

THE STRATEGIC ALLIANCES IN TAIWAN'S CONSTRUCTION INDUSTRY

by

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ABSTRACT

Taiwan initiated a large infrastructure development program in 1991. Because Taiwanese construction companies were small in size and lacked technology at that time, they were not able to perform many projects. As a result, many international contractors came to Taiwan, and formed alliances with local companies.

While firms can achieve selective benefits through alliances, they may also lose their competitive advantages in the process, which may be disadvantageous in the long run. In order to ensure that forming alliances is strategically favorable for overall profitability, a construction firm should first identify the profit items of a project. It can then investigate the effects of an alliance on these profit items through market structure analysis. Finally, by applying the iso-profit model, which is developed in this thesis, the firm can bargain with its partner to establish profitable cooperation.

The government has the authority to promote alliances through two policies: to reinforce alliances through regulations, as well as to enhance profits from alliances. Ultimately, in order to cure its past flaws in policy, the Taiwanese government should motivate alliances in the construction industry.

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I. Introduction

1.1 Motivation of Research

Although Taiwan has been classified as a newly industrialized country, its infrastructure is still insufficient in many aspects. The government thus initiated a large infrastructure development program in 1991, called “Six-Year National Development Plan.” Many construction projects in this program involve large amount of money, high degree of complexity, and very advanced technologies that not a single Taiwanese construction company can afford. On the other hand, because of government regulation and the lack of access to local construction resources (including manpower, machines, and materials¹), foreign companies cannot join bids in this program on their own. As a result, there are many alliances in Taiwan’s construction industry in recent years, including many international cooperations among Taiwanese construction companies and foreign contractors.

This situation is particularly interesting because of several reasons. First, there is no analytical tool for construction firms in Taiwan to judge the profitability in alliances. Forming alliances may be currently favorable because it helps both local and foreign construction companies to participate in the big program and earn profit from it. However, this is not always a profitable strategy in the long run, since parties in alliances may lose their competitive advantages. For Taiwanese companies, losing local market share and control can be tremendous disadvantages. From the perspective of foreign companies, loss of their proprietary ownership of well-developed technologies can also be disadvantageous in the future. Therefore, these construction companies need a logical method to solve

¹ Halpin, Daniel W. and Woodhead, Ronald W. 1985. *Construction Management*, p.10-11.

the strategic dilemma - whether forming alliances is a profitable choice for firms, both in short term and long term.

Second, the Taiwanese government did not impose a clear industrial policy on the construction industry. Unlike other strategic industries such as steel, electronics, and petrochemicals, for which successful industrial policies have been devised and implemented², the government did not use policy aggressively to help Taiwanese construction firms build competitiveness. Consequently, Taiwanese construction companies cannot compete with foreign companies. Under the trend of free and open markets in today's world, the government is now struggling to control the market share of foreign companies and at the same time assist local companies in acquiring competitiveness. In this circumstance, how should construction industrial policy be made to regulate alliances? What effect will this policy have on the profitability of local and foreign construction companies? The government and construction companies in Taiwan should be able to answer these questions before they plan their future operation.

Third, a situation similar to that in Taiwan can also be applied to many developing countries. For these countries, an understanding of today's construction industry in Taiwan will be a useful reference for solving their similar problems. For international contractors, the experience in Taiwan can also provide an analogue when they attempt to enter markets in these developing countries.

This thesis will address these interesting questions regarding international alliances in Taiwan's construction industry, and try to develop an analytic method to seek answers to them.

² Arnold, Walter. 1989. "Bureaucratic Policies, State Capacity, and Taiwan's Automobile Industrial Policy," *Modern China*. Vol.15 No.2, April 1989. p.180.

1.2 Research Goal, Scope, and Method

1.2.1 Research Goal

The goal of this research is to develop a systemic method to analyze the profit distribution of the firms in alliances. Through the analysis of Taiwan's situation based on this method, the writer will recommend some strategies for the firms and a policy proposal for the government.

1.2.2 Scope of Research

The whole construction industry covers a wide range, including such sectors as private residential and office buildings, private industrial construction, public residential and office buildings, and public infrastructure construction. Each sector has a different level of freedom in choosing a contracting method, and each requires a different level of technology. This can be represented in the framework in Exhibit 1.1. The whole industry is too large and broad to be included in this research. Thus this thesis will focus on the projects of public infrastructure construction, that is, the projects funded by the government, excluding residential and office buildings. There are two reasons for choosing this market sector. First, unlike the private sector, the Taiwanese government can use only low price bids form of contract award. Thus the analysis can be simplified by eliminating the need to consider the many implications of different contracting methods. Second, the technology involved in this sector is more complex than that in the sectors of residential and office buildings, and thus is a key factor which affects profit of firms.

		Freedom in Choosing Contracting Method	
		Low	High
Technology Requirement	Low	Public Residential and Office Buildings	Private Residential and Office Buildings
	High	Public Infrastructure Construction	Private Industrial Construction

Exhibit 1.1 Framework of Construction Market Segmentation

Alliances can occur in many stages of a construction project. Because of the market sector chosen in this research, the main analysis will focus on the construction stage, and primary on international alliances formed by a local construction company and a foreign contractor. However, an overview of different types of alliances in the construction industry is provided in this thesis.

1.2.3 Research Method and Procedure

The method of this research contains two major parts: literature review for concepts of alliances; and, economic profit analysis of construction firms.

The main analysis of this research first defines an overall profit model for a construction firm. Based on this profit model, the thesis then investigates how alliances alter the market forces in terms of the overall

profit, and how policy will affect the decision of firms in alliances. The research procedure is shown in Exhibit 1.2.

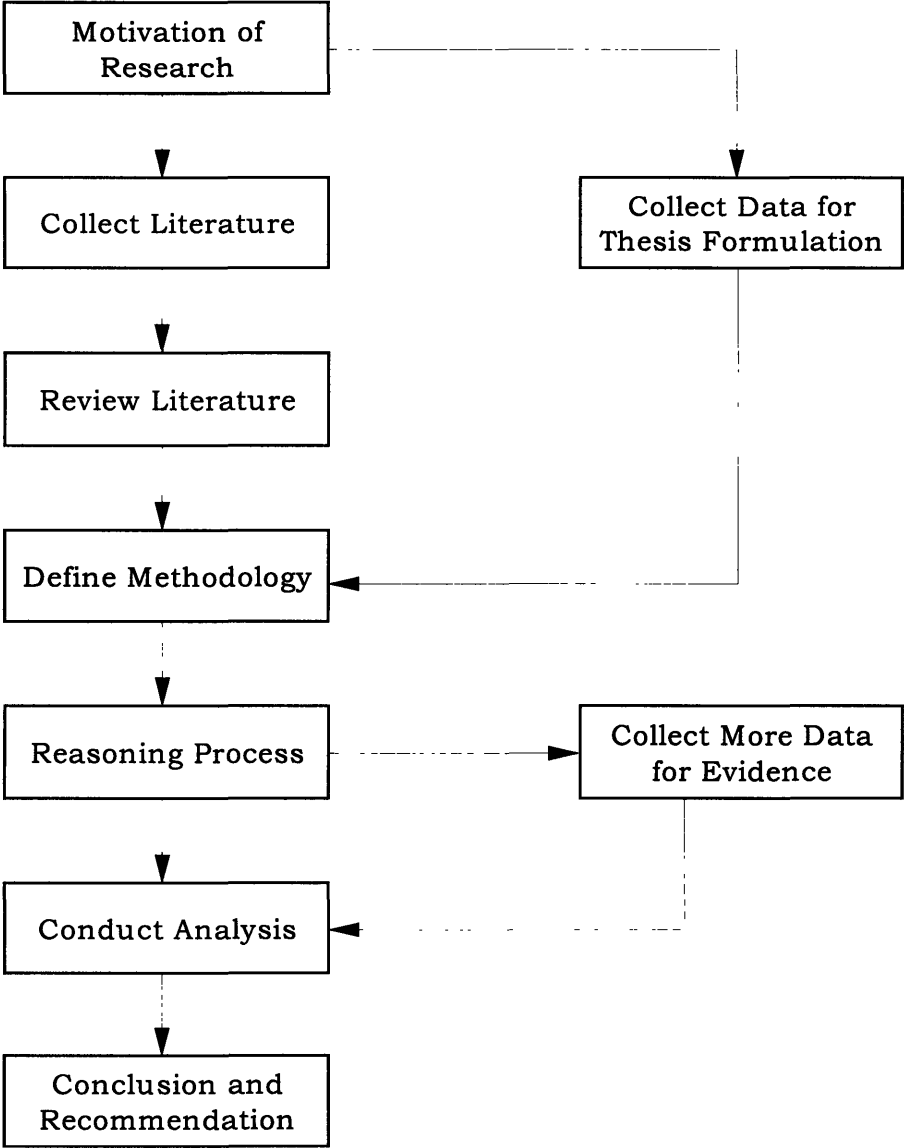


Exhibit 1.2 Research Procedure

1.3 Structure of Thesis

This thesis consists of six chapters. Chapter 1 provides an overview of the thesis, with a description of motivation, goal, scope, and method of research. Chapter 2 gives general ideas about strategic alliances. It summarizes some important points in the literature about alliances, and explains different types of alliances in the construction industry. Chapter 3 introduces the construction industry in Taiwan by identifying the problems in this industry and how alliances can help with those problems. Chapter 4 first analyzes the profit of construction firms. Based on this analysis, the writer then investigates how alliances will affect the profit of construction firms. In the last part of this chapter, a model about how firms should make decisions in forming international alliances is developed. In Chapter 5, the power of the government and its policy on alliances is examined. Finally, Chapter 6 draws conclusions from previous chapters and make some recommendations for construction firms and the government in Taiwan.

II. The Concept of Alliances

2.1 Strategic Alliances in Literature

2.1.1 Definition of Strategic Alliances

A strategic alliance is an agreement between two or more companies to work together to achieve an objective. The agreement leading to a strategic alliance needs not follow a legal or organizational form: it can take the form of a handshake agreement, licensing, mergers, or a joint venture.³ A strategic alliance can be formed with a supplier, a customer, a complementary firm, a competitor, or a facilitator such as government or academia. The key notion of a strategic alliance is that it leverages the distinctive competitive advantage of one firm with those of the partners. Since the major factor that prevents many firms from achieving their operational goals is lack of resources, the strategic alliance can be a good way to put resources together, such as technology and capital, in order to make a breakthrough.

2.1.2 Motivations for Alliances

Firms form strategic alliances for different purposes. Therefore, it is important to identify the goals for parties in alliances. Lorange and Roos have suggested the generic motives for strategic alliances.⁴ There are two dimensions in this framework. One is the strategic importance and the strategic fits within a firm's overall portfolio of the particular business for which the strategic alliance has been formed. In this

³ Chen, Pen S. and Heide, Dorothy. 1993. "Strategic Alliances in Technology: Key Competitive Weapon," *SAM Advanced Management Journal*, Vol 58 No.4, Autumn 1993. p.9-17.

⁴ Lorange, Peter and Roos, Johan. 1992. *Strategic Alliances - Formation, Implementation, and Evolution*. p.6-10.

dimension the business can be classified into two categories: core business and peripheral business. The other dimension concerns a firm's relative position in its particular business segment, that is, whether or not the firm is a leader or a follower.

Within these two dimensions, four generic motives for strategic alliances can be defined: defending, remaining, catching up, or restructuring, as shown in Exhibit 2.1.

		<i>Business' Market Position</i>	
		Leader	Follower
<i>Strategic importance in parent's portfolio</i>	Core	Defend	Catch up
	Peripheral	Remain	Restructure

Exhibit 2.1 Framework of Generic Motives for Strategic Alliances

SOURCE: Lorange & Roos, Strategic Alliances

1. Defending

When a firm enjoys relative leadership in a particular business that is core within its overall portfolio, usually the motive of forming strategic alliances is defending. There are two rationales for this motive.

The first rationale is access to markets and/or technology. Defensively oriented alliances can help leader firms keep track of new technologies in their core business or seek new business opportunities. In this case they can ally with new, entrepreneurial, embryonic organizations to refresh the technological skills that may be necessary to get into a new market segment for this core business.

The second rationale is securing resources. Firms in this situation sometimes form strategic alliances for securing raw materials or inexpensive products. This is more often the case for multinational firms in developing countries.

2. Remaining

If the particular business is peripheral for a firm but one in which the firm is a leader, the strategic motive for alliances is to remain. The concept of remaining is that the firm should maximize efficiency while reducing the resource requirement for this business so that it can preserve the leadership position but shift more resources to its core business.

Another case of remaining is in multinational business, where firms seek continuous presence in foreign countries. In this case, to contribute to its overall global business, a multinational company can ally with a local partner and gain access to the particular market at the cost of giving up full ownership and control. Alliances for this purpose are often project-based joint ventures.

3. Catching up

When a firm is a follower in its core business, its primary motive for partnering should be to catch up. The firm should establish its

strength in this core business to gain competitive advantages and seek industrial leadership within alliances through absorbing technology from partners or outsourcing the peripheral tasks. When catching up is the motive of an alliance, however, the firm may lose its volition because of sharing control over strategy and decision making.

4. Restructuring

If a firm has a peripheral business in which it is a follower, it can form strategic alliances for restructuring the business -- either trying to build strength to become a leader or seeking the chance to unload this business by shifting it to partners.

2.1.3 Benefits from Alliances

The combination of the resource and expertise of partners can greatly benefit a company. There are the following nine major benefits that firms can seek from alliances:

1. Leverage internal investments

Managers are always faced with the problem of limited resource allocations. There will be fewer competing interests within the firm contending for a share of finite corporate resources if partners in an alliance can provide certain required upstream products or services to each other, enlarging the effect of internal investment within the alliance.

2. Deal with core competencies

There are two ways the strategic alliances can help companies to deal with core competencies. The first way is to re-focus on a company's

core competencies. By deciding what skills and process a company should have mastered, it can then form partnerships and acquire everything else from partners. The second way is to leverage the core competencies of others in an alliance. Achieving economies of scale by increasing the utilization factors of partners can maximize the use of their core competencies, and thus benefit each other.

3. Reduce operating costs

Management expense and overhead is a significant part of a company's cost. Strategic alliances provide a good opportunity to combine the activities of companies, and give them the ability to reduce operating staffs while still being able to maintain the same level of functional performance.

4. Broaden product or service offerings

In a strategic alliance, firms can jointly introduce their different products or services to the market. In this case value has been added by expanding the range of services or products.

5. Gain flexibility for changing markets

Joining forces with different organizations offers a firm the opportunity to increase organizational capability for responding to changing demands from the market. The flexibility is present in two ways: capacity for changing work loads, or the capabilities for dealing with variations in service requirements.

6. Spread risk

Strategic alliances reduce operating errors by allowing each partner to focus on its own specialty, thus reducing the risk of failure. Even in the event of a failure, the partners share the consequences and costs so that the damages are less severe than they would be for a single company.

7. Improve quality

By combining the efforts with selected providers in a long-term commitment and with a mutual reliance on success, companies can enhance and raise the standard of quality while still remaining at the same level of cost.

8. Gain access to advanced technologies

Generally speaking, the partners in strategic alliances are selected often because of their possession of superior competencies and advanced technology in their area of expertise. Furthermore, it is expected that the partners' competencies are the most advanced ones in their industries. Strategic alliances provide a way to access and absorb the advanced technologies of partners. This is often one of the most important reasons for entering a strategic alliance.

9. Penetration into foreign market

In the case where a company is to expand its business into a foreign market, an alliance with a local company is a beneficial strategy. With this alliance, the company can acquire business know-how in a foreign country. Furthermore, in the case when there are barriers set by

the government, strategic alliances might be the only low-cost way to enter the market.

2.1.4 Risks in Alliances

Before entering an alliance, there are also potential risks a firm should take into consideration. The following summarizes the three most significant risks in an alliance.

1. Protection of core competencies

For a company, the core competencies are the most important features which provide most of the value to customers. Though the core competencies are not easy to imitate over the short term, long-term partnership provides enough time to obtain insights for emulating special competencies. While some companies enter alliances to gain access to a partner's competencies, these partners should be aware of this intention and protect their own competencies. This is also a significant conflict point within strategic alliances.

2. Mismatch between partners

Companies in strategic alliances always have differences in corporate culture, organizational structure, decision making procedures and business objectives. These differences may break the alliance. Sometimes the strategic objectives between partners diverge in totally different directions. In this case, instead of bringing benefit to partners, the alliance becomes a burden for them.

3. Shared control

An inherent feature of strategic alliances is the need for sharing decision making authority. Also, it is difficult to react to the operational change within an alliance because each partner has to give up its autonomy to some extent.

2.1.5 Key Factors to Success

1. Partner Selection

The selection of partners is always one of the most important key factors determining the success of an alliance. However, this is not a trivial task. When considering potential partners to form alliances with, there are five issues which should be evaluated.

The first consideration is historical and projected performance. The basic criteria of selecting partners is the performance of these potential partners. It is necessary to consider a company's past record on profit, financial structure, market share, and reputation, and then predict and evaluate the performance in the future.

The second is the possession of key technologies and resources. One of the most important reasons for a firm to enter into a cooperative arrangement is to compensate for missing skills, competencies, and resources. More importantly, the task of establishing core competencies for a company often requires some advanced technologies which do not exist in that company. Alliances provide a way to learn, but first the firm should decide what to learn, and then find who owns the technologies. When considering resources and skills, it may be critical to look at the potential partner's technological prowess, innovativeness, access to specific skills and resources, government connections, distribution channels, and production lines.

The third consideration is the compatibility between companies. The organizational structures, cultures, objectives, and management processes are different from company to company. If companies in an alliance are not compatible in these areas, it is obvious that difficulty in communication and decision making will arise, and that the failure of the alliance might be expected.

The fourth consideration is the relationship between potential partners. The relationship in the past between partners is an important factor in an alliance. It is reasonable to consider the past interactions, common customers and technologies, and the level of mutual trust between the company and its potential partners.

Finally, the expectation of alliance should also be considered. There are two aspects of this issue. One is the strategic importance of alliance for the company. This depends on the purpose of entering the alliance. For example, an alliance for entering a new market may not be as important as an alliance for acquiring technology to establish core competencies. On the other hand, the purposes of the potential partners for entering the alliance should also be taken into consideration. After understanding their purposes, companies can then evaluate the potential benefits (such as reduced cost), and the potential risks (such as loss of core competencies).

2. Complexity of Organization and Task

Complexity is also an important factor for success of strategic alliances. When forming strategic alliances, there are two types of complexity that should be taken into consideration: task complexity and organizational complexity.

Task complexity depends on three main factors: scope of alliance activities, environment uncertainty, and relevant partner resources and skills. Organizational complexity depends on the frequency and nature of interactions between partners, which are further affected by the number of partners, role of each partner, level of trust, and task complexity.

Research done by Killing indicated that three factors should be taken into consideration by a firm when entering a strategic alliance.⁵ First of all, alliances that are working on a complex task need not be complex in organization. Task is not the only factor which decides the complexity of organization. Secondly, firms should start with the simpler alliances of less complex task and organization to establish a degree of mutual trust before the formation of complex alliances. Finally, weak firms should be wary of forming complex alliances with strong firms to avoid losing competencies in the alliance.

3. Appropriate Management

Alliances can be successful and effective only through adopting appropriate management. Chen and Heide suggested four important management issues that firms should work on to ensure the success of alliances.⁶

The first issue is to establish management style. The alliance is collegial rather than hierarchical, and parties will have strong interdependence. In this situation, due to the differences between firms in culture and objectives, a new style of management has to be

⁵ Killing, J. Peter, 1988. "Understanding Alliances: The Role of Task and Organization Complexity," in Contractor, Farok J. and Lorange, Peter eds., *Cooperative Strategies in International Business*. p.55-67.

⁶ Chen, Pen S. and Heide, Dorothy, 1993. "Strategic Alliances in Technology: Key Competitive Weapon," *SAM Advanced Management Journal*, Vol 58 No.4, Autumn 1993. p.9-17.

established to nurture the network of contacts, form mutual trust, and release constraints within the alliance.

The second management issue is about defining core technology to protect competitive advantages. The managers in an alliance must fully realize what can be shared with other companies and what is not appropriate. The critical technologies should be developed and shared, but the core technologies of the companies where each manager came from should remain separate. Otherwise, entering alliances cannot bring benefit but reduce the competitive advantages of a company.

Third, firms should set milestones and checkpoints. Alliances should be established step by step. Frequently reviewing what has been done is the key to success in alliances. Thus the milestones and checkpoints should be set before the task, and the review work should be fully executed to ensure the procedure is without fault.

The final issue is to manage conflict constructively. It is inevitable that there will be conflict between partners in a strategic alliance. Managing conflict constructively through examining alternative viewpoints can create new ideas and better approaches, and even increase cohesiveness after solving the problem.

2.2 Strategic Alliances in the Construction Industry

2.2.1 The Process and Actors in the Construction Industry

The production process in the construction industry is a complex and large-scaled procedure which involves several tasks and actors. According to the framework of total-life building process as defined by Halpin and Woodhead, the total production process includes project formulation, planning, engineering-design, construction, use

management, and disposal.⁷ The actors involved in the process include owners, planning consultants, A/E design consultants, construction management consultants, contractors (including general contractors and subcontractors), material suppliers, machine suppliers, financial institutions, and facility operators. Exhibit 2.2 demonstrates the total-life building process and the actors involved.

In many other industries, a company can perform more than one role in the life cycle of its product. In the computer industry, for example, IBM is not only a manufacturer of computer hardware and accessories. Its designing, producing, and marketing OS/2 is identical to the business of a software company. A similar situation also exists in the construction industry. A company in the construction industry may not act in only one role in the building process. Some companies may have both design and construction divisions. There are also cases where a company which is usually a general contractor owns construction material factories, such as cement mixing plants, and sells the material to other contractors.

In this thesis, a construction company is referred to as the company which actually executes the construction process, either as a general contractor or a subcontractor, while such company may still be able to perform other tasks in the total-life building process.

2.2.2 Types of Alliances

Because of the complexity of the construction process, actors may benefit each other through cooperations in which they can combine efforts to deal with difficulties in the process. Therefore firms in the construction industry may ally together involuntarily. There are two

⁷ Halpin, Daniel W. and Woodhead, Ronald W. 1985. *Construction Management*, p.2-7.

important types of alliances which are usually formed by firms automatically. The first type is construction alliances among contractors, sometimes called joint ventures. All contractors involved in construction alliances can combine construction specialties, pool capital and resources, and share construction risks. The second type is the alliances between a contractor and a material supplier, in which the contractor can obtain a steady material supply at a lower cost, while the supplier has constant purchase orders and shares the profit from construction with contractors.

Sometimes an owner will choose a contracting method which requires different actors to perform as a team. In this case different actors have to organize alliances in order to participate in construction projects. Three construction contracting methods, in terms of organization, require team work of actors.⁸ The first is design-build contracting, which requires cooperation between A/E designers and contractors. The second is turnkey contracting, in which a turnkey team of A/E designers, contractors, and financial institutions is established. The third method is Build-Operate-Transfer (BOT) contracting. A BOT team consists of A/E designers, constructors, financial institutions, and facility operators.

Even when the contracting method does not require cooperation, firms can still benefit by forming alliances. For example, the designers and contractors can form alliances without being obligated to do so. Designers can create better designs and estimates by consulting with contractors and understanding the technology constraints in construction. Contractors can also be better off with better

⁸ Gordon, Christopher M. 1994, "Choosing Appropriate Construction Contracting Method," *Journal of Construction Engineering and Management*. Vol.120 No.1, March 1994. p.196-198.

understanding of design so that they can fulfill construction specifications more easily.

Finally, even owners can join alliances with other actors. A joint development plan which integrates the efforts of all the actors in the building process can save a large portion of contingency cost and reduce conflicts between actors.

Exhibit 2.3 summarizes different types of strategic alliances in the construction industry, and the actors involved in each type.

	Alliance Type	Required by Contracting Method	Major Participants
1	Construction Alliances (Joint Ventures)		General Contractors
2	Contractor-Supplier Integrations		General Contractors Material Suppliers
3	Design-Build Teams	Design-Build Contract	A/E Designers General Contractors
4	Turnkey Teams	Turnkey Contract	A/E Designers General Contractors Financial Institutions
5	BOT Teams	Build-Operate-Transfer Contract	A/E Designers General Contractors Financial Institutions Facility Operators
6	Joint Development Teams	Joint Development Plan	Owners Planning Consultants A/E Designers General Contractors Construction Managers Financial Institutions

Exhibit 2.3 Strategic Alliances in the Construction Industry

III. Taiwan's Construction Industry

3.1 An Overview of Taiwan's Construction Industry

3.1.1 The Importance of Construction Industry to Taiwan

The construction industry has always been one of the most important industries in all countries around the world. That is because the infrastructure of a nation consists of the products of the construction industry. These products include buildings, manufacturing factories, transportation systems, power plants, dams, industrial and petroleum facilities, and many other structures, which largely determine the capacity of many other industries in the national economy to produce and distribute goods and services.⁹ Some of these products, such as sewerage systems and recycling facilities, also affect the living standard of a nation. In recent years, the worldwide construction industry has generated a total value of over \$3.2 trillion construction work annually, which is about 6.5% of the world's Gross Domestic Product (GDP). In the U.S., the construction and related industries contribute 10% to 12% to the GDP, and employ more than 5.6 million workers.¹⁰ The importance of the construction industry is demonstrated by the above statistics.

In Taiwan, the output of the construction industry accounts for 4% to 6% of the Gross National Product (GNP). Exhibit 3.1 shows the percentage of the construction industry in the GNP. The major products of the construction industry include residential buildings, non-residential buildings, and other constructions, which also contribute about half of the nation's Gross Fixed Capital Formation, as shown in

⁹ Lin. Ming-Hung. 1995. *Processes and Effective Analytical Tools for Strategic Planning in the Construction Industry*, Master Thesis, MIT. p.16.

¹⁰ *Construction Review*. 1994.

Exhibit 3.2.¹¹ The construction industry is a key factor in Taiwan's economic growth because it is the fundamental element for other industries. In addition, because of the industrial linkage effect, many other industries will be promoted by the prosperous construction industry.¹² Furthermore, the growth in the construction industry will increase the rate of employment significantly, which helps boost the nation's economy. Consequently, the construction industry is often referred to as the "locomotive industry" in Taiwan.

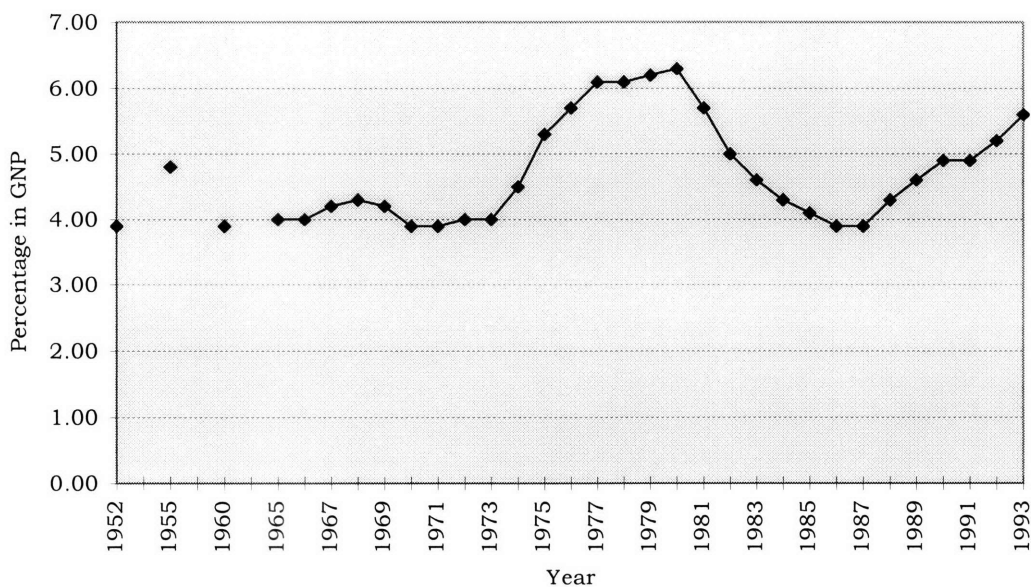


Exhibit 3.1 Construction in Taiwan's GNP

Source: Taiwan Statistical Data Book, 1994

¹¹ *Taiwan Statistical Data Book*, 1994, p.41-56.

¹² Chang, Chen-Yu. 1994. *A Research on the Economic Behavior of the Construction Market in the R.O.C.* Master Thesis, National Taiwan University. p.66. In Chinese.

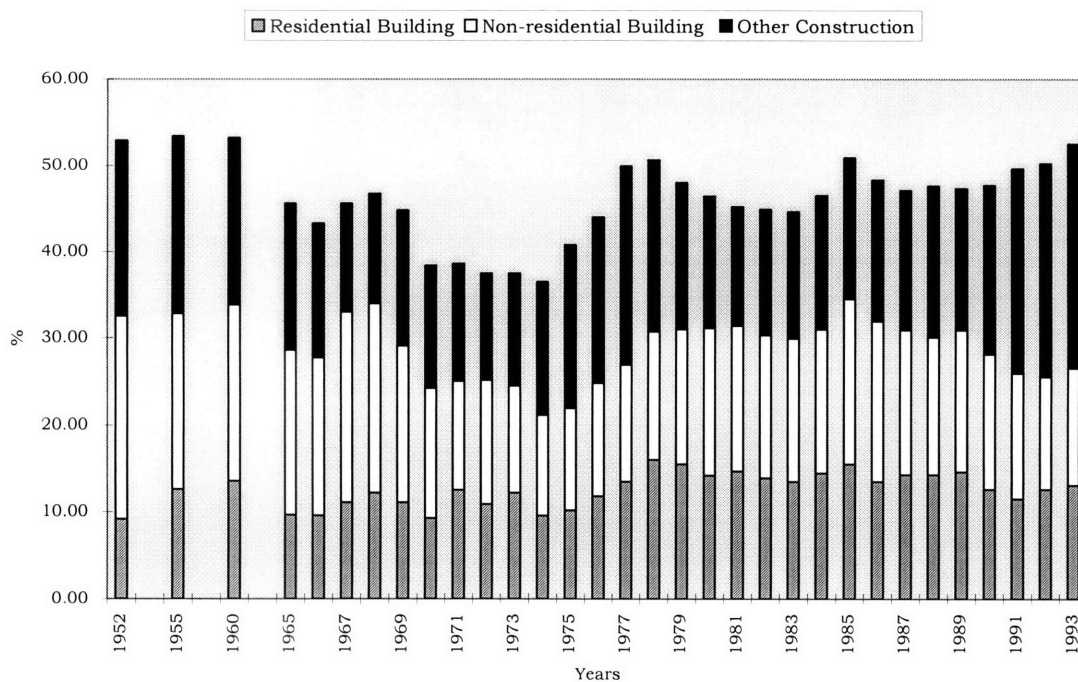


Exhibit 3.2 Contribution of Construction in the Gross Fixed Capital Formation in Taiwan

Source: Taiwan Statistical Data Book, 1994

3.1.2 Six-Year National Development Plan

In 1990, the Council for Economic Planning and Development in Taiwan proposed the “Six-Year National Development Plan,” a large-scaled infrastructure development program to be performed during the years of 1991 to 1996. The Executive Yuan (Cabinet) approved this program in January, 1991, and started its execution. The goals of this program are to restore economy order and to reach balanced overall

progress, through raising the per capita income, establishing industrial capacity, balancing the development in each area, and promoting living standards.¹³ There are fourteen major categories of development in this program, including agriculture, water systems, transportation and communication, urban and housing, energy, education, industrial development, environment protection, medical services, social security, and other items. The range of this program is very wide, and many construction projects are involved in each category of development.

The total planned spending of this program is NT\$82.8 trillion (about US\$3 trillion), in which there is about NT\$32.8 trillion directly spent in construction projects. This means that the government planned an annual investment of NT\$5,500 billion in the construction industry during these six years.¹⁴ Consequently, the whole construction industry in Taiwan was stimulated by this program. Many international contractors also noticed this great opportunity and wanted to participate and benefit.

Compared with construction projects in the past development programs in Taiwan, including those in the “Ten Major Projects” started in 1973 which was the largest government investment in construction projects before 1990, the construction projects in the Six-Year National Development Plan have two different characteristics. These two characteristics become the main challenge for Taiwanese construction firms to participate in this program. First, the cost of each projects is much higher. Firms therefore need a larger capacity in capital as well as other company resources to deal with these larger projects. Second, the technology requirement is higher. This is because many new types of

¹³ *Six-Year National Development Plan*. 1991. Council of Economic Planning and Development, Executive Yuan, ROC. p.1-3. In Chinese.

¹⁴ Lin, Ching-Nan. 1992. *Research on the Joint Venture for Construction*, Master Thesis, National Taiwan Institute of Industrial Technology. p.25. In Chinese.

construction work are included, such as high speed railway, mass rapid transit (MRT) system, and many other advanced industrial facilities. These projects may involve new construction technology which Taiwanese construction companies had never used, require higher accuracy of engineering, or contain higher complexity which is difficult to be managed by existing engineering and management technology.

3.2 Regulations in the Construction Industry

3.2.1 Classification of Construction Firms

The basic regulation for the construction industry in Taiwan is the “Construction Industry Administration Rules,” which is set by the Ministry of Interior. According to this regulation, all construction companies are divided into three classes: class A, class B, and class C. This regulation applies to any kind of construction work, including public construction, industrial construction, and residential building as well. Exhibit 3.3 shows the requirements for registration and the limitations for each class.

All companies should start from class C, and they can upgrade to the next higher class after two years if they fulfill both capital and experience requirements. Among these two main requirements for upgrading, capital requirements are not substantial. Even for class A companies, the capital requirement is still low (NT\$2,250,000, about US\$850,000). Therefore, the experience requirement is a more critical condition. Furthermore, the limitation of contract price imposed on firms in class B and C make this condition more important. For example, for class C firms, the price limitation is NT\$15,000,000. To apply to be a class B firm, a class C firm needs to finish projects with a total of

NT\$75,000,000 within five years, which means at least five projects should be done. Thus, upgrading is not an easy task for firms in class B and class C because of this limitation.

Class	Registration Requirement			Limitation of Awarded Contract Price
	Minimum Registered Capital	Number of Certified Professional Engineer	Experience	
A	NT\$7,500,000	More than 1	1. In class B for more than 2 years	No Limit
			2. Finished total construction work worth more than NT\$50,000,000 within the past 5 years	
B	NT\$2,500,000	More than 1	1. In class C for more than 2 years	No more than NT\$10,000,000 for each contract
			2. Finished total construction work worth more than NT\$25,000,000 within the past 5 years	
C	NT\$1,000,000	More than 1	New companies.	No more than NT\$5,000,000 for each contract

Exhibit 3.3 Regulation of Construction Firm Classification in Taiwan

Source: Ministry of Interior, Republic of China, Construction Industry Administration Rules

Two implications can be concluded from this classification system. The first implication is that this regulation limits the size of projects which firms can work on, and thus limits the profitability of firms. Because the mark-up of a project is usually a proportion of the total price of the project, which is usually 10% to 15%, if the price of the project is limited, the amount of profit will be limited as a result. For instance, there is a construction firm which usually enjoys a 10%

markup of its work. That means if the firm works on a \$1,000,000 project, it has a profit of \$100,000. However, if the company can only take the projects with price less than \$100,000, the profit from each job therefore will be less than \$10,000. Thus firms will try very hard to upgrade to class A as soon as possible.

The second implication is that the classification system focuses on only the capacity of firms. It has no specialty requirement. This is different from the situation in Japan, where the regulation requires firms to be specific on what kind of jobs they can take, such as tunnel, highway, etc., so that firms cannot undertake different kind of jobs before being qualified. This implication shows that a class A firm has very high degree of freedom in getting work.

3.2.2 Pre-qualified Bidding System

Design and construction are separated in Taiwan's public construction projects. After the design work is finished, the owner follows a low-price bidding process for contract awarding. The basic regulation related to the bidding process is an executive order called "Notice on Construction Bidding for Executive Yuan and Subdivisions." It states that only firms with sufficient experience, capacity, and equipment can participate in the bidding of public construction work. The qualification standards of each project can be set by the authorized government engineering agency which is in charge of the project. These standards include the following five items: 1. financial capacity, 2. past performance and experience, 3. work plan for the project which is certified by professional engineers, 4. availability of necessary machinery, and 5.

credit record.¹⁵ The executive order lists some standards for general qualification, but allows the authorized agency to change these standards.

This order basically gives the authorized agencies much freedom in using this bidding system. The agencies can just announce the standards and all firms which meet the standard are qualified to bid. In this case the bidding system is basically an open bidding system. On the other hand, the agencies can also use pre-qualification aggressively. According to this bidding process regulation, it is also lawful that the agencies use the bidding system as a nominated bidding system in that they examine the standards of the work plan (3rd item) and equipment preparation (4th item) of firms which want to bid, and then nominate qualified companies to participate in price bidding. In this case firms are judged in terms of technology, because these two standard items represents the technological proposal of a construction company.

Because many projects in the Six-Year National Development Program are very large and complex, the authorized government engineering agencies, such as the Department of National Highway Construction and Taipei Department of Rapid Transit System, usually use an aggressive pre-qualification process.

Pre-qualified bidding system puts three important constraints on firms: financial capacity, past performance and experience, and technology qualification. These constraints limit the type, number, and price of construction projects that a construction firm can be awarded. For example, in 1995, the Department of National Highway Construction required the financial capacity to be twenty times the registered capital of

¹⁵ Executive Yuan, ROC. Executive order. *Notice on Construction Bidding for Executive Yuan and Subdivisions*. Article 7 and 8.

a company.¹⁶ To be awarded a contract in highway construction, a contractor should first have enough experience and technology. Even if a firm is qualified on these conditions, it can only be awarded the total value of projects (i.e. the sum of project prices) no more than twenty times the registered capital of the company. If the company's registered capital is \$1,000,000, and it already has two awarded projects of which the prices are \$10,000,000 and \$5,000,000, respectively, then this company can participate in bidding only for the project of which the estimated (design) price is less than \$5,000,000 because the capital capacity of this company is \$20,000,000.

3.3 Construction Firms and Alliances in Taiwan

3.3.1 Local Construction Firms

1. Problems of Local Construction Companies

When Taiwanese construction companies are investigated, there are two problems presented. First, the sizes of these construction firms are too small. Exhibit 3.4 classifies the size of Taiwanese construction companies in 1991, the year when the Six-Year National Development Plan started. These figures show that even the largest Taiwanese companies are relatively much smaller than big construction companies in the U.S. and Japan. Until recently, the situation has only improved a little. The figures for Taiwanese companies in 1995, as shown in Exhibit 3.5, demonstrate that most of the Taiwanese companies are still small in terms of capital.

¹⁶ Ministry of Economic Affairs, ROC. 1995. *Operational Norms of JV in Public Construction for Small & Middle Size Entrepreneur*, Appendix, p.IV-3. In Chinese.

Registered Capital	Class A	Class B	Class C
More Than NT\$500,000,000	6		
NT\$400,000,000 - NT\$500,000,000	2		
NT\$300,000,000 - NT\$400,000,000	1		
NT\$200,000,000 - NT\$300,000,000	3		
Less Than NT\$200,000,000	1,064		
Total Companies	1,076	519	1,443

Exhibit 3.4 Number of Construction Companies in Taiwan in 1992

Source: Ministry of Interior, Republic of China

Registered Capital	Class A	Class B	Class C
More Than NT\$1,000,000,000	6		
NT\$400,000,000 - NT\$1,000,000,000	12		
NT\$200,000,000 - NT\$400,000,000	17		
NT\$100,000,000 - NT\$200,000,000	122		1
NT\$60,000,000 - NT\$100,000,000	135		
NT\$20,000,000 - NT\$60,000,000	889	47	20
NT\$10,000,000 - NT\$20,000,000	16	58	48
Less Than NT\$10,000,000	241	709	2,496
Total Companies	1,438	814	2,565

Exhibit 3.5 Number of Construction Companies in Taiwan in 1995

Source: Construction Industrial Association, Taiwan Area

The second problem is the lack of technology, both in management and construction. There are three aspects of this problem: low degree of automation; insufficient experience and knowledge in a variety of project types; and invalid management skills and technology. Although the industry in Taiwan has already become aware of this problem and has started to find solutions to it, most of the research projects in

construction technology development are supported by the government.¹⁷ Taiwanese companies did not actually put much effort into the development of technology.

In fact, these two problems are closely related. If firms remain small, they will not have the ability to develop advanced technology to save cost and increase profit. The lack of capital capacity limits firms' qualification for big projects, so that firms have less chance to obtain experience and improve technology, which only worsens the insufficiency of technology.

These problems with Taiwanese construction companies affect the competitiveness and profitability of firms. They also result in firms being incapable of working on public construction projects. One significant example is the case of the Taipei MRT projects. During the years of 1991 and 1992, there were not enough local companies qualified to participate in these projects. Exhibit 3.6 illustrates this situation. Part of the problem can be relieved if firms can increase their registered capital. The rest of it can be solved only through the technology progress in other domestic construction firms.

The problems become more harmful to Taiwanese firms because of the internationalization of Taiwan's construction market. In 1992, Taiwan applied for General Agreement on Tariffs and Trades (GATT), which is now renamed as World Trade Organization (WTO), and started to negotiate with other member countries in 1993.¹⁸ Many of the major member countries suggested that Taiwan should join this international organization as a developed country, and therefore the government could not impose protectionism on the domestic market in the future. Since

¹⁷ Hsiao, Jen-Chi. 1995. *A Comparison of Construction Automation in Major Constraints and Potential Techniques for Automation in the U.S., Japan, and Taiwan*. Master Thesis, MIT. p. 45-46.

¹⁸ Baum, Julian. 1993. "Waiting for the Call," *Far Eastern Economic Review*. March 23, 1993. p.47.

then, Taiwan’s construction market has been open to all contractors around the world. In 1995, there were already 42 companies among the top 225 international contractors which are now working in Taiwan.¹⁹ With much larger capacity in capital and finance, and more advanced management and construction skills, foreign companies are more competitive than Taiwanese ones. This situation makes it even more difficult for small Taiwanese firms with insufficient technology to survive in the market.

Bid Prices	Number of Bids	Number of Qualified Companies	Number of Additional Qualified Companies if their Capital Increased
NT\$1,500,000,000-\$2,500,000,000	7	12	6
NT\$2,500,000,000-\$4,000,000,000	7	9	4
More than \$4,000,000,000	11	4	3

Exhibit 3.6 Bid Prices and Qualified Companies for Taipei MRT Projects in 1991-1992

Source: Taipei Department of Rapid Transit System

2. Purposes of Forming Alliances for Local Firms

Faced with the problems mentioned previously, Taiwanese construction companies have a primary operational objective of finding solutions to them, in order to participate in the current giant national projects, and to survive in future competition. Forming alliances is one of the most effective strategies to achieve this objective. In general,

¹⁹ “Going Global - The Top International Contractors,” *Engineering News Record*. August 28, 1995. p.92.

Taiwanese companies enter construction alliances mainly for four purposes. First, companies can leverage capital and other resources through alliances. That is particularly important because the amount of money involved in the recent public construction projects is much larger than before. Small companies need to pool capital together so that they can fulfill the capacity qualification.

Second, Taiwanese construction firms can establish technological competencies through alliances. They can ally with foreign companies and absorb their technologies directly, or they may combine their efforts on research and development, and evolve technologies on their own.

The third purpose is to spread risk. Construction work always contains high risks and uncertainties. Alliances are effective in sharing risks among the members, so that each member will suffer fewer uncertainties.

Finally, some Taiwanese construction firms enter alliances to broaden their product or service offerings. Because of the increased profitability in recent public construction projects, some companies in Taiwan which used to focus on other market sectors in the construction industry, also want to benefit from these public projects. They form alliances with more experienced companies or foreign contractors in order to obtain the know-how in different types of construction.

3.3.2 International Contractors

According to the survey of *Engineering News Record* in 1995, among the top 225 international contractors, there are a total of 42 companies which are working in Taiwan.²⁰ Exhibit 3.7 shows where

²⁰ "Going Global - The Top International Contractors," *Engineering News Record*. August 28, 1995. p.83-96.

these 42 companies came from. The result of this survey indicates that there are only 15 countries around the world in which there are more top 225 companies working than in Taiwan, which shows that Taiwan has become one of the world's most important construction markets.

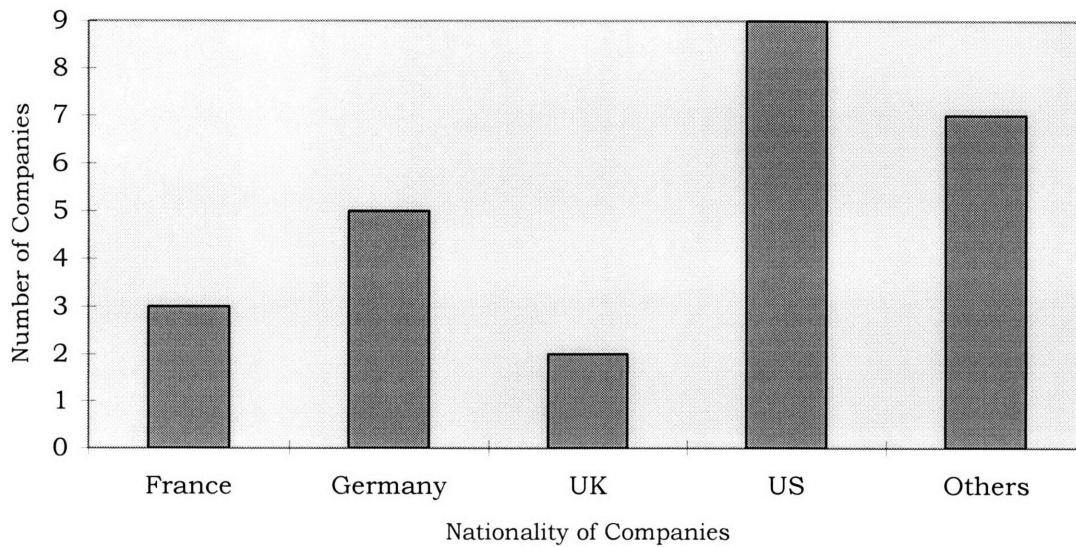


Exhibit 3.7 International Contractors in Taiwan in 1995

Source: Engineering News Record

From the perspective of these international companies, forming alliances may be a favorable strategic choice. The main purposes of these companies in alliances are related to three aspects: market penetration, capacity concern, and risk reduction.

1. Foreign Market Penetration

When considering penetration into Taiwan's market, international construction firms may form alliances for several reasons. First, alliances may be mandated by the owner. In some bids of recent public projects in Taiwan, the owners only allow firms to join the bidding in the form of joint venture between at least one local firm and one foreign firm. To comply with this requirement and receive profits from these projects, foreign firms need to find local partners.

Second, alliances can solve the limitation of classification regulation. The regulation requires all construction firms to start from class C, including famous foreign companies who want to start their business in Taiwan. Before they can upgrade to class A firms, which takes at least four years, the jobs that they can take are limited in terms of size and price, and therefore their profitability is limited. By forming alliances with local firms, foreign companies at lower classes but with enough qualification may have chances to earn more profit from larger projects, which were beyond their reach according to the law. Also, the working experience, an important factor for upgrading, is usually measured in terms of the price of projects which have been done in Taiwan. Foreign firms can gain experience credit with higher prices by forming alliances with local firms, so that they can accelerate the upgrade process.

Third, alliances are helpful for accessing local resources. International construction companies usually need to find local sources of machinery and labor. Without the help of local firms which are familiar with the condition in the local supplier's market, foreign firms may suffer serious cost disadvantage by not being able to find suppliers with lower price or higher quality. Forming alliances with local firms

provides foreign companies at least the chance to contact the suppliers which are doing business with their local partner.

2. Company Capacity Concern

International construction companies usually work in more than one country. Although this provides them the chance to seek profit in a broader range, because the resource and capacity of a company is limited, spending too much in one market may result in scarcity in other markets. Allying with others allows companies to preserve their resources, and therefore choose profitable opportunities in a wider field but at relatively less cost. With the capacity concern, foreign firms in alliances wish to obtain the benefits of leveraging internal investments, and reducing operating costs.

3. Risk Reduction

Getting into a foreign market is highly risky because of the differences in culture, law, and other political conditions. Furthermore, the resistance of local people toward foreigners may affect the relationship with the owners or suppliers, which results in even higher risk. Due to this unfamiliarity, foreign companies usually suffer higher risk than domestic firms. Thus risk reduction is relatively more important to foreign firms than local firms. Forming alliances allows foreign firms to perform two risk-avoiding strategies. The first is to share the risk of a project with local partners, who may have better knowledge about what construction risks they may confront and how to deal with them. The second strategy is risk diversification. Usually firms can provide less company resources in alliances than if they take the projects on their own. This allows them to spend the saved capacity in other

alliances. By doing this, foreign companies are actually diversifying their risk from a single project to many projects.

3.4 Construction Alliances in Taiwan

The first construction alliance case is Taiwan Power Company's dam construction project in 1969. After evaluating the technology level of Taiwan's construction industry at that time, the owner found that no Taiwanese company had the ability to finish the project. It thus invited foreign contractors to bid this project. The alliance of Torno Co. (Italy) and Kumagai Gumi Co. (Japan) won the bid and finished this project successfully.²¹

During 1970's, several alliances among domestic construction companies had been formed for Ten Major Projects, Taiwan's first large scale infrastructure construction program which started in 1973. However, since the government did not promote alliances, there were only a few alliance cases during 70-80's.

International construction alliances did not appear in Taiwan until late 1980's, when the Taipei City Government started to work on its MRT projects. The first international case was in 1989, and involved the cooperation of a domestic construction company, Ret-Ser Engineering Agency, and two foreign contractors, Samsung (Korea) and Ed. Züblin (Germany). After that, many foreign companies came to Taiwan, formed alliances with local companies, and worked on projects in the Six-Year National Development Program. These foreign companies include many top global contractors such as Morrison Knudsen Corp. (US), Bilfinger+Berger Bau AG (Germany), Shimizu Corp. (Japan), Obayashi

²¹ Lin, Ching-Nan. 1992. *Research on the Joint Venture for Construction*, Master Thesis, National Taiwan Institute of Industrial Technology. p.10. In Chinese.

Corp. (Japan), and Mitsui Construction Co. (Japan).²² In 1990's, most of the major alliances in Taiwan involve international collaboration and cooperation. Exhibit 3.8 shows the number of major construction alliance cases in Taiwan.

Year	Foreign-Foreign Alliances	Foreign-Local (International) Alliances	Local-Local Alliances	Total
Before 1970	1			1
1970 - 1980			1	1
1980 - 1990		1	3	4
1990 - 1995	2	16	3	21

Exhibit 3.8 Number of Major Construction Alliance Cases in Taiwan

Source: Ministry of Economic Affairs, Republic of China

²² Ministry of Economic Affairs, ROC. 1995. *Operational Norms of JV in Public Construction for Small & Middle Size Entrepreneur*. p.80-82. In Chinese.

IV. An Analysis of Profitability in International Alliances

4.1 The Overall Profit in a Construction Project

4.1.1 Types of Profits

Profit is the fundamental operational goal of a company. In order to increase overall profits, companies have strong incentives to develop and adopt different strategies. Even firms which sacrifice their short term profits and focus on market share or position are basically promoting their long term profits. Therefore, an understanding of the source of profits is an essential issue in a firm's operation.

The overall profit of a construction firm from a specific project can be divided into four categories: direct profits from construction, returns on intangible assets, long term profits from other projects, and other profits.²³ Each of the profit categories contains many different potential profit items. Basically, profits in the first two categories come directly from the specific construction project. Direct profits refer to the normal returns on the firm's input of resources to the construction project. Because these profits are actually the opportunity costs of company resources, they will not vary dramatically from firm to firm.

The major factors which distinguish a firm's profits in a construction project from those of other firms are intangible assets, including exclusively owned construction technologies, better management skills, useful past experiences, advantageous access to construction resources, the ability to finance at a lower interest cost, and special relationship with the owner. Profits obtained by the use of intangible assets can be the most important part of the profits that a firm

²³ Wu, Dao-Hseng. 1993. *An Application of Game Theory in Contract Awarding Behaviors of Public Construction Projects*. Master Thesis, National Taiwan University. p33-35, 93-98. In Chinese.

derives from a project. A construction firm's returns on its intangible assets are often the key factors in the probability of its being the winner in the bidding for a construction project.

The third category, long term profits, measures the profits from other construction projects, but the reasons for obtaining them are generated from the current project. In fact, firms may be able to generate many intangible assets from a current project, and thus long term profits are often the returns on intangible assets of other projects. For example, a construction company can apply the experience gained in the current project and enjoy the resulting cost savings in later projects. In this case these cost savings are the return on the firm's intangible assets of experience when the profits of the later projects are considered. However, if the firm wants to understand the profits from the current project, these cost savings should be categorized as long term profits.

Construction firms may be able to obtain extra profits from activities other than construction projects. These profits are grouped into the last category as other profits. A construction firm's profits in this category do not come directly from construction projects, either present or future. Rather, the project currently undertaken creates opportunities for profits from land development, facility maintenance, and actual operating the constructed facilities.

The timing of receipt of these profits is illustrated in Exhibit 4.1. When considering the overall profits from a project, a construction firm should estimate the expected values of the different profit items in these four categories. The expected value of a profit item is based on two factors: the possible amount of the profit, and the probability of obtaining such an amount. By carefully assigning appropriate values to the amounts and the probabilities for each profit item, a company can

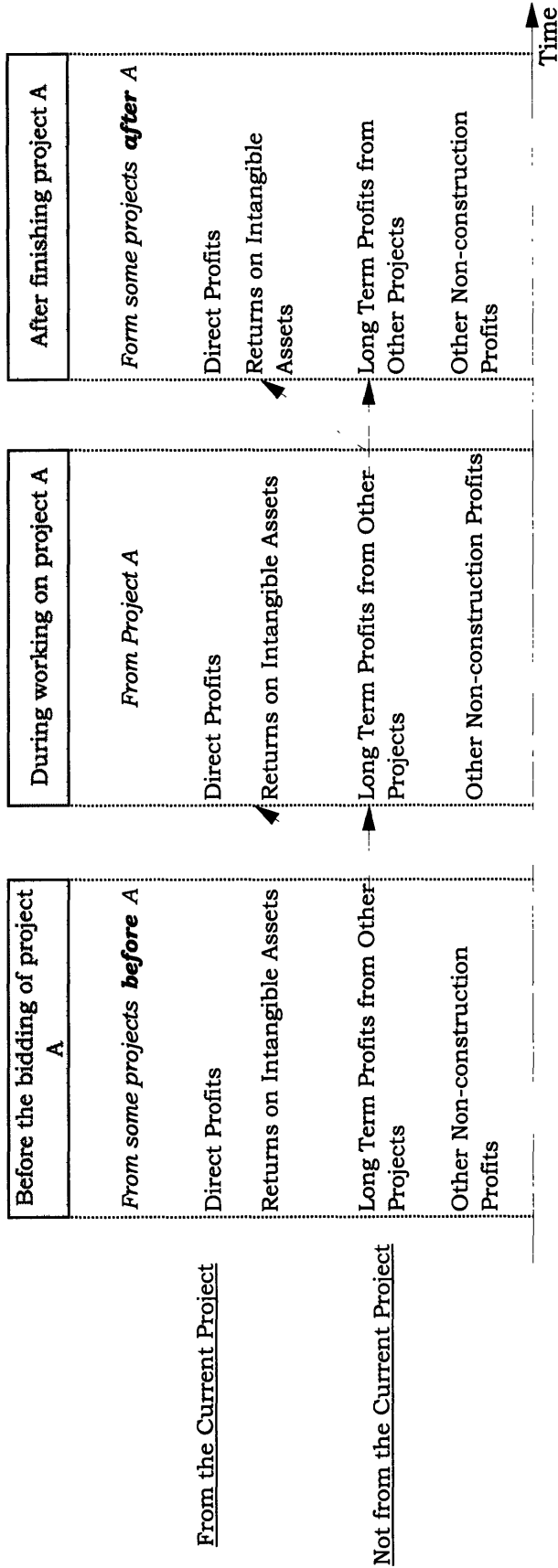


Exhibit 4.1 Timing of Profits

Source: Wu, An Application of Game Theory in Contract Awarding Behaviors of Public Construction Projects

gain an insight into the overall profit it may obtain from a construction project.

4.1.2 Competencies of a Construction Firm

Generally speaking, the ability of a construction firm to generate more profits than other firms in a construction project comes mainly from the three competencies: capital, intangible assets, and the access to other profit opportunities. These competencies are the sources of a construction firm's profits. The following examines these competencies and the profit items brought by each of them.

1. Capital

Capital is essential to a construction firm's operation. Capital affects profits from a project in two respects. First, the capital capacity may be one of the qualifications for participating in a project in the first place. As mentioned in 3.2.2, the pre-qualification bidding process used in Taiwan usually requires firms to meet a certain capital capacity. In this situation, capital decides whether a firm can undertake a certain construction project, and thus decides whether the firm can earn any profit from this project.

Second, a large amount of capital provides improved financial ability. This ability may bring extra revenues which fall into the category of direct profits from the current project. For example, the prices of construction materials may fluctuate significantly during the long period of construction. A firm with a large amount of capital may be able to purchase all the materials it needs for the current project at one time when the prices are low, and thus enjoy additional cost savings.

2. Intangible Assets

Intangible assets contribute a significant amount to a construction firm's income from a project. In the construction industry, especially in the public infrastructure construction market in Taiwan, the products are undifferentiated. Following the process of design-then-construction, and the low price bid system, different construction companies can generate almost the same final product. Thus firms cannot make profits from product differentiation. The only way to earn more profits than other companies is to reduce costs as much as possible. Intangible assets provide a construction company with the ability to reduce costs, and therefore are very important factors in the firm's profitability. These intangible assets can be divided into five major categories, including : 1. technologies and skills, 2. advantageous access to resources, 3. experiences, 4. special relationship with the owner, and 5. financial credit.

The first category, technologies and skills, includes construction technologies, technologies for management, management and scheduling skills, and field construction techniques. This type of intangible asset has three major effects on a company's profit. First, a specified standard of technology is an essential requirement in Taiwan's pre-qualification bidding system. Without meeting this standard, a company is unable to enter the bidding. Second, experienced management skills and technology can reduce costs involved in the construction process. Third, firms with advanced technologies may be able to propose an alternative construction method to the owner, and generate additional profits from the cost differences between the alternative and the original methods envisioned. These effects are not only related to the return on intangible assets of the current project, but also are important to the long term profits.

Advantageous access to resources mainly provides cost savings to construction firms. In this category, three types of advantageous access to resources are involved. First, firms may have long term working relationships with specific suppliers, such as material suppliers, subcontractors, and equipment rental companies. These relationships enable firms not only to obtain construction resources at lower costs, but also to retain a stable resource supply which is especially important when many large projects are underway at the same time. This is the situation in Taiwan's Six-Year National Development Plan. Second, construction firms with vertical integration can enjoy cost savings on resource supply. Possible forms of vertical integration may be include: company ownership of important construction equipment; company ownership of material factories; and work forces within the company that can perform as subcontractors. Third, some companies may have the unique sources of money from which they can borrow at a lower interest rate. For example, some Taiwanese construction companies are in fact subsidiaries of large financial institutions, which enable them to borrow money at a much lower interest rate from their parent companies.

Experience falls into the third category of intangible assets. Past experience affects a construction firm's profitability in two ways. First, according to Taiwan's construction regulations, prior experience is not only the key factor in classifying a firm, but also is the major qualification for a firm to participate in a construction project. Firms without sufficient experience have difficulty in being awarded projects, and thus their overall profitability is influenced. Second, past experience helps firms to reduce construction costs. This affects both the profits from current project in terms of returns on intangible assets, and the long term profits from other projects. Experience in previous projects is helpful to the current project, while the experience obtained in the

current project may also help firms work at lower costs in their future projects.

In the fourth category, if a firm has a special relationship with the owner, the resulting stronger mutual trust between the firm and the owner may benefit the firm in many ways. First, it may be easier for the firm to negotiate with the owner over the contract items. Second, the owner may apply more reasonable supervision during the construction process so that the firm can avoid many problems which may cause the delay of project completion. Third, the firm may be able to settle changed conditions with the owner in a more favorable fashion. These effects may help the firm obtain more profits from its current project.

Finally, good financial credit can help a firm to borrow more money. Firms with better financial credit may be able to implement better project financing. Thus this type of intangible asset can have a similar effect as having a large amount of capital.

3. Access to other profit opportunities

Sometimes a project may give a firm the opportunity to obtain more profits in addition to those generated on construction projects. Some of these opportunities may be short term ones such as a rise in the construction company's stock prices due to its being awarded the project, or the opportunity to develop the land near the project site. There may also be long term opportunities, such as additional revenues from the maintenance of the constructed facility, or from the operation of the facility.

4.2 Market Structure Analysis

Porter suggested a five forces framework to analyze the market structure of an industry.²⁴ These five forces are important because their collective strength determines the potential of firms in a market. The essence of strategy formulation is to cope with these five forces. These forces include the threat of new entrants, rivalry among existing firms, the bargaining power of buyers, the bargaining power of suppliers, and the threat of substitute products or services. Exhibit 4.2 shows the structure of this framework.

In order to understand how alliances affect the overall profit of construction firms in Taiwan, this section applies the five forces framework to see how alliances alter the strength of these forces, and thus affect the profitability of a construction firm.

In the construction industry, the threat of substitutes is small.²⁵ Therefore this thesis will not discuss this market force. Moreover, in the public infrastructure construction market, the buyer is the government. It not only has the power of ordinary buyers in other industries, but also has the power to affect a firm's profitability through its policy. Thus this section also does not discuss the buyer's power. Detailed analysis of the power of the government is presented in Chapter 5.

4.2.1 Threat of New Entrants

New entrants bring new capacity to the market. They try hard to gain market share and often substantial resources, and thus reduce the profitability of the existing firms. The strength of the threat from new

²⁴ Porter, Michael E. 1985. *Competitive Strategy*. p.3-33.

²⁵ Uemura, Daisuke. 1995. *Strategies of Large Construction Firms in Japan for the Open Bidding Systems*. Master Thesis. MIT. p.62-63.

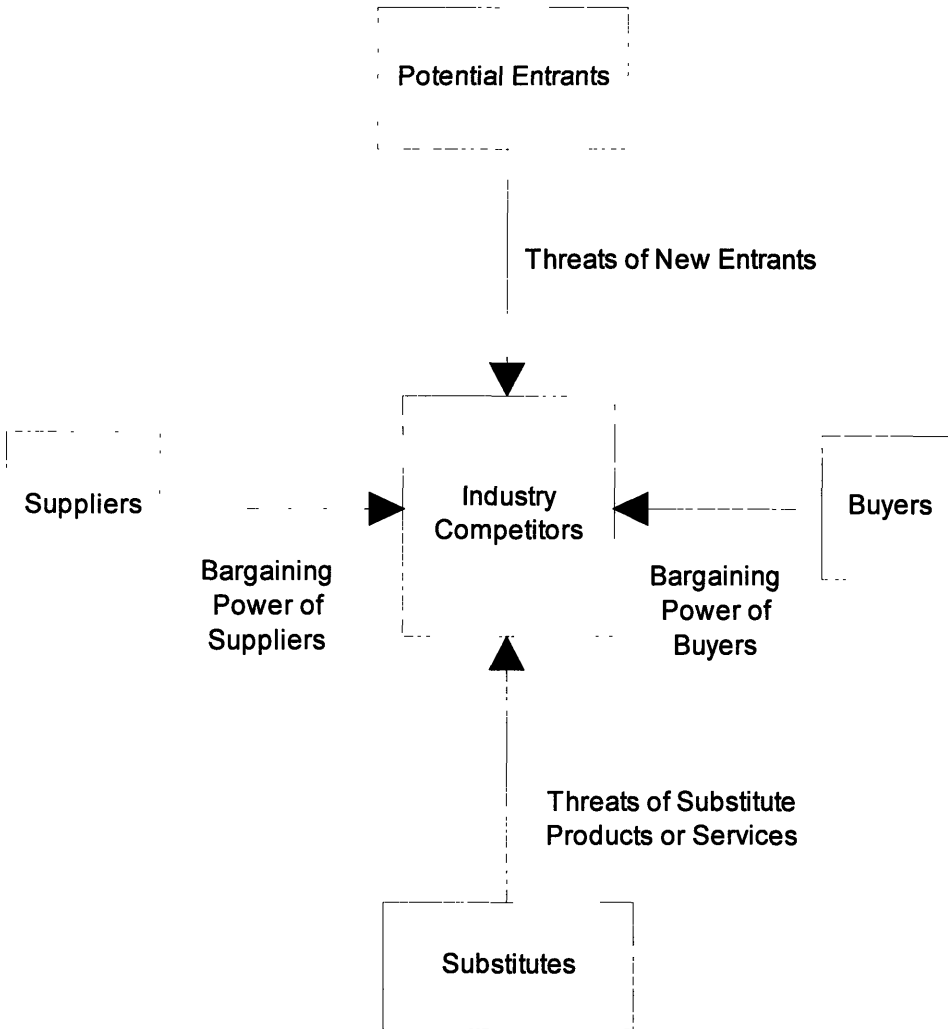


Exhibit 4.2 Five Forces Framework

SOURCE: Michael Porter, Competitive Strategy

entrants depends on the barriers to entry. There are seven major sources of barriers to entry, including economies of scale, product differentiation, capital requirements, switching costs, access to distribution channels, cost disadvantages independent of scale, and government policy. Among these sources, economies of scale in production is not applicable to the

construction industry.²⁶ Products are undifferentiated because of the build-after-design process in Taiwan's public infrastructure construction market. Furthermore, since the low price bid system is in effect, all qualified firms can participate in bidding, and the owner's switching costs are low. Therefore, capital requirements, cost disadvantages independent of scale, and government policy are major entry barriers to Taiwan's public construction market.

Recently in Taiwan, the Six-Year National Development Plan has resulted in many new construction projects. These profitable projects have attracted many new entrants who are looking forward to entering the public infrastructure construction market. There are three major types of new entrants: international contractors; local class-A companies which used to focus on other market sectors; and, other Taiwanese construction firms in lower classes, especially class-B firms which are more instantly threatening. The existing Taiwanese firms in that market sector face a strong threat from these new entrants.

New entrants affect the expected profitability of existing construction firms from a specific project in two ways. First, the increase in the number of companies reduces the probability of winning any bid. Second, new entrants are usually willing to enter a market at an initial loss. Therefore, if existing firms want to compete, they have to reduce their bidding prices. This increases the risk of projects, and thus reduces the expected value of long term profits.

Alliances affect entry barriers, and in turn affect firms' profitability. For foreign companies, they face two types of entry barriers: government regulations; and cost disadvantages in accessing local construction resources. Forming alliances with local companies is a favorable strategy

²⁶ Uemura, Daisuke. 1995. *Strategies of Large Construction Firms in Japan for the Open Bidding Systems*. Master Thesis. MIT. p.54.

for international firms to eliminate these barriers at lower costs in entry, and thus enlarge their profitability in three aspects. First, direct profits from the current project may increase due to saved entry costs. Second, their returns on intangible assets from the current project may also increase with local firms' favorable access to resources. Third, their long term profits increase because they can establish a working record in Taiwan more quickly, which is essential to their future qualification in Taiwan's company classification system, and in the pre-qualification bidding system.

On the other hand, however, for Taiwanese companies, by allying themselves with foreign companies, they invite more firms into Taiwan's construction market. Consequently, they intensify future competition in the local market, reduce their own chances in winning future bids, and thus their long term profits will decrease.

4.2.2 Rivalry among Existing Firms

One of the major considerations for a firm when it is setting its strategy is the performance of existing competitors. The rivalry among existing firms is strong in the construction industry for four reasons: numerous competitors; slow industry growth; lack of product differentiation; and low switching costs of the owner. It is expected that the future competition in Taiwan will be more severe after the finish of the Six-Year National Development Plan, because the demand for construction will largely decrease at that time, and many new firms enter the market during the execution of the Six-Year National Development Plan.

The key factor for winning competition in the construction industry is profit items. Wu indicates that if a firm has more potential profit items,

it has a better chance to win the bid for a construction project.²⁷ In order to be a winner in bidding competition, a firm should try to obtain more competencies to bring more possible profit items to this project.

Alliances may create synergy through combining competencies of firms. This synergy increase firms' profits from the current project. An international alliance is thus beneficent for firms' short term profits in both categories of direct profits and returns on intangible assets, because it contains a larger capital capacity contributed by partners; technology advantages brought by the foreign firm; and the local firm's advantages in accessing resources. By sharing risks between firms in an alliance, each firm increases their own probability of obtaining profits from the current project. However, alliances may not always be profitable in the long run.

For local companies, forming alliances may help them acquire advanced technologies, and increase their long term profits. On the other hand, alliances give foreign companies access to local resources. This may reduce the strength of local firms' advantageous access to resources, and consequently reduce their long term profits. The situation for foreign companies mirror that for local companies. While they can establish the resource supply network with help from their local partners in alliances, their loss of technologies reduce their strength of long term advantageous competencies.

4.2.3 Bargaining Power of Suppliers

In the construction industry, there are three major types of suppliers for construction resources: material sellers, equipment rental

²⁷ Wu, Dao-Hseng. 1993. *An Application of Game Theory in Contract Awarding Behaviors of Public Construction Projects*. Master Thesis, National Taiwan University. p.36-40. In Chinese.

companies, and subcontractors.²⁸ These suppliers can exert their bargaining power and affect the profitability of an industry by threatening to raise prices, reduce the quality of purchased goods or services, and delay the delivery. The bargaining power of suppliers are strong in the construction industry for several reasons. First, the suppliers' products are important inputs to construction firms. No construction company can work on any project without these suppliers. Second, these suppliers face few threat from substitute products. Third, construction companies will usually stick with some certain suppliers, and thus the switching costs for them are large. This bargaining power is even stronger in Taiwan recently because of the sudden demand expansion in the beginning of the Six-Year National Development Plan. The salary of laborers as well as engineers increased because of a shortage of supply. Prices of many types of construction material also increased.

The synergy resulting from alliances may help firms deal with the bargaining power of suppliers. This has a positive contribution to firms' profits from their current projects. For example, the larger capital capacity from alliances may give firms the ability to purchase a larger volume of materials at one time. This reduces the bargaining power of material suppliers.

4.2.4 Summary of the Analysis

Exhibit 4.3 summarizes the result of market structure analysis done previously. Firms can examine the effect of alliances on their

²⁸ Uemura, Daisuke. 1995. *Strategies of Large Construction Firms in Japan for the Open Bidding Systems*. Master Thesis. MIT. p.61.

expected profitability with this framework. This helps them understand the possible profits or losses in alliances before they are formed.

	Local Firms		Foreign Firms	
	Short Term	Long Term	Short Term	Long Term
Threat of New Entrants		(-) Intensify local competition	(+) Reduce Market Entry Costs	(+) Establish working experience record
Rivalry among Existing Firms	(+) Synergy Effects (+) Shared Risks	(+) Gain technology advantages (-) Lose resource accessing advantages	(+) Synergy Effects (+) Shared Risks	(+) Gain resource accessing advantages (-) Lose technology advantages
Bargaining Power of Suppliers	(+) Synergy Effects		(+) Synergy Effects	

(+) : increase profit

(-) : reduce profit

Exhibit 4.3 Summary of Alliance Effects on Profit

4.3 Concept for Cooperation Decisions

4.3.1 Alliances and Competencies

Alliances change the strength of firms' competencies. This change results in the effects on their profitability, as described in Section 4.2. Among their three competencies described in Section 4.1.2, construction firms will not lose their own capital capacity to each other in alliances. Other profit opportunities can only affect a firm's profitability for the current project. Moreover, these opportunities are under the control of firms which own these opportunities. The exchange of profits from them depends on the willingness of firms. However, firms may inevitably lose

some of their advantages on intangible assets to the other party in alliances.

The effects of alliances on a firm's profitability can be classified into the following four categories, in terms of the relation with firms' competencies.

1. Short Term Synergy from Competencies

Alliances generate synergy by combining competencies of firms. This synergy affect mainly profits from the current project, and benefit all parties in an alliance with no unfavorable effects. Several possible types of synergy can happen in alliances, including: increased capital capacity; combined advantages for the current project; better bargaining power to deal with suppliers; and increased chances in other profit opportunities.

2. Gained Competencies for Long Term Profits

Firms may acquire competencies from their partners in alliances. Gained competencies benefit only the firm which possess it. These competencies usually have long term effects on firms' profitability. As stated in 3.3, in construction alliances in Taiwan, one of the local firms' objectives in construction alliances is to obtain technology from foreign companies. For foreign contractors, on the other hand, they need the access to resources from local companies.

3. Lost Competencies for Long Term Profits

This mirror the situation in gained competencies. For the party which gives competencies, this is harmful because giving up competencies implies the reduction of strength in its own competitive

advantages. Thus local firms may lose their advantage in accessing resources, while foreign companies lose their advantage in technology.

4. Effects Independent of Firms' Competencies

Alliances may bring effects which are not related to firms' competencies. There may be positive effects on firms' short term profits, in that alliances help firms reduce their own risks in the current project. There may also be negative effects. For example, alliances help foreign firms enter the local market. For domestic companies, this increases future competition, and will reduce their long term profitability.

In an international construction alliance formed by a local company and a foreign contractor, as is the case in most of the alliances in Taiwan, the local firm has the advantage in accessing resources, while the foreign firm has the advantage in technology. Both parties want to acquire the other's advantage, but they may lose their own in the alliance. Their overall profit will also be affected by the synergy effects generated from alliances, or effects independent of competencies in alliances. Thus before firms decide to form alliances, they should evaluate what overall effect the alliance has by following the profit concept describe previously. If their overall profit increases, they may benefit by forming alliances; however, if their profit decreases more from losing advantageous competencies than it increases from acquiring the other firm's competencies, not to form alliances may be a more profitable strategic option.

4.3.2 Iso-Profit Curves

1. Local Firms

Local firms will give up their resource accessing advantages in exchange for a foreign company's technology advantages. However, as more resource accessing advantages have been given up, local firms are less willing to give up even more since they want to maintain at least a little advantage over their foreign counterpart. In addition, the marginal profits brought by additional strength of technology advantage are decreasing. Local firms are not willing to provide advantage in accessing resource in exchange of technology if they already have sufficient strength of technology advantage.

The concept of local firms' situation can be represented graphically as iso-profit curves. The concept of iso-profit curve is similar to the economic concept of isoquant, which is a curve that shows all possible combinations of inputs that yield the same outputs.²⁹ These iso-profit curves are convex toward the lower-right, as shown in Exhibit 4.4. In this graph, the horizontal axis measures the strength of advantage in accessing resources that local firms have, while the vertical axis measures the strength of advantage in technology that foreign firms provide. Each point in this graph represents the strength of advantage in accessing resources that a local firm will give up, and the strength of technology advantage that the firm can get in return. All points on a iso-profit curve have the same level of profit, and each iso-profit curve represents a different level of profit. For the same strength of resource accessing advantage, the more strength of technology advantage provides more profit. Therefore, the upper-left iso-profit curves represents higher levels of profit. Firms will not give up any resource accessing advantage

²⁹ Pindyck, Robert S. and Rubinfeld, Daniel L. 1995. *Microeconomics*. 3rd Edition. p.168.

for nothing. Thus, when only the effects of competencies exchange are under consideration, there is a least profit curve which pass through the origin. The area to the left of the least profit curve is the feasible region, which means local firms can only accept cooperation conditions in this area.

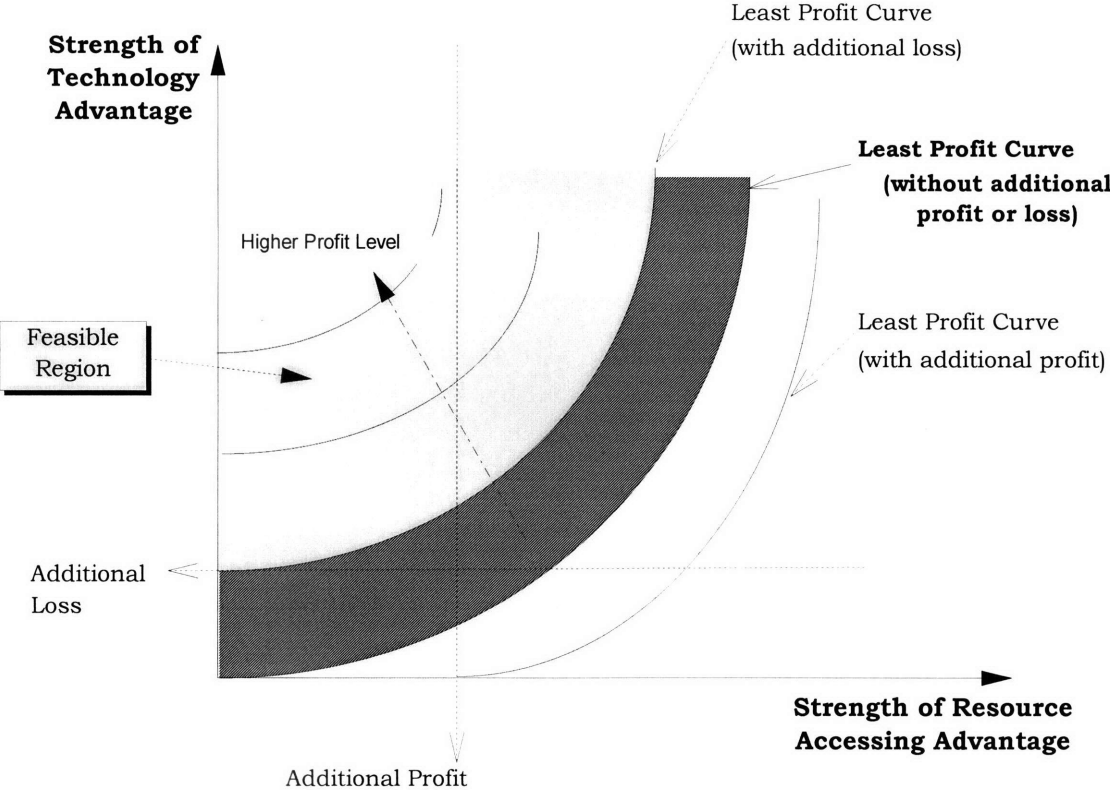


Exhibit 4.4 Iso-Profit Curves of a Local Firm

The least profit curve represents the cooperation conditions with which the firm will receive the same amount of profit as if there is no exchange between resource accessing advantage and technology advantage. In the area to the right of this curve, the exchange conditions

can only make a firm worse off because the lose of advantage on resource can lead to more severe future competition and the benefit from absorbed technology cannot offset this lost.

If there are effects of synergy or potential disadvantages independent of competencies in an alliance, the least profit curve may not pass through the origin. These effects of an alliance provide additional profits or losses other than competencies exchange. When these effects provide a net additional profit, in order to obtain this profit, a local firm may be willing to form an alliance and give up some of their resource accessing advantages without asking for technology exchange. This will shift the least profit curve to the right, and thus enlarge the feasible region of the local firm. In this circumstance, the cooperation can be achieved more easily. On the other hand, when the net effect is a loss, the local firm may ask for technology without providing any resource access in exchange, in order to offset the loss in the alliance. Thus the least profit curve will move upward, and the feasible region of the local firm will become smaller.

2. Foreign Firms

The situation for foreign firms can be analogous to the that of local firms, as shown in Exhibit 4.5. Foreign firms have the iso-profit curves with higher utility at the lower right part. Each point in this graph represents the strength of technology advantage that the foreign firm will give up, and the strength of advantage in accessing resources that it can get in return. The curves are convex toward upper-left, and there is also a least profit curve which confines the feasible region to the lower right part. The net effect of synergy from an alliance and disadvantages independent of competencies also shifts the least profit curve, as well as

shifting the feasible region. That is also because a foreign firm may give up some technology advantages not for exchanging access to resources, but for obtaining the net additional profit other than competencies exchange from the current project, while it may also ask advantageous access to resources without giving up technology in order to offset the net additional loss other than competencies exchange in the alliance.

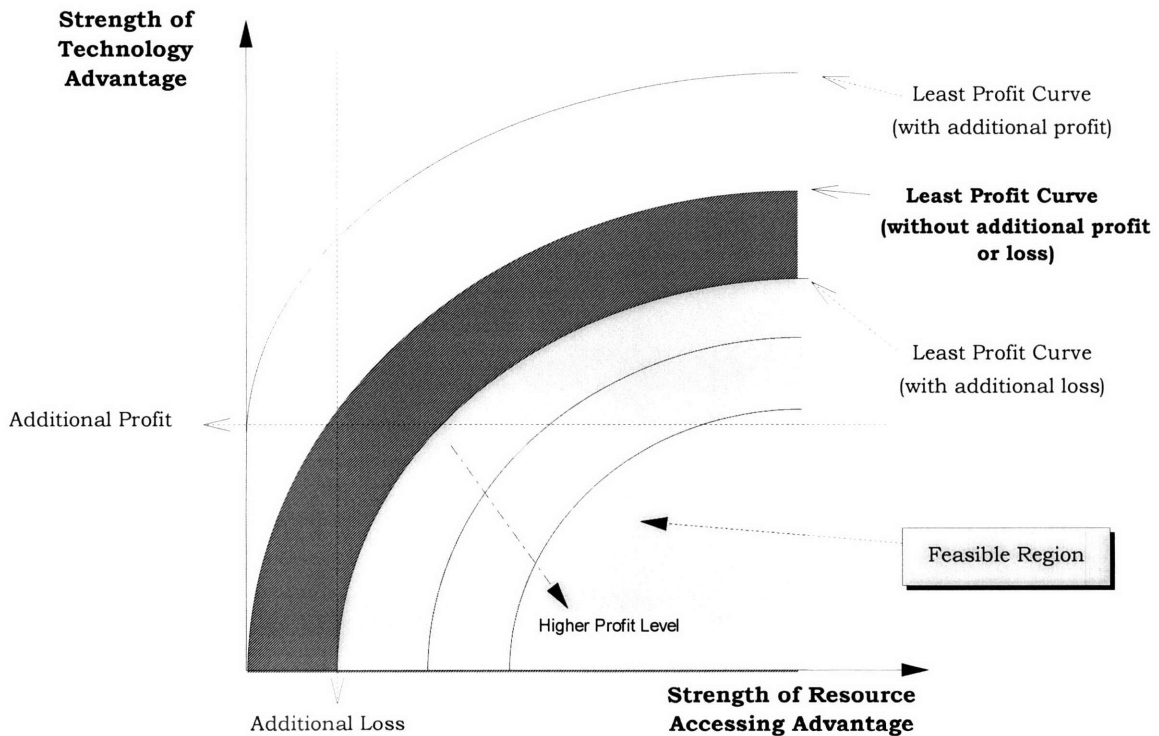


Exhibit 4.5 Iso-Profit Curves of a Foreign Firm

4.3.3 Bargaining for Cooperation

1. Trade Region

By combining the iso-profit curves of local and foreign firms, one can find that cooperation can be achieved in the region formed by the least profit curves of local and foreign firms, as shown in Exhibit 4.6. This region is called “trade region”, in which cooperation can be achieved because that is the intersection of the feasible regions of both parties.

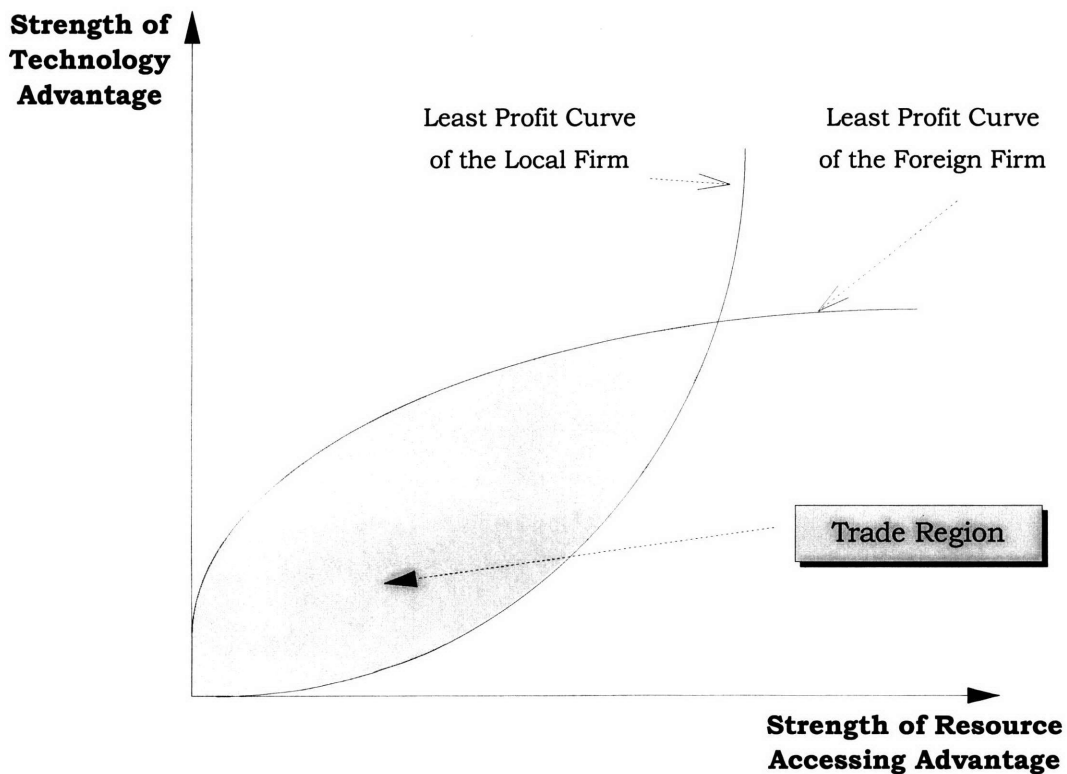


Exhibit 4.6 The Trade Region

Trade regions do not necessarily exist. Exhibit 4.7 demonstrates two situations in which there is no trade region. In the first situation, the

only intersection of two least profit curves is the origin, and there is no trade region. This means that alliances cannot bring more profit to firms, and thus cooperation cannot be achieved. This situation happens because firms' least profit curves still pass through the origin, which is resulting from firms' feeling that there is no additional profits from alliances other than competencies exchange, or the additional profits was offset by the potential loss independent of competencies. In these circumstances, if firms determine that their own advantages are more valuable than the other party's, the only intersection of least profit curves is the origin.

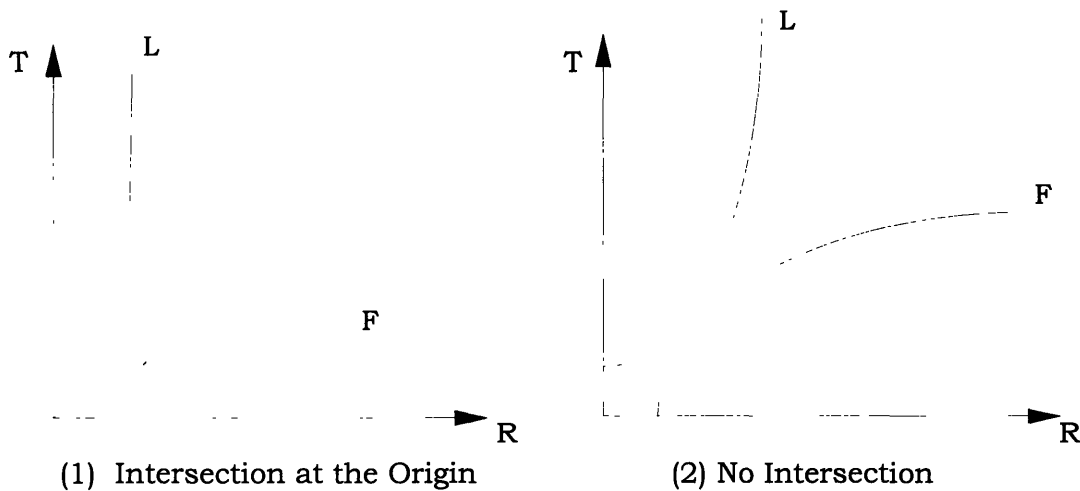


Exhibit 4.7 Situations of No Trade Region

In the second situation, there is no intersection of firms' feasible regions. This happens because according to firms' evaluation, there are

very large potential losses independent of competencies in an alliance. Thus there is also no cooperation.

Sometimes the trade region contains only one point, which is the tangent point of two least profit curves, as shown in Exhibit 4.8. This usually happens in the circumstance that there are net potential losses for firms other than competencies exchange. In this case because the only trade point is on firms' least profit curves, alliances will not increase their profit. Therefore, firms are indifferent between whether or not to form alliances.

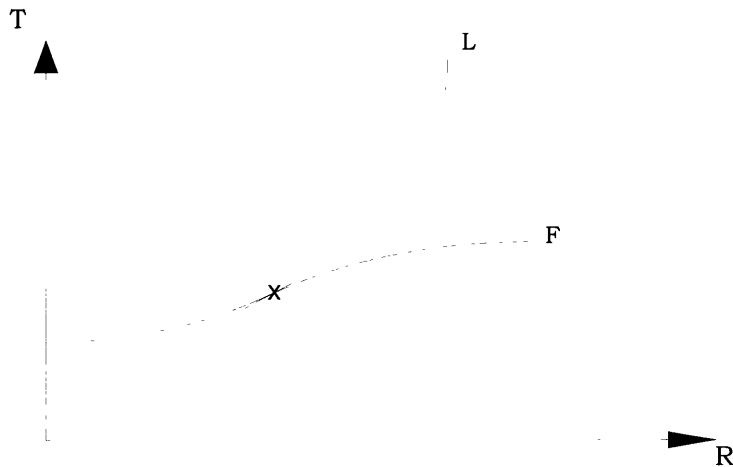


Exhibit 4.8 Single-Point Trade Region

2. Pareto Optimum

An alliance can make both participating firms better off with the exchange condition at any point within the trade region. Thus cooperation can happen at any point within the trade region. However,

only a few points in the trade region are the Pareto optima. A Pareto optimum is a point that cannot be improved on.³⁰ That is, in Pareto optimum, the resources and output are allocated in such a way that no reallocation can make anyone better off without making at least one other person worse off.³¹

This situation can be demonstrated as Exhibit 4.9. An iso-profit curve of local firm, PL1, and an iso-profit curve of foreign firm, PF1, have two intersections, point A and C. Firms can choose two different degrees of cooperation, either at high level point of A or at low level point of C, and receive the same level of profit. However, neither point A nor point C is a Pareto optimum because there is at least one party in this situation that can be better off without making the other party worse off. For example, firms can switch their exchange condition to point B, which is a tangent point of PF1, and another iso-profit curve of the local firm, PL2. From point A or C to point B, the foreign firm's profit remains at the same level as PF1, but the local firm's profit increase from PL1 to a higher level, PL2. Point B is a Pareto optimum because there is no way that one firm can receive more profit without reducing that of the other.

3. Bargaining with Incomplete Information

Although firms have already been better off when they cooperate with the condition at any point within the trade region, they will still bargain for better cooperation conditions in order to achieve iso-profit curves at higher profit levels since firms usually want to maximize their own profit.

³⁰ Binmore, Ken. 1993. *Fun and Games*. p.177.

³¹ Pearce, David W. 1992. *The MIT Directory of Modern Economics*. 4th Edition. p.324.

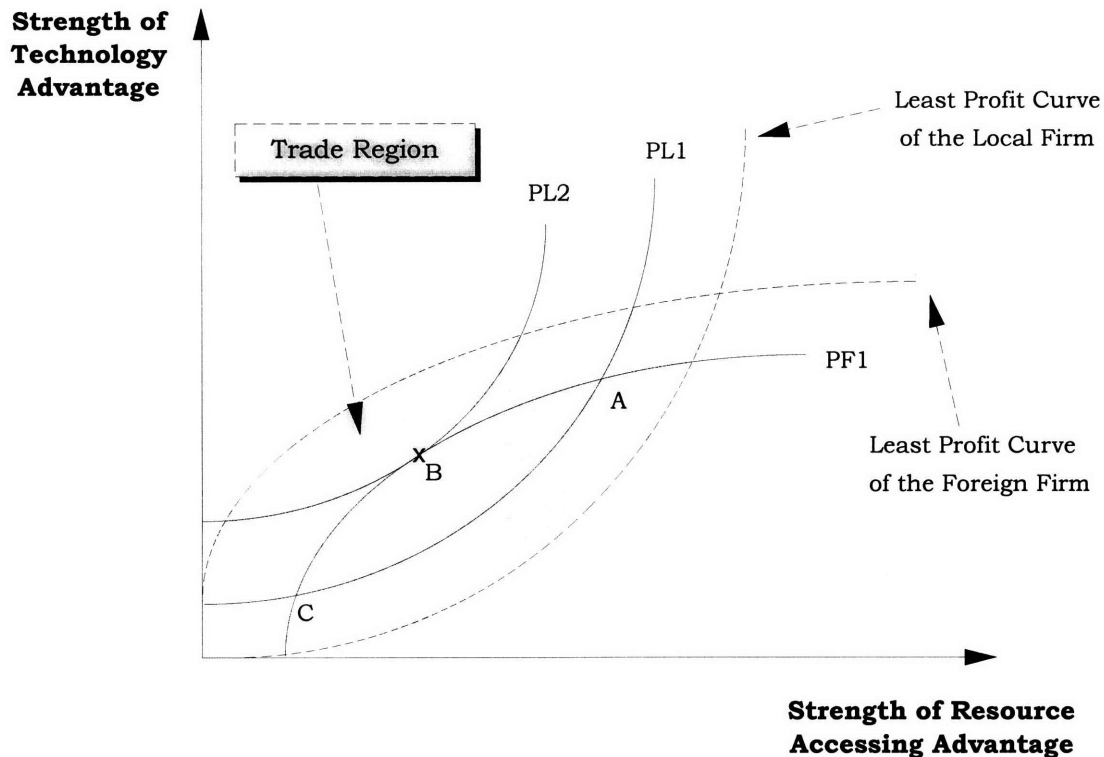


Exhibit 4.9 Pareto Optimum

Basically, when bargaining for the exchange conditions to form alliances with, firms' information is incomplete in two ways. First, firms are not sure about the profits they will obtain. They also do not know the exact value of competencies which they acquire from alliances or lose in alliances. Firms can deal with this problem only through better estimating the expected values of profit items, as stated in Section 4.1.1.

Second, firms face incomplete information about the other party's feasible region. According to the research done by many game theorists, in the situation that bargainers have private information, there will be a

great many equilibria in which bargainers can settle an agreement.³² Therefore, it is difficult to predict where in the trade region cooperation will be achieved. However, when bargaining for alliance conditions, firms should focus on two major issues in order to maximize their own profit. First, they should make sure the cooperation condition is within the trade region. As long as this condition holds, firms will benefit from alliances. Second, during the bargaining process, firms should try to achieve Pareto optimum. They may propose different exchange conditions to see if there is any better condition that will make both firms in an alliance better off.

³² Fudenberg, Drew and Tirole, Jean. 1991. *Game Theory*. p.399.

V. Government Policy and Alliances

5.1 Promoting International Construction Alliances

5.1.1 Industrial Policy Failures in Taiwan

Taiwan had significant economic growth in the past forty years, and the construction industry has played an important role in this progress. However, the government did not adopt an appropriate industrial policy for the construction industry. It invested in public construction projects mainly for two purposes. First, public construction projects were pursued to fulfill the need of domestic infrastructure. This need was based on the rationale for supporting the expansion of other industries, the demand from the public due to insufficient living standards, and other political issues such as the reelection of mayors, councilors, or parliamentarians. In these circumstances, the prime goal of the government was to finish these projects as soon as possible in order to satisfy the need and avoid complaint from the public.

Second, investment in construction projects is an important part of fiscal policy in Taiwan. By increasing the investment in construction projects, the government can increase the employment, and stimulate demand in many other industries. Therefore, the Taiwanese government often used the investment in public construction projects to boost economic growth.

As a result of these two purposes, the government did not have a long term plan for promoting the construction industry itself. Instead, it used the construction industry as a tool to fulfill other goals. This attitude caused many problems, as described in the following.

1. Flaws in contract awarding process

Three major flaws existed in the contracting process for public construction projects in the past. First, the government gave the Retired Serviceman Engineer Agency (RSEA) the priority to negotiation for public construction projects. RSEA is a part of the government organization. It was established mainly to help thousands of retired servicemen who came to Taiwan with Chiang Kai-shek's Kuomintang from mainland China in 1949 when the communist China was established. RSEA utilizes manpower of these veterans and performed construction work for public projects. As a part of the government, it is believed that RSEA can do the work at the lowest possible costs. There was also an executive order from the Executive Yuan (Cabinet) which instructs the government - both central and local- to negotiate with RSEA before proceeding with open bidding for the public projects, especially projects which require high levels of technology, in order to shorten the time of the bidding process and construction.³³ This unfair bidding condition limited the growth of private Taiwanese companies. As a result, when the Six-Year National Program was about to start in 1991, RSEA was the largest construction company in Taiwan, with the largest annual revenue and over twenty times more employees than private Taiwanese construction firms.³⁴

Second, the government applied "international bidding" to projects which require high technology. In the "international bidding" process, because of the concern that no domestic company has enough technology to finish a project, only international contractors can participate in the bidding process. For example, the first joint venture

³³ Executive Yuan, ROC. Executive order. *Retired Servicemen Assistant Act*, Article 8.

³⁴ "The Top 1000 Companies in Taiwan," *Common Wealth Magazine*. June 15, 1991. In Chinese.

case in Taiwan, a cooperation between Torno Co. (Italy) and Kumagai Gumi Co. (Japan), was the result of international bidding. The government usually finds international contractors for complex projects in order to accelerate the progress of construction. Consequently, local firms did not have a chance to work on these projects and develop technology for them.

Third, the classification system does not require specialization. Without being required to specialize in specific types of construction work, Taiwanese construction firms did not spend money on R&D to improve their specialization. This worsened the situation of the local industry's lack of technology.

2. Inconsistent Investment in Public Construction

Because the government just wanted to fulfill short term demand for construction, it did not have a long term plan for infrastructure construction. Furthermore, the construction administration and planning organizations in the government are complex and inefficient. Consequently, investments in public infrastructure construction were inconsistent.³⁵ The fluctuation in demand forced domestic construction companies to remain small in order to have more flexibility in their operation.

3. Inflexible Contracting Method

The government did not create profit incentive in its contracting method for construction firms to reduce their costs on projects. Without

³⁵ Chang, Chen-Yu. 1994. *A Research on the Economic Behavior of the Construction Market in the R.O.C.* Master Thesis, National Taiwan University. p.194. In Chinese.

profit incentives, Taiwanese companies were more reluctant to develop advanced technology or adopt better management skills for cost savings.

These problems not only resulted in the government suffering higher cost and relative lower quality construction products, but also in heavier impacts on the environment and society. Furthermore, the domestic firms have remained small or medium in size, and their technology ability has fallen far behind the big construction companies from Japan, U.S. and Europe. According to a rough estimation, it will take them about ten years to catch up.³⁶ Thus, Taiwanese construction companies face a crisis of surviving in the future.

5.1.2 Why should the Government Promote International Alliances

From the short term perspective, because of the past policy failures, the construction industry in Taiwan does not have the capability to absorb all the projects in the Six-Year National Development Plan. By promoting alliances, the government can invite many international contractors with large capital capacity and advanced technologies. This accelerates the progress of these projects, and enables the government to finish these projects at lower costs and enjoy higher quality. Moreover, with foreign companies' better technology and experience, there may be lower environmental and social impacts when the construction of these projects is underway.

From the long term perspective, Taiwan has opened its construction market to foreign companies. It can be expected that the future competition in this market will be very severe. However, Taiwanese

³⁶ Ministry of Economic Affairs, ROC. 1995. *Operational Norms of JV in Public Construction for Small & Middle Size Entrepreneur*, p.118. In Chinese.

construction firms do not have the ability to compete with foreign companies. The construction industry is very important to a nation's infrastructure. It will be disadvantageous for the government if this industry is controlled by foreign companies. Therefore, the government should help local firms establish their competitiveness for future competition. Alliances provide local firms excellent access to advanced technologies of foreign companies. Promoting international alliances may help local firm obtain these technology more easily.

5.2 Market Power of the Government

5.2.1 The Power of Government Policy

Government can limit or even foreclose entry through controls such as licensing requirements and limits on access to raw material. This is the most powerful source of entry barriers because there is no way to get around these regulations. The most significant example in Taiwan's construction industry is the regulation about classification of construction firms.

In order to eliminate this entry barrier, new entrants are willing to pay higher costs in exchange for the resulting profits from entering the market.

5.2.2 The Government as a Project Owner

Owners of construction projects have a primary goal to pay the least price and enjoy the best quality product. In order to achieve this goal, owners usually create a very competitive environment in order to reduce the price. However, low price may result in low quality. Thus there are lots of contracting mechanisms designed to provide the owners

as many chances as possible to choose the best combination of quality and price. Even when those alternative contracting mechanisms are not allowed to be used, owners can find the lowest price contractor and still maintain acceptable quality through serious supervising.

The bargaining power of the government as the owner is strong in Taiwan's situation because of several reasons. First, because the only buyer of public projects is the government, this single buyer enjoys monopoly power for setting prices. Second, the product of public construction is undifferentiated in that public works usually have standard specifications. Third, because the design of projects is usually done by the owner, or agents who work for the owner, the owner has clear information about the approximate cost of a project before its bidding, and thus it is difficult for bidders to raise prices. Finally, saving budget for construction projects is one of the key criteria in evaluating the performance of a government's engineering agency. This evaluation is very important to the promotion and career of officers who work in this agency. Thus the government's engineering agencies will try hard to make the bid prices as low as possible.

5.3 Policy Effects on Alliances

5.3.1 Policy and Alliance Decision

According to the concept of iso-profit curve, developed in Chapter 4, the effect of government policy on alliance decisions can be demonstrated in Exhibit 5.1. If there is government policy which requires local firms to ally with foreign firms in order to participate in bidding a project, the least profit curve will move toward right. That is because local firms now are willing to give up some of their advantages in

accessing resource in exchange not for technology, but for the profit which they can obtain from the project which they are bidding for. The feasible region of local firms will therefore expand to the right with the policy constraint line. This effect is similar to the situation where there is a net additional profit other than competencies exchange.

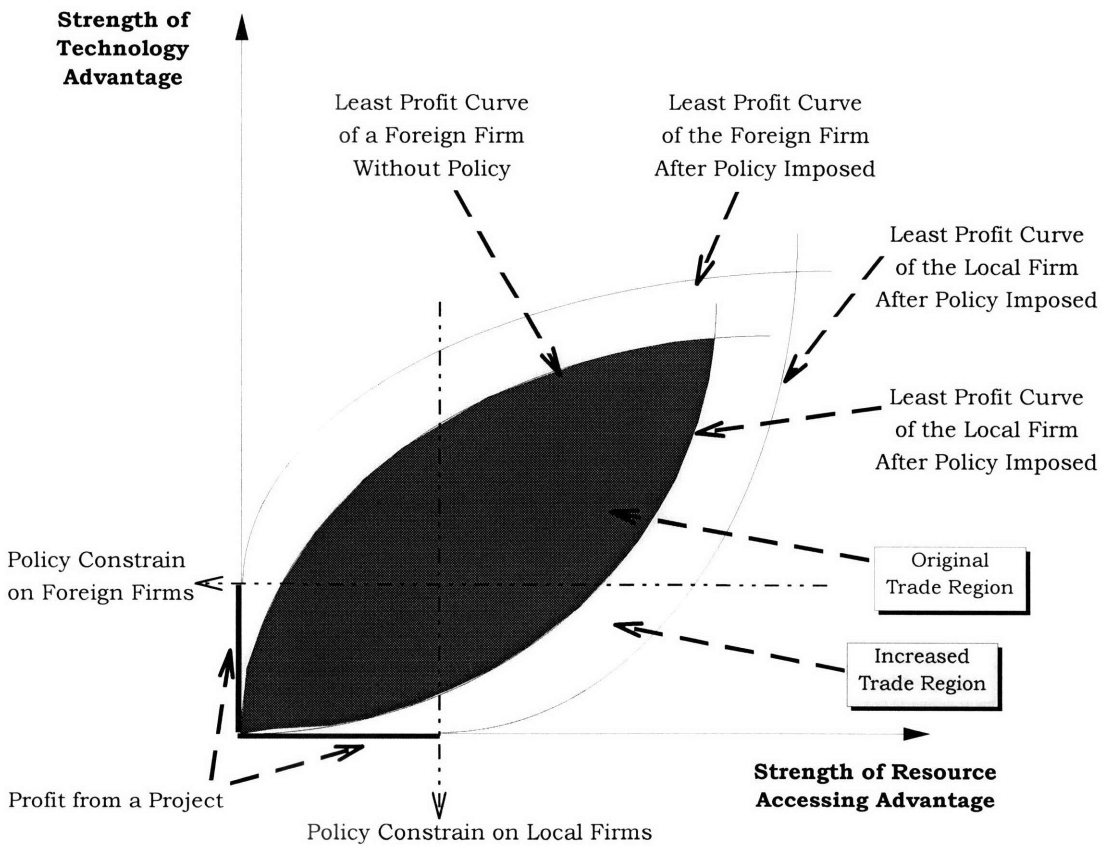


Exhibit 5.1 Cooperation with Government Policy

For foreign companies, the policy which requires foreign firms to ally with local firms will also have a similar effect. It shifts a foreign firm's least profit curve upward, as well as enlarges the firm's feasible region.

With the policy constraint, foreign firms will give up their technology advantages for the profits they can receive from projects.

The government policy can therefore enlarge the trade region. The cooperation can be achieved more easily with the policy constraint.

5.3.2 Policy Alternatives to Promote Alliances

Concluding from the previous analysis, if the government wants to promote alliances, the best way is to enlarge the feasible region of firms, which in turn enlarges the trade region.

There are two possible policy alternatives which can enlarge firms' feasible region. First, the government can force firms to form alliances. As described in the previous section, with this policy constraint, firms need to form alliances and give up some of their competencies advantages in order to obtain the profit from a project.

The other policy alternative that the government can adopt to expand firms' feasible regions is to increase the profit other than competencies exchange in alliances. Although one of the government's primary goal in a bidding process is to save as much project budget as possible, which reduces firms' direct profit from a project, the government can still increase other profit items. For example, the government can grant firms in alliances more opportunities for land development. This additional profit received from land development can be obtained only by firms which form alliances, and thus it increases the benefit effect of alliances, as shown in Exhibit 5.2. Firms' feasible region will become larger because of this addition profit, and firms will have a better chance to achieve cooperation.

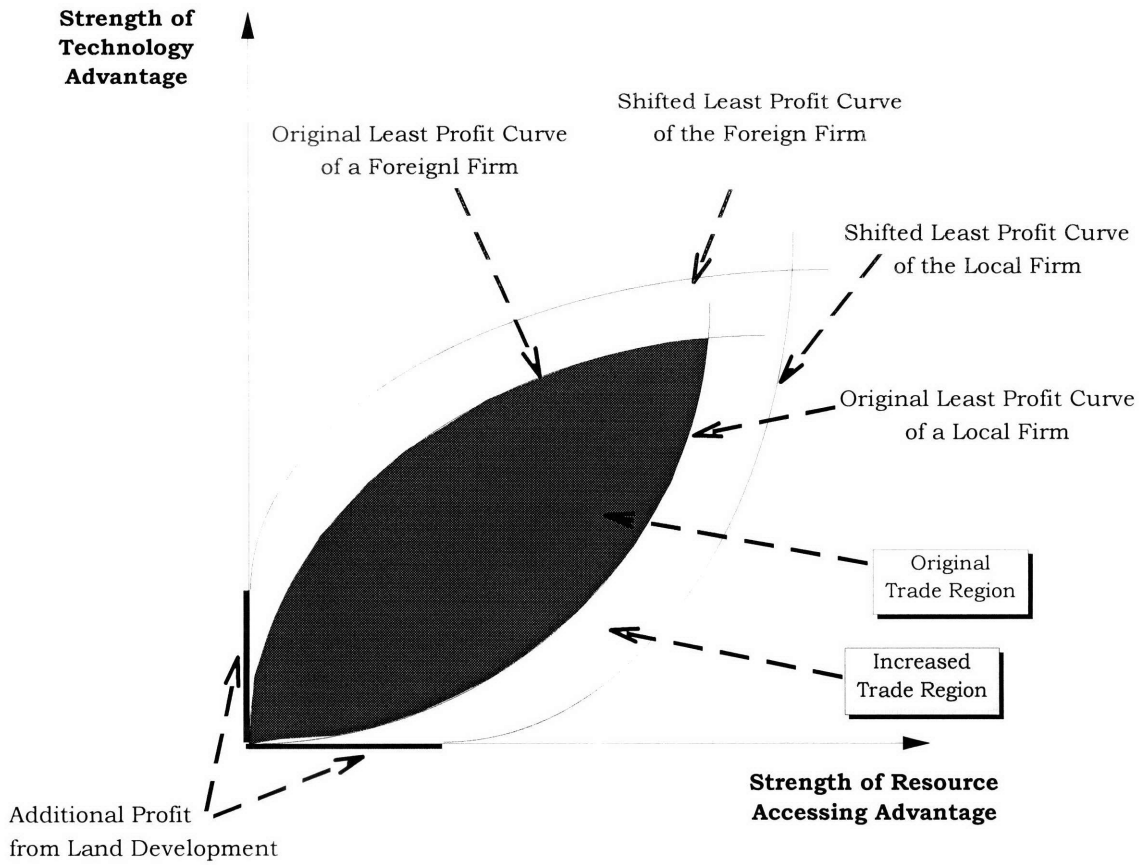


Exhibit 5.2 Effects of Additional Profit in Alliances

VI. Conclusions & Recommendations

6.1 Conclusions

As Porter indicated, although alliances can help firms achieve selective benefits, they always exact significant costs.³⁷ Since firms' primary operational goal is to increase their overall profits - including both short term and long term, firms should understand how alliances will change their overall profits in the first place. They should never accept alliance proposals which result in overall loss in their profitability.

This thesis provides a method to analyze the overall profits in an international construction alliance. A construction firm should first identify the profit items that it can obtain from a project which it is going to bid for, and assign appropriate expected values to each profit item. By applying the five forces framework, the firm can then investigate the effects of an alliance which will change the overall profit from the project. Finally, when it is bargaining with its partner to establish the cooperation condition, it should make sure that the condition is in its feasible region in terms of competencies exchange, and with respect to achieving Pareto optimum.

The government plays an important role in shaping the development of the construction industry. It also has strong power in promoting construction alliances. In order to cure its past flaws in policy, the Taiwanese government should attempt to promote international alliances in the construction industry through two policy alternatives: one setting regulation to enforce alliances; and the other enlarging profits from alliances, as described in Chapter 5.

³⁷ Porter, Michael E. 1990. "The Competitive Advantage of Nations," Harvard Business Review. March-April 1990. p.92.

The discussion in this thesis mainly focused on decisions before firms form alliances from a profit perspective. However, this is not to say that management in alliances is not important. Even when firms made right decisions, if they don't apply appropriate management to manage alliances, they may not be able to receive expected benefits, and the realized cooperation condition may fall outside their feasible region. Several key factors for managing a successful alliances were described in Section 2.1. Firms should adopt these principles to ensure their profits from alliances.

6.2 Recommendations for Construction Firms

6.2.1 Taiwanese Construction Companies

Facing the urgent problem of lacking competitiveness, the most important goal that Taiwanese companies should seek in international alliances is to acquire technology, rather than to obtain profits from the current projects. Since domestic firms have a better chance to seek other profits outside projects, Taiwanese firms may attempt to obtain such profit opportunities as often as possible, share them with foreign firms to enlarge their feasible region, and acquire technology through alliances.

In the long run, Taiwan has only a relatively small construction market. In addition, Taiwan's market has opened to foreign companies, so that the competition in the future may be very severe. After gaining sufficient competitiveness in size and technology, Taiwanese construction companies should go aboard to seek more opportunities and in order to maintain their profitability. They may try to enter the market in developing countries, especially in mainland China. China has a large market and strong demand in infrastructure construction. Moreover, in

comparison with other international contractors, Taiwanese companies have advantages in many aspects (such as language) in China. Taiwan has improved its economy through investment in China and was the second highest foreign capital investor in China in 1994.³⁸ Taiwanese companies may aim at China as their first target market for their globalization.

6.2.2 International Contractors

In order to seek as many profit opportunities as possible, international contractors should broaden their market and work in a wide range of countries. However, they always face high difficulty when they want to enter a new market. While they can fulfill their purposes in the three aspects of market penetration, company capacity concern, and risk reduction through forming alliances with domestic companies, they should also understand the competencies which they will lose in alliances, and the resulting reduction in their overall profits. If the losses exceed the benefits from alliances, they should wait for another entry opportunity, or choose alternatives other than alliances to enter the market.

6.3 Policy Recommendation for the Government

Promoting international alliances is a favorable policy for the government, as described in Section 5.1.2. When the Taiwanese government applies policy tools for promoting international construction alliances, they should also ensure the effectiveness of technology transfer to the local companies.

³⁸ Baltierra, Miguel. 1994. "Looking to the Mainland for Future Growth," *Architectural Record*, July 1994.

In addition to promoting international alliances, the Taiwanese government should also consider the following four policies in order to help local construction companies establish their competitiveness.

1. Promote Local Alliances

By forming alliances, local construction firms can combine their capacity to finish large projects. Furthermore, firms can work together in alliances to develop advanced technology.

2. Steady Investment

The fluctuation in demand forced domestic construction companies to remain small, as described in Section 5.1.1. Therefore, the government should have a long term plan for its investment in infrastructure construction, and invest more steadily on public construction projects.

3. Regulation on Specialization

By requiring firms to specialize in specific types of construction work, the government can increase the competition in each specialization. As a result, construction firms will pay more efforts on developing new technology in order to increase their own competitiveness.

4. Apply Other Contracting Methods

Some of the contracting methods other than low-price bidding can create incentives for construction firms to reduce their costs on projects or improve quality. With these incentives, Taiwanese construction firms

will be more willing to develop advanced technology or adopt better management skills.

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