how, technologies in certain fields and human networks etc. In this phase, forming a joint venture for large projects became a common process. Therefore, regarding to RQ 2, home based resources, capability and accumulated experiences are important for firms going oversea markets. Regarding RQ 3, if firms do not have enough resource and capability, they should consider strategic alliances in some forms.

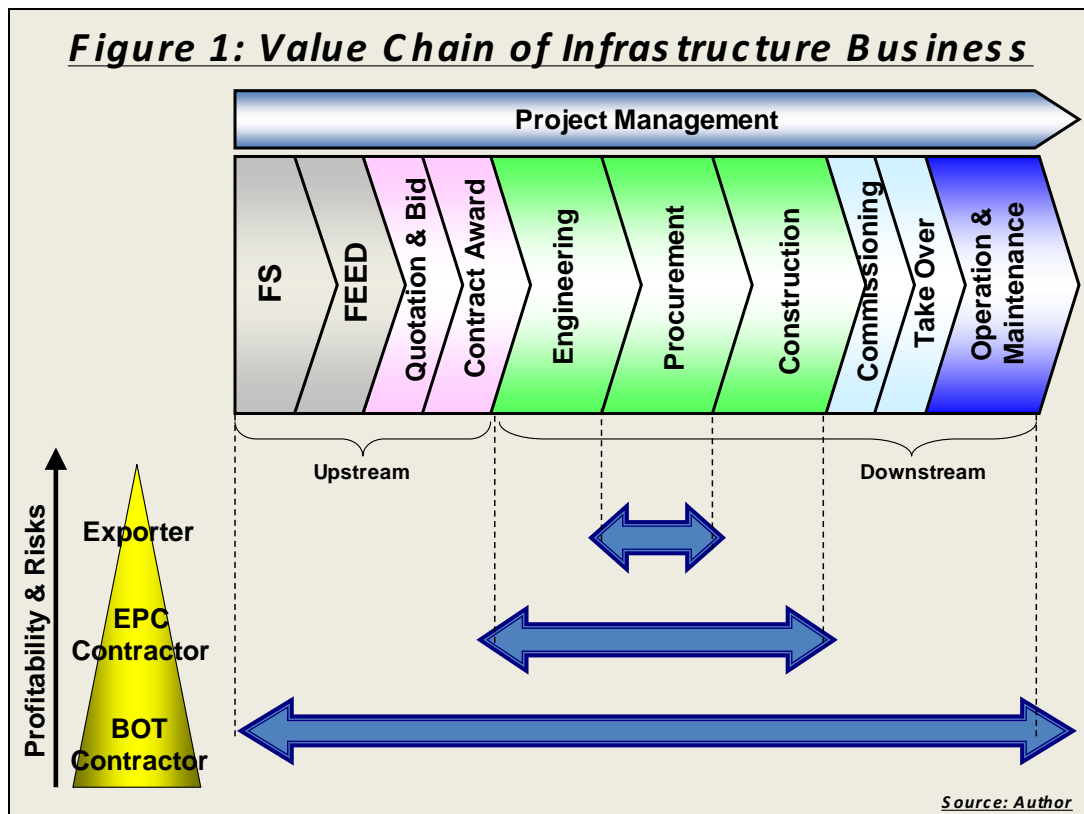
The fourth phase occurred in the late 90s after the collapse of a bubble economy in Japan followed by an Asian currency crisis and global financial crisis in 2008. These events slowed down both activities in head offices and subsidiaries but also it began for some firms where the performance of the subsidiaries in certain countries like USA, Indonesia, Malaysia became superior to their own home market. Ever since, all firms have been willing to enter the international markets especially those ones in emerging countries. Although Japanese firms perceived the importance of

the market in the Middle East and African regions, their activities remained cautious due to the country risks and political instabilities. As may hear from media, regarding RQ 1, localization may be the key strategy for firms to be more successful in oversea markets.

Section 3. INDUSTRY STRUCTURE

This section describes the characteristics of the infrastructure industry, risks of global projects in general and provides the basic concepts of risk reduction. Then it provides information about current competition in the industry and describes the emerging competitors. At the end of this section, it describes a brief history of standards in petrochemical industry and focuses on the presence of particular standards.

The value chain of infrastructure business can be divided into several categories and usually defined as the following: Feasibility Study (FS), Front-end Engineering Design (FEED), Quotation & Bid, Contract Award, Engineering, Procurement, Construction, Commissioning, Take Over, and Operation & Maintenance (see the top part of **Figure 1**). It is also reasonable to divide into two category where prior to the real construction begins, in this case till Contract Award, is called the upstream of the project and the subsequent part is called the downstream of the project. Usually, associated local government or national enterprise handle the whole project progress and they are in charge of approvals of each package of projects award.



There is a relationship that firm having a smaller liability have a small profitability (see the bottom part of **Figure 1**). Here the exporters are only to be involved within the procurement stage and may obtain relatively small margin together with small risks. EPC contractors are involved with engineering, procurement and construction stage, and may obtain moderate level of margin but greater risks. There is a total solution-type firms that are capable of managing the entire value chain activities and try to maximize their opportunity for profitability but are willing to accept much higher level of risks (they also known as a project type BOT, Build Operate Transfer, therefore BOT contractor). Historically Japanese firms begun their infrastructure business as equipment exporters taking their strong advantage of quality and advanced technologies and later some heavy industry firms entered as EPC contractors. Regarding RQ 2, such home based capability could motivate firms to enter overseas markets more aggressively.

However, in Japan, there is no firm with high reputation in managing the entire value chain providing the total solution for the customers. BOT contracts became a common project type in developing countries at the late eighty's. Remarkably, in contrast, there are many Korean contractors who are capable of taking such activities and have been running their business for decades. The absence of Japanese firms as BOT contractors is mainly because of a lack of know-how and operational management skills within them. It implies that Japanese firms have extensively been losing the scope of work with much higher profitability. However, in general, it is practically difficult to reduce the risk that may arise from the activities through the entire project. Regarding RQ 3, firms may choose to form strategic alliances to reduce their own risks.

In almost every industry, risks of any projects in global scale may be attributed to, in general, all forthcoming contingency events. There are two types of risks; the first one is called unavoidable risks (sometimes it is called force majeure) such as political turnover and natural disasters. The second type is called controllable risks that are all attributed to commercial activities. The latter type of risk is the core subject when implementing the global projects, thereafter the rest of this section will refer this type. There are several types of controllable risk and countermeasures have to be considered. Here examples of typical controllable risks are introduced accompanied with each stage

of projects, financial issues at the contract, the access problems at construction, and price policy at the operation stage.

One common item for all global projects is fluctuating currency exchange rate. It may become a serious matter if a loan from local banks and the revenue uses different currency so it is highly desirable to have the consistency of currency through the whole contract. By utilizing international financial institutions and other related capital market for the capital procurement provide stable resources with better terms and conditions when needed. Selecting appropriate partners is perhaps the most important issue unless the firm has all required capabilities in such way that they can deal with the entire process without having the support from local subcontractors, local suppliers, lawyers, consultants etc. At the execution stage, risks of the access to the critical location have to be considered. This usually includes the access to the site for the materials and human resources by appropriate transportation, where it is usually isolated from the modern technology. Implementing the site survey beforehand could reveal all such risks hence could significantly reduce the risk of the whole project becoming delayed. Finally, at the operational stage, firms should confirm that local government would guarantee the minimum required demand for the operation. Firms should dispatch their own research team to the site with the support from specialists to estimate the demand. When establishing the price system, it is highly desirable that the operator is viable to change the price flexibly, regarding the inflationary economy and macro economical factors. Regarding RQ 3, firms are recommended to create a partnership with others who already have experiences and know-how when contingency events occur.

Not only during the execution stage of the project, but collaboration with other firms, that includes both domestic and foreign firms, and trading firms in a variety of types, is common in infrastructure business nowadays. Japanese firms with risk-averse attitude prefer collaborating with other Japanese firms by forming a consortium with one trading company as a whole project manager. For further details, please refer to section 3-3. Since any infrastructure project requires a long range of time span, usually more than ten years, and tremendous amount of financial resources which sometimes becomes over billion dollar project, it is desirable to minimize the risks of uncertain

events.

The main difference between forms of a joint venture and a consortium is the profit distribution. For a joint venture project, overall profit will be distributed to all participated parties based on the fixed ratio agreed in the contract. In this way, all parties could avoid conflicts of interest between them; however, it requires huge effort and time for coordination and decision making. On the other hand, a consortium type project, each party takes the responsibility for the scope of works and budgets so that prompt response and execution is possible. But if work allocation is inappropriately implemented or problems accompanied with additional cost is not noticed, it often leads to conflict of interests. Risk management may be a systematic process and the project manager should be able to understand and apply such processes. Several generalized analytical tools for risk management already exist and they include risk identification process, both qualitative and quantitative analysis to control the cost, schedule, scope and quality etc. Therefore with regards to RQ 3, firms forming strategic alliances would possess, at least, the capability to deal with the allocated works accompanied with smaller risks. Then the form of alliance and selection of partnership becomes the key issue.

In the late 90s, Japanese construction firms experienced tough competition among all other multinational firms but usually recognized as one of most active and aggressive organizations going abroad. This can clearly be indicated by their total revenues reported in these years and they were always ranked within the top in regions all over the world, Asia, Middle East, Africa etc. This trend of industrial growth has dramatically changed in the past decade. The following table is the latest ranking of the top international contractors announced in 2014 (see **Table 2**). The top five positions are still dominated by European and American firms, Groupo ACS, HOCHTIEF AG, Bechtel, VINCI and Fluor Corp.; however, Japanese firms had lost the strong force that they used to have. Even though JGC, the top Japanese firm on the list, has been improving its financial performance in the past few years, by restructuring the operational process due to the economic impact in 2008, the massive earthquake in 2011 and the influences of strong Japanese currency; they are losing its competitiveness against other rivals in the global scale. However, regarding RQ 2, JGC seems to

Table 2: Top International Contractors 2014

Rank	Firm	Country	International Revenue (\$mil.)
1	Grupo ACS	Spain	44,053.80
2	HOCHTIEF AG	Germany	34,845.00
3	Bechtel	U.S.A.	23,637.00
4	VINCI	France	20,292.60
5	Fluor Corp.	U.S.A.	16,784.30
9	China Communications Construction Group Ltd.	China	13,162.50
12	Construtora Norberto Odebrecht	Brazil	9,877.10
13	Hyundai Engineering & Construction Co. Ltd.	S. Korea	8,707.80
15	Samsung Engineering Co. Ltd.	S. Korea	7,132.50
17	Samsung C&T Corp.	S. Korea	6,308.00
20	China State Construction Engineering Corp.	China	5,742.70
23	Sinohydro Group Ltd.	China	5,314.40
25	China National Machinery Industry Corp.	China	5,288.90
27	JGC Corp.	Japan	4,822.00
28	China Railway Group Ltd.	China	4,766.90
29	GS Engineering & Construction Corp.	S. Korea	4,713.40
30	Daelim Industrial Co. Ltd.	S. Korea	4,381.30
39	China Railway Construction Corp. Ltd.	China	3,486.00
43	SK Engineering & Construction Co. Ltd.	S. Korea	3,051.40
44	Chiyoda Corp.	Japan	2,957.70
45	Obayashi Corp.	Japan	2,889.00
46	CITIC Construction Co. Ltd.	China	2,830.90
47	Larsen & Toubro Ltd.	India	2,786.70
49	Daewoo E&C Co. Ltd.	S. Korea	2,759.90
51	China Gezhouba Group Co. Ltd.	China	2,532.70
52	ENKA Construction & Industry Co. Inc.	Turkey	2,398.80
53	Renaissance Construction	Turkey	2,391.10
54	Kajima Corp.	Japan	2,386.80
57	POSCO Engineering & Construction	S. Korea	2,373.20
58	SEPCOIII Electric Power Construction Corp.	China	2,356.30
63	China Petroleum Pipeline Bureau (CPP)	China	2,114.00
64	Shanghai Electric Group Co. Ltd.	China	2,105.50
68	China Metallurgical Group Corp.	China	1,945.00
70	Toyo Engineering Corp.	Japan	1,884.70
71	China Civil Engineering Constr. Corp.	China	1,879.50
73	Hanwha Engineering & Construction Corp.	S. Korea	1,648.70
75	Shimizu Corp.	Japan	1,580.70
76	China Petroleum Eng'g & Construction Corp.	China	1,576.60
77	Construtora Andrade Gutierrez SA	Brazil	1,571.70
79	Dongfang Electric Corp.	China	1,480.40
82	China National Chemical Engineering Group	China	1,315.50
83	TAV Construction	Turkey	1,268.30
84	China Int'l Water & Electric Corp. (CWE)	China	1,266.20
85	China General Technology (Group) Holding Ltd.	China	1,123.60
86	Polimeks Insaat Taahhut ve San Tic. AS	Turkey	1,252.10
88	Takenaka Corp.	Japan	1,236.50
89	Sinopec Engineering (Group) Co. Ltd.	China	1,153.20
90	Taisei Corp.	Japan	1,150.00
91	Taikisha Ltd.	Japan	1,109.70
92	Punj Lloyd Ltd.	India	1,089.00
93	CGC Overseas Construction Group Co. Ltd.	China	1,057.50
94	OAS SA	Brazil	1,020.00
97	Penta-Ocean Construction Co. Ltd.	Japan	952.3
98	Qingjian Group Co. Ltd.	China	945
99	Arabian Construction Co. SAL	Lebanon	937.6

Adapted by author, source:
ENR, (2014). "Top 300 International Contractors 2014".

have home based capability to enter international competition. As shown in the table, there are many newly emerging competitors from developing countries that are almost dominating the rest of the top hundred ranking position.

In terms of international revenue, some firms had achieved remarkable growth just within the past three years. Chinese construction firms have long been aggressively participating in many kinds of infrastructure projects in the region of Asia and Africa. More surprisingly, the presence of Chinese firms is also increasing in the Middle East region where Japanese firms have long had a stronghold. There are two types of project in term of technologies, for an example, in transportation infrastructure business, low technology type such as highway project, and high technology such as airport. Chinese contractors are widely accepted in both types such that they are already listed on the vendor list in some countries. Construtora Norberto Odebrecht, one of the Brazilian construction firms, has already surpassed all other Koreans which thought to be major Japanese competitors in the past few years; and has been seeking an opportunity to become at the dominant global position. Larsen & Toubro Ltd., an Indian construction firm, ENKA Construction & Industry Co. Inc. and Renaissance Construction, both are Turkish construction firms, have also attained the same competitiveness as other Japanese firms. Regarding RQ 2, these emerging competitors may have resources and capabilities, as well as aggressiveness to enter any regions around the globe.

This is an absolutely chaotic situation for Japanese firms where they have been struggling with for many years trying to discover the solution to increase competitiveness again. Information seen in the public these days often indicates that Japanese government should play a key role in project progression and take the initiative to control the operation management among all those Japanese participating private firms for public-private partnership and optimize the output of the demanded construction facility by utilizing the high technology that Japanese firms possess. Yet the practice is much harder that being said. Because Japanese culture is more likely to have consensus oriented decision making processes, involving a large number of parties which is common in the global scale projects, which leads to slow responses when communicating with the opponent. In contrast to Japanese firms that have higher cost, emerging firms have cost advantage which is one

major factor of that help them to win international biddings. Other reason is that those emerging firms have typically integrated the horizontal value chain activities so that prompt response enables emerging firms to convince the local government that specifications satisfy all requirements. Together with the financial supports from the home country government, the consequence is that these emerging firms participate into infrastructure projects without much concern of taking high risks of the uncertainties. Regarding to RQ 2, this would further spur the aggressiveness of emerging firms to be competitive international bidders.

The following is a brief history of standards in petrochemical industry and focuses on the presence of particular API standards established by American Petroleum Institutions (API), leading to one of important assumption in this study, which will be stated in Chapter 4. Establishing standards are an essential process as it provides rigorous and important technical references for entire activities of the firms not only limited to the oil and gas industry but any kinds, regardless of the level of the standards applicable to national, regional and international projects. For global sized projects, excellent standards for all related areas facilitate such implementations trouble-free in an increasingly complexity in petrochemical industry. This is one of the characteristics in natural resource-based industry. The depletion of the resources is the major issue. Any businesses involved in the oil and gas industry is very capital intensive accompanied with high risks, therefore in order to keep increasing output; firms have to improve exploration, extraction and refining technologies. This yielded the diversified and complicated system of standards in the global oil and gas industry, including firm's own project specifications. The investigation done by one of European organizations in 1994 revealed that nearly two thousand standards were in use by a number of operators in Europe only. Those regulations for the oil and gas industry were historically set by national regulators, without consideration of international applications. It unconsciously led to differences in regulations with wide variations across the regions reflecting diversified environments and backgrounds. One new regulation is usually referred by existing one so some regulated items are quite similar to each other. With a large effort and capital investment, some standards became more common with more sophisticated contents to develop consistency in technical requirements on a

global basis with the necessary national adaptations to the prevailing conditions at the operation sites. Hence few standards became widely acceptable in the global projects.

The American Petroleum Institute (API) is a one of the leading standards in the development of petroleum, including the primary and secondary products; and petrochemical facilities and their operating standards covers a wide range of areas including oil extraction process, refining process, equipment specifications etc. Because it enables the engineering and operating practices to be safe, interchangeable for equipment and materials, many governments and national enterprises have been integrated into their regulations and adopted by ISO for worldwide acceptance. In such a complicated petrochemical industry and works involved in related fields, API provides two important implications which are beneficial for involved parties. First, regardless of the amount of required effort to understand the whole concepts, specifications could facilitate communications between all stakeholders majorly including purchasers and manufacturers in both upstream and downstream activities. Second, these standards also facilitate communications with related industry which mainly includes the secondary products, as a proven industry practices for firms understanding common API practices. Therefore firms are usually being asked to submit their experience records whether they have managed to construct the facilities or equipment complying with the required standards. API Standards combine components of both specifications and recommended practices, and it is intended for adoption by regulatory agencies or authorities having jurisdiction. Formatting bulletins and technical reports deliver technical information on a specific subject or topic. According to the investigation and its result referred in the “Regulators ‘use of standard” published by The International Association of Oil & Gas Producers in 2010, API has been most referenced by national regulators around the globe. It came to the conclusion stating that:

“Standards provides for clear and known references for parts, equipment, systems and facilities of this complex industry. With this recognition comes the responsibility for the oil and gas industry, regulators included, to maintain and develop a suitable package of standards for the continued efficiency of the global oil and gas industry”

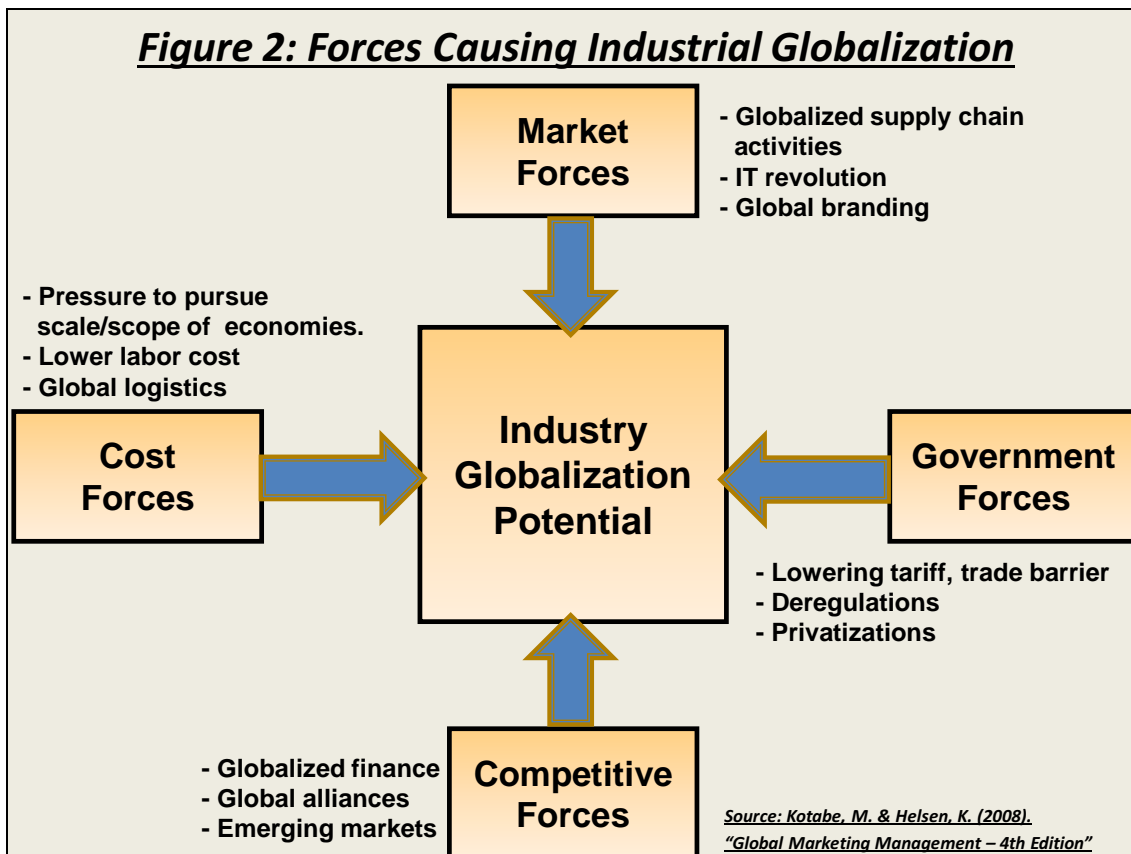
This indicates that the global petrochemical industry has a tendency of converging towards a certain global standards.

CHAPTER 3. LITERATURE REVIEW & HYPOTHESES

Section 1. GLOBAL STRATEGY

All industries have the potential to be globalized such that, nowadays, it is hard to find one that is completely isolated and kept within the domestic activities. To some extent, all industries are partially influenced by global activities and global firms always attempt to integrate the whole market (Levitt 1983). The potential of the industrial globalization is affected by four forces; market, cost, government, and competitive (see **Figure 2**). The market force is determined by the consumer behaviors. The force generally includes emerging of globalized supply chain activities as well as IT revolution and global branding. The cost force is determined by the profitability of the business domain. This includes the pressure to pursue the scale and scope of economies, lower labor cost, and global logistics. These would affect the decision making for the production site, market selection and global research and development (R&D). The government force is simply determined by the governments in each country. The policy includes lowering tariff and trade barriers, deregulations, and privatizations. Participating in the regional trade agreements is particularly seen in media these days. The competitive force is strongly determined by the rivalry and it spurs the need for global strategy of each firm. The force includes globalized finance system, global alliances and increasing in the number of emerging markets.

There is much research on globalization process regarding its strategy and organization growth. The sequence of the globalization process usually begins with exporting, direct sales, overseas productions; and at the later stage, marketing, designing and R&D functions would be transferred (Dunning 1993). The studies by Dunning (1993) led to develop the concept of OLI framework, Ownership, Location and Internalization specific advantages, explaining the possible reasons why firms gain advantage as they go globalized. These include the multi-nationality organizational and risk diversification theories (Kogut 1985, Rangan 1998), resource based theory approach (Conner & Prahalad 1996), and others. Global firms usually possess the management capability to control the complex organization. To penetrate the market, firms have to establish their



own local offices. Firms can manage the local business and interact with local human resources which may be completely different from those in their home markets. Prudent managers perceive the above forces (see **Figure 2**) to realize the global market as one market and try to develop a system having a global integration to create scales and scopes of economy, and local responsiveness simultaneously (Bartlett & Ghoshal 1989). However, in practice, it is difficult to attain both cost leadership and differentiation strategies, and they are classically defined as a trade-off relation (Porter 1980). Some studies had developed more sophisticated concepts to overcome such a trade-off problem in the global market. The practically applicable idea in emerging markets is that firms adapt their products or services by a vertical differentiation strategy. Eliminating and/or downgrading the functions of products or services enable them to be competitive in some countries where the majority of consumers demand simpler items than those ones served in developed countries (Kim & Mauborgne 2005). Because the world is not as flat as it was thought; the cross-border integration of activities is at a much lower level than was expected (Ghemawat 2003). His study explicitly suggests

not all the integration that is required to add value across borders need to occur within single organization. By introducing additional dimension, arbitrage, to the Porter's work (1980), aggregation and adaptation, it is possible for firms to overcome the trade-off relation, in which they usually attain from one of them and ultimately for all at the later stage (Ghemawat 2007).

Although a large investment in production reduces the cost and builds an entry barrier against other new entrants, there is no guarantee that the firm could permanently sustain the cost advantage in the dynamics of the global market. In natural resource related industries, the major players experienced horizontal integration through the value chain after the Second World War. However, they became more privatized or the entire value chain was broken into pieces such that more players had entered. The Herfindahl Index indicates an increase in producers and refiners between the 50s and the 70s (Ghemawat 2000). Of course, this result cannot be criticized by a simple statistical analysis. As more new natural resource fields were discovered as the exploration technologies have improved, there is an increase in number of players. Although in emerging markets, many of them are still horizontally integrated and nationalized. Firms may achieve better performance if they take diversification strategies in emerging markets such that each business domain could reduce the risks arise from uncertainties in the market (Khanna & Palepu 1997). Natural resource based industries in countries like OPEC, Organization of the Petroleum Exporting Countries, were particularly influenced by their political activities. There always exist some differences between developed market and emerging markets. Firms should understand those differences or sometimes absence of materials; in a large scale, this is called institutional voids. The idea implies that firms should adapt their home developed strategy to specific selected markets or stay away from it (Khanna 2005). When firms face a situation that they do not find appropriate human resources, they should not hesitate to invest and to spend time for educating locals with appropriate ethical standards and respect (Meyer 2004).

Section 2. GLOBALIZATION

For Japanese construction firms, the localization of subsidiaries began more active at the end of the 70s. Investment and financing for infrastructure projects in developing countries majorly depended on foreigners and the capital needed to flow inwards efficiently. Local governments set strict conditions for the international biddings, for examples, prioritizing local firms as purchasers, establishing a joint venture became a necessity, and sometimes political protections for the infant industry, so that those local firms could gain competitiveness. Firms newly entering to these countries had to learn the complexity of cross border direct investment (Bartlett & Ghoshal 1989). Many foreign firms were welcomed to retain their activities in local markets by establishing subsidiaries and branches. In particular, local procurements were desired as it stimulated the entire national economy. This led local firms to increase their capabilities by upgrading the corporate management and human resource management, developing related industries, knowledge diffusions etc. The demands by local firms may differ from each country. Therefore, applying a regionally fragmented strategy can create more value than a single global one (Ghemawat 2005). He also states that:

“Without a clear sense of how a regional structure is supposed to add value, it is impossible to specify what the structure should try to achieve. A company with no regional HQs may still use regions as the building blocks of its overall strategy, and a company with many regional HQs may still not have a clearly articulated regional strategy. In other words, having regional headquarters doesn’t mean that you actually have a regional strategy”

In fact, most multinational enterprises had never been passive against local government policies. Lobbying activities to both home and the local governments create tremendous advantage for firms and it sometimes overturns industrial policies. Employing local personnel as the top managers in local subsidiaries may take the advantage of having direct connections to key

governmental institutions. Interestingly, a comment made by Mr. Gothlin, CEO of Accenture Consulting, in one of the article stated that,

“Many Japanese multinational enterprises, which actively entered foreign markets during the 80s, have well-structured and sophisticated global organizations and leaders. However, those firms became globalized during 90s usually take important decision processes in head offices and dispatch some expatriates to manage the local organizations. In order to pursue the real globalization, it is clear that these kinds of organizations are inappropriate. The key solution is to provide local manager with authority and responsibility. Good examples can be found in LG, South Korean electronics firm, in India, or the acquired British automobile firm Jaguar by Indian firm, Tata Motors. Typically, Asian firm cultures tend to protect the centralized decision making process, but fostering local leaders with some respect is inevitable to gain capability for rapid response against local needs, and to sustain competitiveness in the global market.”(translated by author, from Japanese)

This implies that localization process is important for any firms and it influences the financial performance in the long term. Japanese headquarters’ trusts for local manager and employees lead Japanese firms to provide autonomies with responsibilities, information and other resources. In practice, it is difficult for firms to explore markets where they have never been. At the beginning of the globalization stage, firms tend to invest in foreign markets that are geographically close to their home market and then later they begin to invest in further markets. Classically this is described as psychological distance (Johanson 1990) and also improved to more sophisticated concepts of four distances; cultural, administrative, geographical and economical distances (Ghemawat 2001). However, once the firms overcome this problem, it increases the morale of the locals and may result in higher performance.

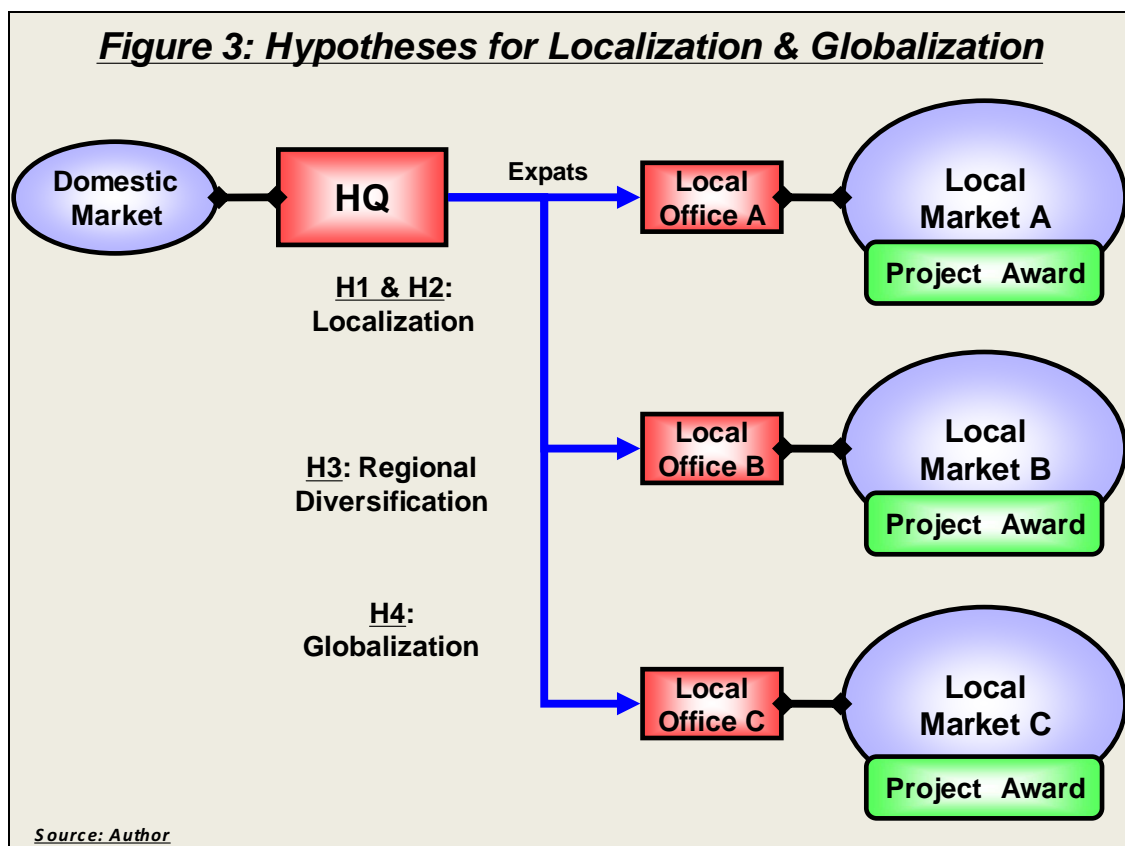
The statement and argument above leads to the following hypotheses (refer to **Figure 3**).

Hypothesis 1 (H1): If firms are more localized in terms of human resources, they are more likely to receive project awards.

Hypothesis 2 (H2): If firms have longer local activities, they are more likely to receive project awards.

Hypothesis 3 (H3): To some extent, if firms establish more regional branches, they are more likely to receive the project awards.

Hypothesis 4 (H4): If firms have a high ratio of foreign to domestic revenues, they are more likely to receive project awards.



Section 3. CROSS BORDER ALLIANCES

Strategic alliance combines two or more firms having mutual benefits to achieve an important goal. This is a common process in technology intensive industry where no firm owns all the latest technologies. Firms are recommended to use alliances selectively to gain the advantage of foreign enterprises hedging against risk, provided that they still create the competitive advantage at their home countries (Porter 1990). They have to select some countries or markets as an entering target and they usually have to make an alliance with some firms who have the experience and local knowledge. In general, international joint ventures or strategic alliances may fail with high probability. Several possible explanations were made to describe the causes for such failures. Alliances are essentially unstable as both firms strive to cooperate on the condition that they help each other in some instances but they remain as rivalries (Kogut 1989). If the purpose of the alliance is just limited to the learning from each other, all parties compete for knowledge acquisitions and tend to take opportunistic behaviors (Khanna, Gulati & Nohria 1998). Therefore, they have to take higher priority for trust building at the beginning of the formation stage. Such trust is also influenced by the national and organizational cultures of each party (Hofstede 1980). A research on cross-border alliance implies several important facts for creating successful partnerships. The firms involved within the alliance are preferred to be competitive, in a leader or at least in a good position in the market, and to have autonomy and flexibility for management process in all organizations (Bleeke & Ernst 1991). Although it is still controversial, the firms are desired to have equal amounts of ownerships so that both firms would be interested in long term success.

From the resource-based point of view, firms obtain sustained competitive advantages by implementing strategies that exploit their internal strength, though it is hard to define and measure the resources (Barney 1991). If firms apply foreign direct investment as the consequence of strategic asset seeking by utilizing domestic based resources and capabilities that they are absolutely confident enough, they tend to enter the foreign market individually to avoid opportunism-related conflicts and increase of transaction cost (Conner & Prahalad 1996). Nevertheless, alliances were historically applied as a complementary function of a global strategy, and in some industries, these

alliance constellations had influential power for the whole market (Gomes-Casseres 2003). Many foreign firms entering developing countries preferred to make an alliance or form a joint venture with local firm(s) to acquire knowledge in uncertain environmental markets. In exchange, local partners would like to acquire advanced technology, management techniques and knowledge of international markets. Regulations of foreign capital cause the firms to select specific entry mode. In the public sectors in emerging markets like India and Brazil, foreign firms were often forced to form a joint venture. For a successful alliance in an emerging market, foreign firms should understand the demands from each party in surrounded legal and institutional environments (Young et al. 2011). As mentioned before, lobbying activities to both home and local governments are powerful tools so that local personnel having direct connections to the key governmental institutions are advantageous.

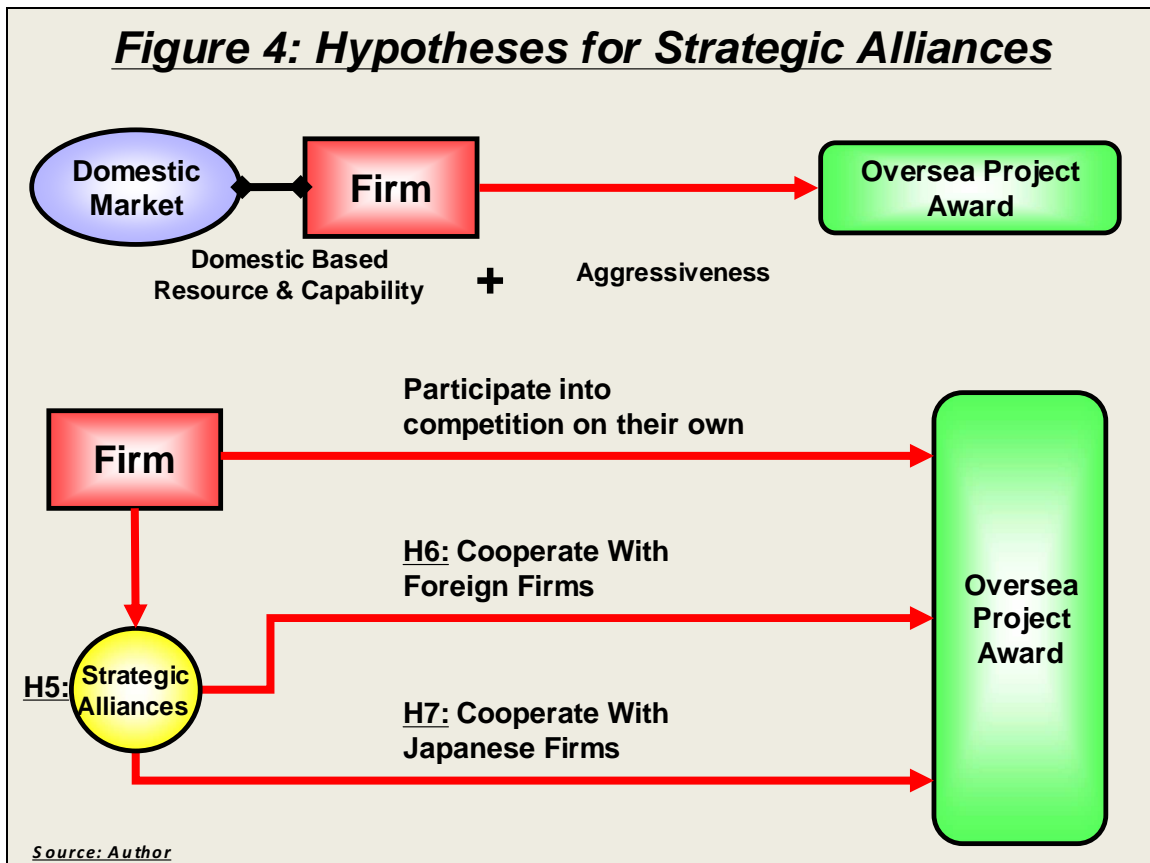
Recently, Japanese trading firms aggressively participating in many global infrastructure projects, particularly in independent power plants. This is the consequence as the soft infrastructure at home country were developed, especially project finance by institutions such as JBIC, Japan Bank for International Cooperation, and other major banks. These trading firms are taking an important role at a position of project management, controlling the entire value chain activities as BOT contractors (see **Figure 1**). Intense competition in the domestic retail sector due to saturated domestic market changed their attitude towards overseas business. By utilizing their global networks built over decades, they are actively employing locals and provide autonomy to local branches for rapid response to local needs. Under competitive pressure, such a progressive shift in corporate strategic objective reflecting firms' motivation for operating internationally can also be found in other industries (Malnight 1995). Although it is still far to be major competitive players in global infrastructure business, these trading firms are willing to take both high profitability and risks by managing the whole project and taking the initiatives of allied groups.

The statement and argument above leads to the following hypotheses (refer to **Figure 4**).

Hypothesis 5 (H5): If firms collaborate with other firms, they are more likely to receive project awards.

Hypothesis 6 (H6): If firms collaborate with foreign firms, they are more likely to receive project awards by forming alliances with local firms.

Hypothesis 7 (H7): If firms collaborate with Japanese firms, they are more likely to receive project awards by forming alliances with Japanese trading companies.



CHAPTER 4. METHODOLOGY

Section 1. DATA ACQUISITION & PROCESS

This section describes the origin of acquired data and provides statements of key assumptions made in order to facilitate the statistical approach in this study. Then it describes the process applied to acquired data in order to implement statistical analysis. Three important assumptions are stated in order to implement the analysis.

The objective of this analysis is to estimate the potential factors and their effectiveness resulting successful project awards. Therefore, the dependent variable is *award*, the number of project awards for certain firms. Required control variables are indicators of activities in overseas markets, financial performance at home countries etc. Annually published “Plant Export Data Book” by The Heavy & Chemical Industries News Agency contains the table of projects awarded by Japanese firms in different infrastructure sectors, for example, transports, power etc. Information of each project consists of the country of the project site, types of contracts, prices of contracts if available, and names of awarded firms if disclosed. The numbers of total projects awarded to Japanese firms in the global petrochemical industry are 51 in 2009, 54 in 2010, 76 in 2011, 79 in 2012 and 73 in 2013 (The Heavy & Chemical Industries News Agency 2010, 2011, 2012, 2013 & 2014). In this study, 47 firms were selected as those firms awarded more than one project within five year data span, so each firm would appear at least once. Therefore the dependent variable *award* is always positive integer such that it appears as 0, 1, 2, 3 ...

Because of the characteristics of the international bidding, materials disclosed to public contain only information about the successful bidder. Some key information such as the number of other participants those who have lost the bid, prices of their bids, reason of the failure, and names of their partners are not disclosed. Here for further analysis requires an important assumption for such blinded competitions. The assumption is that the competitiveness of each international bid in a particular country in a particular year is equivalent to the condition as if, instead of other firms not disclosed, all other Japanese firms have entered into the same global competition in that country in

that year. This also implies another assumption which is that the firm's policy for making alliances with other firms was unchanged through the entire five years data span. For an example, if a firm has a policy willing to collaborate with foreign firms, its policy remains the same between 2009 and 2013. Therefore, the data span from 2009 to 2013 was intentionally selected. From the resource based point of view, firm gain the competitive advantage by pursuing policy, accumulating experience and obtaining the efficiency in the long run (Teece et al. 1997). It is certain that many Japanese firms became willing to enter overseas markets after the global financial crisis in 2008.

Some firms have awarded more than one project through the entire five years data span, logistic regression seems to be inappropriate. Applied method is called negative binomial regression, which is a generalized Poisson regression, and is particularly useful for data with discrete variables. According to the statement made by the Institute for Digital Research and Education of UCLA (USA), the condition for use is when the conditional variance exceeds the conditional mean. A similar guideline is also recommended by other statistical software researchers (Zeileis et al. 2008). Here the dependent variable is the number of awards won by certain firms in a certain country in a certain year. Because these numbers are count data, which are non-negative integer values with maximum number of 13 through the whole data, it is feasible to apply negative binomial regression test because the assumption of the Poisson model is no longer valid as the range of count is limited.

Section 2. DATA DESCRIPTION FOR HYPOTHESIS TESTS

The hypotheses are tested using the independent variables as follows: To test **Hypothesis 1** (If firms are more localized in terms of human resources, they are more likely to receive project awards), we construct *local_expat_r* (the ratio of numbers of local employees to expatriates) and *local_emp_r* (the ratio of numbers of local employees to employees at home country). We expect that those two variables have positive coefficients. To test **Hypothesis 2** (If firms have longer local activities, they are more likely to receive project awards), we construct *exp_year* (experience of years since the branch offices or subsidiaries established). We expect that the variable has a positive coefficient. To test **Hypothesis 3** (To some extent, if firms establish more regional branches, they are more likely to receive project awards), we construct *num_country* (the number of countries the firm has established branches), *num_office* (the number of branch offices the firm has established) and *off_country_r* (the ratio of number of country markets entered to number of branch offices). We expect that those three variables have positive coefficients. The data source for these independent variables is “The Advance of Japanese Firms into Foreign Markets” published by Toyo Keizai Data Bank which contains organizational structure of overseas offices of Japanese firms. Information contains numbers of branches in entered countries, numbers of local employees and expatriates, established years and the rates of capital fund (Toyo Keizai Data Bank 2009, 2010, 2011, 2012 & 2013). To test **Hypothesis 4** (If firms have a high ratio of foreign to domestic revenues, they are more likely to receive the project awards), we construct *foreign_r* (the ratio of export revenue to total revenue). We expect that the variable has a positive coefficient. The data source for *foreign_r* is “Nikkei NEEDS Database” which is a database available online managed by Nikkei Media Marketing, INC. Some key financial statements of firms can be found and these include domestic total revenue, marginal profit, overseas total revenue, numbers of employees at home countries, and capital (Nikkei Media Marketing, INC. 2009, 2010, 2011, 2012 & 2013). These hypothesis tests should provide some implications to RQ 1 regarding the localization process how the ratio of number of local employees, expatriates and employees at home country influence the number of successful project awards. These hypothesis tests should also provide some implications to RQ 2

regarding how aggressiveness of the globalization process (relative size of overseas markets to the home market) influences the number of successful project awards.

To test **Hypothesis 5** (If firms collaborate with other firms, they are more likely to receive project awards.), we construct *indiv_r* (the ratio of awards without strategic alliances to all winning awards). We expect that the variable has a negative coefficient. To test **Hypothesis 6** (If firms collaborate with foreign firms, they are more likely to receive project awards by forming alliances with local firms), we construct *local_r* (the ratio of awards with strategic alliances with local foreign firms to all winning awards). We expect that the variable has a positive coefficient. To test **Hypothesis 7** (If firms collaborate with Japanese firms, they are more likely to receive project awards by forming alliances with Japanese trading companies), we construct *trade_r* (the ratio of awards with strategic alliances with Japanese trading firms to all winning awards). We expect that the variable has a positive coefficient. The data source for these independent variables is Plant Export Data Book. These three hypothesis tests should provide some implications to RQ 3 regarding how the selection of strategic alliance partners influences the number of successful project awards.

Moreover, we have several control variables such as *sales* (total revenue), *profitability* (the ratio of marginal profit to total revenue), *employee* (the number of employees at home country), and *year dummy*.

CHAPTER 5. RESULTS & IMPLICATIONS

The result of correlation analysis of all variables stated in the previous chapter is shown in **Table 3**. This indicates that there is no significant co-linearity among selected control variables against the dependent variable (DV) *award*, the number of project awards for certain firms. The outcome of the statistical (negative binomial regression) analysis is summarized in the result table (see **Table 4**). Each row represents the coefficients of selected control variables with standard error in the brackets. Each column represents a test (1) to (12) described in the previous chapter. Implications of results are also described in this section and they are stated with an explanation of the hypotheses made previously.

Column (1) does not indicate a positive and statistically significant value for the localization parameter *local_expat_r* (the ratio of numbers of local employees to expatriates). **Hypothesis 1 (H1)** - the effect of localization process to successful project awards - is not evidently supported. This implies that in terms of the ratio of numbers of local employees to expatriates, localization is not a significant factor for firms to get project awards successfully. Column (2) also does not indicate a positive and statistically significant value for another localization parameter *local_emp_r* (the ratio of numbers of local employees to employees at home country). Again **H1** is not evidently supported. This implies that in terms of the ratio of employees at home country to local employees, localization is not a significant factor for firms to get project awards successfully.

Column (3) indicates a positive and statistically significant value for *exp_year* (experience of years since the branch offices or subsidiaries established). **Hypothesis 2 (H2)** - the effect of time length of local activities to successful project award - is evidently supported. This implies that if overseas branches or subsidiaries have longer history after establishment, they are more likely to be successful.

Table 3: Correlation Analysis of Variables																
	<i>award</i>	<i>sales</i>	<i>profitability</i>	<i>local_exp_r</i>	<i>local_emp_r</i>	<i>num_country</i>	<i>num_office</i>	<i>off_country_r</i>	<i>employee</i>	<i>foreign_r</i>	<i>indiv_r</i>	<i>trade_r</i>	<i>nontrade-r</i>	<i>local_r</i>	<i>nonlocal_r</i>	
<i>award</i>	1.0000															
<i>sales</i>	-0.1506	1.0000														
<i>profitability</i>	0.0361	-0.1565	1.0000													
<i>local_exp_r</i>	-0.1305	-0.2420	0.3781	1.0000												
<i>local_emp_r</i>	0.6162	-0.1414	0.1012	-0.3398	1.0000											
<i>num_country</i>	0.1035	0.3582	-0.0600	-0.1952	0.4216	1.0000										
<i>num_office</i>	-0.0122	0.5479	-0.1176	-0.2426	0.3092	0.9020	1.0000									
<i>off_country_r</i>	-0.1439	0.5888	-0.1626	-0.2561	0.0456	0.4346	0.7127	1.0000								
<i>employee</i>	-0.1115	0.8495	-0.0459	-0.2848	0.0492	0.2994	0.4821	0.5013	1.0000							
<i>foreign_r</i>	0.3416	-0.1867	0.3286	-0.1348	0.5645	0.3265	0.1889	-0.0202	-0.0662	1.0000						
<i>indiv_r</i>	-0.0814	-0.2763	0.0937	0.0344	0.0765	-0.1969	-0.2385	-0.1369	-0.2933	-0.3152	1.0000					
<i>trade_r</i>	-0.0284	0.2413	-0.0287	-0.1653	-0.0620	0.1709	0.2277	0.1230	0.2071	0.2122	-0.5808	1.0000				
<i>nontrade-r</i>	0.0182	0.5325	-0.0510	-0.0860	0.1457	-0.0242	0.0409	0.1708	0.6648	0.1760	-0.5348	-0.0260	1.0000			
<i>local_r</i>	0.2259	-0.0253	-0.1922	0.1945	-0.0273	0.2460	0.2797	0.1282	-0.0651	0.0512	-0.2489	0.0422	0.0341	1.0000		
<i>nonlocal_r</i>	0.1712	-0.1468	-0.0319	0.1191	-0.0876	0.0825	0.0049	-0.1260	-0.1351	0.2022	-0.3840	-0.0688	-0.0294	0.1137	1.0000	
Average	0.06	1349310	0.06	93.18	0.01	12.0	26.4	1.96	27845	0.46	0.68	0.12	0.09	0.03	0.07	
S.D.	0.32	1858845	0.06	191.50	0.04	8.1	24.1	0.84	57309	0.23	0.38	0.25	0.22	0.07	0.17	
Max.	4	11226735	0.50	1876	1.11	38	129	4.5	361796	1	1	1	1	0.27	1	
Min.	0	9941	-0.05	0	0	1	1	0.56	177	0.03	0	0	0	0	0	
N	4559	3693	3693	458	3693	3857	3857	3857	3693	3163	4559	4559	4559	4559	4559	

Table 4: Summary of Overall Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
<i>DV_award</i>	-4.02E-07*	-3.08E-07**	-2.51E-07***	-4.49E-07***	-4.19E-07***	-1.97E-07**					
	(2.09E-07)	(1.02E-07)	(6.96E-08)	(8.88E-08)	(9.80E-08)	(8.32E-08)					
<i>sales</i>											
<i>profitability</i>	-3.97	0.77	-0.70	-0.81	-0.80	-1.48	-2.74*	-2.38*	-0.92	-1.51	-0.62
	(5.22)	(1.64)	(1.35)	(1.37)	(1.36)	(1.38)	(1.40)	(1.43)	(1.45)	(1.40)	(1.43)
<i>local_expatri</i>	-3.60E-03										
	(3.10E-03)										
<i>local_emp_r</i>	0.32										
	(3.85)										
<i>exp_year</i>			5.45E-02***				4.95E-02***	4.91E-02***	5.13E-02***	5.00E-02***	5.15E-02***
			(6.65E-03)				(6.51E-03)	(6.55E-03)	(6.56E-03)	(6.50E-03)	(6.55E-03)
<i>num_country</i>				4.80E-02***							
				(1.12E-02)							
<i>num_office</i>					8.81E-03**						
					(4.23E-03)						
<i>off_country_r</i>						-0.24**					
						(0.12)					
<i>employee</i>							-8.12E-06**	-9.23E-06***	-6.83E-06**	-8.63E-06***	-7.07E-06**
							(3.35E-06)	(3.53E-06)	(3.27E-06)	(2.76E-06)	(3.00E-06)
<i>foreign_r</i>							2.65***	0.24***	2.28***	2.08***	2.07***
							(0.36)	(0.39)	(0.36)	(0.41)	(0.40)
<i>indiv_r</i>								-0.38			
								(0.28)			
<i>local_r</i>									3.59***		2.71**
									(1.09)		(1.18)
<i>nonlocal_r</i>									0.80*		0.33
									0.48		(0.54)
<i>trade_r</i>										-0.42	-0.49
										(0.39)	(0.40)
<i>nontrade_r</i>										2.90***	1.93*
										(0.88)	(1.00)
<i>cons.</i>	-1.72	-1.90	-2.65	-2.70	-2.33	-1.77	-3.91	-3.51	-4.01	-3.83	-3.99
	(0.80)	(0.25)	(0.19)	(0.23)	(0.20)	(0.27)	(0.29)	(0.41)	0.29	(0.28)	(0.29)
<i>N obs.</i>	209	1622	3690	3618	3618	3618	3160	3160	3160	3160	3160
<i>Log Likelihood</i>	-74.42	-417.00	-924.30	-946.93	-954.06	-954.23	-808.95	-808.02	-802.68	-802.06	-799.57

***: 1%, **:5%, *:10%
standard error is in parentheses ()

Column (4) indicates a positive and statistically significant value for the first variable for regional diversification *num_country* (the number of countries the firm has established branches). This implies that it is important for firms to enter local countries and establish branches to win the awards. It also implicitly indicates that establishing branches for direct communication with local governments and local national enterprises may be supportive for project winnings. Column (5) indicates a positive and statistically significant value for the second variable for regional diversification *num_office* (the number of branch offices the firm has established). This implies that it is important for firms to establish more branches abroad to win project awards. More branches offices simply mean the firm could gather more local market and project information. Column (6) indicates a negative and statistically significant value for the third variable for regional diversification *off_country_r* (the ratio of number of country markets entered to number of branch offices). This implies that it is important for firms to avoid high degree of geographical concentration when establishing branches. Together with columns (4), (5) & (6), **Hypothesis 3 (H3)** - the effect of regional diversification of local activities to successful project awards - is evidently supported. This implies that in order to win project awards, firms should enter the local market and establish their own branch offices to some extents. If the firm has too many branch offices in one local market, it does not lead to successful winning of project awards. Thus regional diversification strategy is important in the global petrochemical industry.

Column (7) indicates a positive and statistically significant value for *exp_year* (experience of years since the branch offices or subsidiaries established) and *foreign_r* (the ratio of export revenue to total revenue). **Hypothesis 4 (H4)** - the effect of firm's aggressiveness of entering overseas markets to successful project awards - is evidently supported. This implies that if the financial performance of the firm is high at its home country, the necessity of globalization is small. Therefore the firms do not consider overseas market seriously. If the ratio of foreign to domestic sales is high, they are more likely to get further project awards successfully.

Column (8) does not indicate a positive and statistically significant value for one of the strategic alliances parameters *indiv_r* (the ratio of awards without strategic alliances to all winning

awards). **Hypothesis 5 (H5)** - the effect of entering overseas markets by forming strategic alliances with other firms to successful project awards - is evidently supported. This implies that entering overseas markets on their own does not lead to success of getting project awards, although the evidence is not significant.

Column (9) indicates a positive and statistically significant value for other two strategic alliances parameters *local_r* (the ratio of awards with strategic alliances with local foreign firms to all winning awards) and *nonlocal_r* (the ratio of awards with strategic alliances with non-local foreign firms to all winning awards). **Hypothesis 6 (H6)** - the effect of entering overseas markets by forming strategic alliances with foreign firms to successful project awards - is evidently supported. This implies that, together with strategic alliances with foreign firms, firms are more likely to get project awards successfully by forming alliances with both local and non-local firms. In this case, alliance with local firms is better as it shows higher statistical significance.

Column (11) indicates a positive and statistically significant value for other strategic alliances parameters *nontrade_r* (the ratio of awards with strategic alliances with Japanese non-trading firms to all winning awards), but does not indicate a positive and statistically significant value for *trade_r* (the ratio of awards with strategic alliances with Japanese trading firms to all winning awards). **Hypothesis 7 (H7)** - the effect of entering overseas markets by forming strategic alliances with Japanese firms to successful project awards - is partially supported as *nontrade_r* is statistically significant whereas *trade_r* is not. This implies that, together with strategic alliances with Japanese firms, firms are more likely to get project awards successfully if the alliances complement the different parts of value chain activities. In contrast, it is not successful when allied with Japanese trading firms. Column (12) indicates a positive and statistically significant value for all strategic alliances parameters, but it is not as significant as seen in column (11). Again, **H6** is partially supported. This implies that, compared to entering overseas markets on their own, firms are more likely to get project awards successfully by forming strategic alliances with firms that are active on different parts of value chain, and even better when collaborating with local firms.

CHAPTER 6. DISCUSSION

The implications stated in the previous chapter can be described as simple concepts. Firms should have a clear globalization strategy in terms of regional strategy. In this study, in petrochemical industry in particular, localization process in terms of human resources is not important. Firms should have domestic based resources and capabilities to succeed in the global market but aggressiveness is more important. If firms lack some parts of resources and capabilities for executing particular projects, forming alliances with appropriate partners leads to winning successful project awards.

Regarding the results from (1) to (6), where **H1** is rejected and **H2** & **H3** are evidently supported, there are some developed ideas of business-to-business marketing strategy that may explain, in terms of human resources, why regional diversification strategy is important whereas localization process is not. As the analytical result indicates, accumulated historical experience of local branches is important, especially when dealing with customized products and services in business-to-business marketing. Firms may consider investing in local markets strategically in advance to build long term relationships with purchasers rather than being interested in short term profit. For example, firms may have flexible production process, logistics, servicing, and they may rapidly respond to some modifications at any time, by establishing local offices adjacent to the customer's head office (Boston Consulting Group 2005). This is indeed true and often seen in petrochemical industry. However, the localization process may not be so important in such labor intensive industries. One of marketing mix, promotion process, in business-to-business marketing is not effective. Instead, the reputation or supply record, of firms in the industry indicates the reliability of their products or service, and sustaining a confidential relationship with industrial local leaders is far more vital.

With regards to result (7), rejected hypothesis **H4**, could be explained as misinterpretation of the resource based theory. Because the market size of infrastructure business in Japan is large, many firms actually possess resources and capabilities. But if these firms do not consider the global

markets earnestly, especially those emerging markets, it does not lead to successful project awards. If firms have the benefit of the dominant position in lucrative domestic business, they may not consider or even hesitate to enter emerging markets with high risks and uncertainties. When a firm is successful in domestic market, they pursue more growth in their domestic business that further tends to ignore overseas markets creating a vicious cycle. Firms should aggressively invest in business opportunities that are long term with high risks when they have affluent financial resources and capabilities otherwise when the external environment changes dramatically for some reasons, it may be belated to do so. This is a dilemma that firms having sustainable competitive advantage for existing businesses would not easily admit further transformation of their current business portfolio. Firms with inferior positions in the domestic market to other competitors probably possess neither enough resources nor capabilities except aggressiveness as they are forced to become globalized, therefore they would consider overseas markets more seriously. Some Japanese firms entered emerging markets like Myanmar decades ago, immediately after WWII. In this type of discrete customized business, there may be a very effective first mover advantage as they could accumulate more knowledge and experiences, and occupy key resources in the local market.

The results from (9) to (12) are interesting, where **H5** and **H6** are supported and **H7** is partially supported. The role of trading firms is similar to orchestration in some sense. In terms of knowledge acquisition, brand management, relationship enforcement and activating organizations, strategic alliances having forms of orchestration are common in technology intensive industries where the orchestrator is willing to accept greater risks of overall project. This type of alliance may be considered in certain situations when firms have a lack of capability, when the firms enter inexperienced businesses or markets, when firms do not intend to invest their time and effort to build required capability etc. (Boston Consulting Group 2006). Historically, the era between 70s and 90s was the period of financial stagnation for all Japanese trading firms as many Japanese manufacturing firms established their own branch offices and production factories in local markets. Together with IT revolution, it brought the concept of eliminating the middlemen. Therefore entries to overseas markets no longer become dominated by trading firms. Instead, trading firms evolved by acquiring

capabilities of building information networks and market investigation functions. Trading firms define themselves as organizers of projects and they may lead the next generation of infrastructure maintenance business. This is indeed true that trading firms always played a crucial role of natural resource import business. However, from export oriented firm's perspective, this is questionable. Other than technologies applied to petrochemical plants, the complexity of project management increased as each project involves whole vertical value chain activities. One of the interesting characteristics of trading firms nowadays is that they focus on short term strategy and profit. They usually attempt to optimize their business portfolio and sometimes radical change occurs even within one year (Japanese Foreign Trade Council, Inc. 2014). This is a completely different attitude from those infrastructure exporters who would like to build long term relationships with all participating parties. By utilizing built networks, trading firms may possess more power under the name of consortiums or joint venture projects. Perhaps knowledge diffusion between these parties is restricted substantially and it could only occur one way whereby information flows from all other parties to the trading firm. Therefore it may not be beneficial for all other infrastructure exporters as they lose all leaning opportunities of project management in wide scope. Yet, the trading firms want to minimize the risks, so there is a clear misalignment between these parties. There are many books and papers published by the Japanese Foreign Trade Council, Inc. (JFTC), which mostly consists of people originated from trading firms. Therefore they insist on the necessity of trading firms for exporting infrastructure business to overseas markets. This insistence could somewhat be perceived as self-evaluated and self-praised and it remains dubious.

This study revealed that some relationships between successful project awards and some potential factors attribute to firms own specifications. There are three practical implications for existing firms in petrochemical industry. First, firms must have long term perspective and should not expect dramatic increase in sales or profit by simply entering into existing markets. Historically, Japanese construction firms were always forced to enter the global market by external factors in which they gained opportunity to acquire all necessary skills, know-how, local knowledge and building relationship with local governments. Such a great undertaking cannot be accomplished

overnight. Firms should also be aware of potential changes in the market and prepare entry processes to local market in advance if required. Second, in this labor intensive industry, firms should understand that globalization strategies can always be considered by relative evaluation of the domestic market and the capabilities firm possesses. Without firms making a commitment to enter the global market, the consequence is miserable. Third, no matter if the firms do have enough resources and capabilities to execute all globalization process by themselves or not, firm should not enter local markets on their own and should avoid taking all risks by selecting appropriate partners. Forming strategic alliances with other parties having common interests create mutual learning opportunities.

This study also revealed some implications for academic side that has to be scrutinized. First, the limitation of the assumptions has to be examined. The assumption, blinded competitions, is debatable and there are no evidences supporting this assumption. Firms may not enter as much competitions as assumed. Any statistical approach complementing this assumption may be greatly supportive. As discussed in section 2-3, since the global petrochemical industry has a tendency of converging towards a certain global standards, it was reasonable to assume that the complexity of each project is equivalent to each other, hence the work and effort required to awarded projects is also equivalent to each other. But it is not sure whether a similar concept of assumption is applicable in other sectors. Regarding firm's policy, analyzed data only covers five years data span and this can be extended. In such a case, the data range has to be sufficiently long enough, for example twenty years data span, to break down into the behavioral analysis of each firm along the timeline, investigating how each firm made the decision of strategic alliance with different types of partners. Otherwise the assumption is violated and it can no longer be meaningful analysis. Second, the validity of the data has to be tested. One of the control variable used to examine hypothesis regarding firm's diversification strategy, the acquired data included the number of countries the firm has established branches and the number of branch offices the firm has established. This may have a biased perspective and selecting such indicator could be inappropriate. In practice, firms tend to establish local branches in countries close to their home country and if firms strategically consider

them as important locations through their value chain activities, firms indeed would establish more branches depending on geographical dispersion in each country. In this particular study, Japanese firms usually have several branches in China. Third, the possibility of applying similar method to other field has to be studied. The scope of work may be expanded to other related industry such as power plant, railways and other transport sectors, however, there also require other significant assumptions. Researchers should be aware of validity and constrained application of assumptions used in this study. Perhaps it may be feasible to apply a similar statistical method to the power sector where facilities of the power plants are relatively modularized so that regarding complexity of projects may be applicable. Sustainability of firm's policy, may also be applicable. The power sector is interrelated with other energy sectors and firms usually require long term investment. Thus, there could be several potentials to investigate in different sectors.

CHAPTER 7. CONCLUSION

The main finding of this study is that, in petrochemical industry, Japanese firms may have better ability to win project awards if they have clear long term regional strategies and consider the overseas markets seriously. Localization in terms of human resources is not so important as widely believed. If firms do not have resources and capabilities to deal with the entire project, rather than bravely undertake the problems on their own, it is better to form strategic alliances with others in the same field. However, the study could not reveal any evidences showing that trading firms are predominantly supportive for other Japanese firms to make alliances with. In this globalized industry, Japanese firms should understand the effective way to enter overseas markets and leverage the resources, capabilities and technologies they have accumulated over the past decades to be competitive, and cooperate with each other when necessary.

ACKNOWLEDGEMENTS

I am pleased to acknowledge the help of my supervisor, Professor Asaba, implementing statistical analysis in this study. Supportive comments on earlier stage of this study have been provided by Professor Iriyama and all members in the Asaba-Iriyama joint seminar in Waseda Business School.

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