

Forms of Collaboration and Project Delivery in Chinese Construction Markets: Probable Emergence of Strategic Alliances and Design/Build

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Abstract: Changes in regulations to allow foreign contractors to qualify as wholly foreign-owned “construction enterprises” came into effect in September 2002 as one of the steps taken by the Chinese government to honor its World Trade Organization commitments. Emerging markets have a significant impact on the strategic planning of contractors; based on an electronic survey covering foreign contractors, clients (foreign investors), and design institutes, the design/build procurement route in conjunction with strategic alliances has been found to enable foreign contractors to enter the Chinese marketplace. The writers present a strengths, weaknesses, opportunities, and threats (SWOT) analysis to inform readers where opportunities for development might be found and to warn of threats to entry. The research also found that mutual trust, synergistic strengths and complementarities, market demand for services, flexibility for both parties, and minimum change of top managers were ranked as the top five critical success factors for strategic alliances between foreign contractors and design institutes. Finally, medium-sized, state-owned, and large-sized design institutes were ranked as the first, second, and third preferences, respectively, for strategic partnering by foreign contractors.

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Introduction

The current complexity of the construction regulations and restrictions on the availability of local resources can make it very difficult for foreign contractors to work in China without significant collaboration with Chinese design institutes. The form of collaboration can be mergers and acquisitions, international joint venture, project-based collaboration, or strategic alliance, as shown in Fig. 1. Typically, Chinese construction enterprises are engaged as subcontractors on foreign contractors' projects, but due to their structure and expertise, design institutes could be more important for foreign contractors at a corporate level for strategic development. The role of design institutes is similar to that of design firms in Western countries (Xu et al. 2004), and the institutes recently have had to reinvent themselves as modern engineering consultants in order to compete. For example, they now have to offer multiproject delivery and a customer service mentality. Strategic alliances are being formed at a time when the Chinese construction industry is evolving under the impact of the

World Trade Organization (WTO), which promotes global trade liberalization with the core criteria of market access and national treatment (Xu and Wang 2001).

Foreign contractors can enter the Chinese construction market through various project delivery routes: design/bid/build, design/build, build/operate/transfer (BOT), and construction management, as shown in Fig. 1. The term design/build used in this research refers to the procurement route in which the contractor is responsible for the whole design and implementation process (that is, project feasibility studies, design, procurement, and construction). Design/and/construct, package deal, turnkey, design/and/manage, design/innovate/build, and engineering/procurement/construction (EPC) are considered variations of the design/build project delivery method. This is consistent with the concept of “Gong Chen Zhong Chen Bao” in Chinese construction law (Construction Law 1997).

The purpose of this paper is to examine foreign contractors' design/build delivery in the post-WTO-implementation Chinese construction market. In this paper the writers present a strengths, weaknesses, opportunities, and threats (SWOT) analysis to inform readers where opportunities for development might be found and to warn of threats to entry. The paper also presents the findings of an electronic survey (e-survey) that asked respondents to rank the critical success factors for strategic alliances between foreign contractors and design institutes. Finally, the e-survey becomes the basis for a discussion of the most appropriate type of design institute with which foreign contractors could collaborate.

Literature Review

Design and construction work were assigned to design institutes and construction enterprises, respectively, by the government during the planned economy era (Mayo and Liu 1995). Competitive

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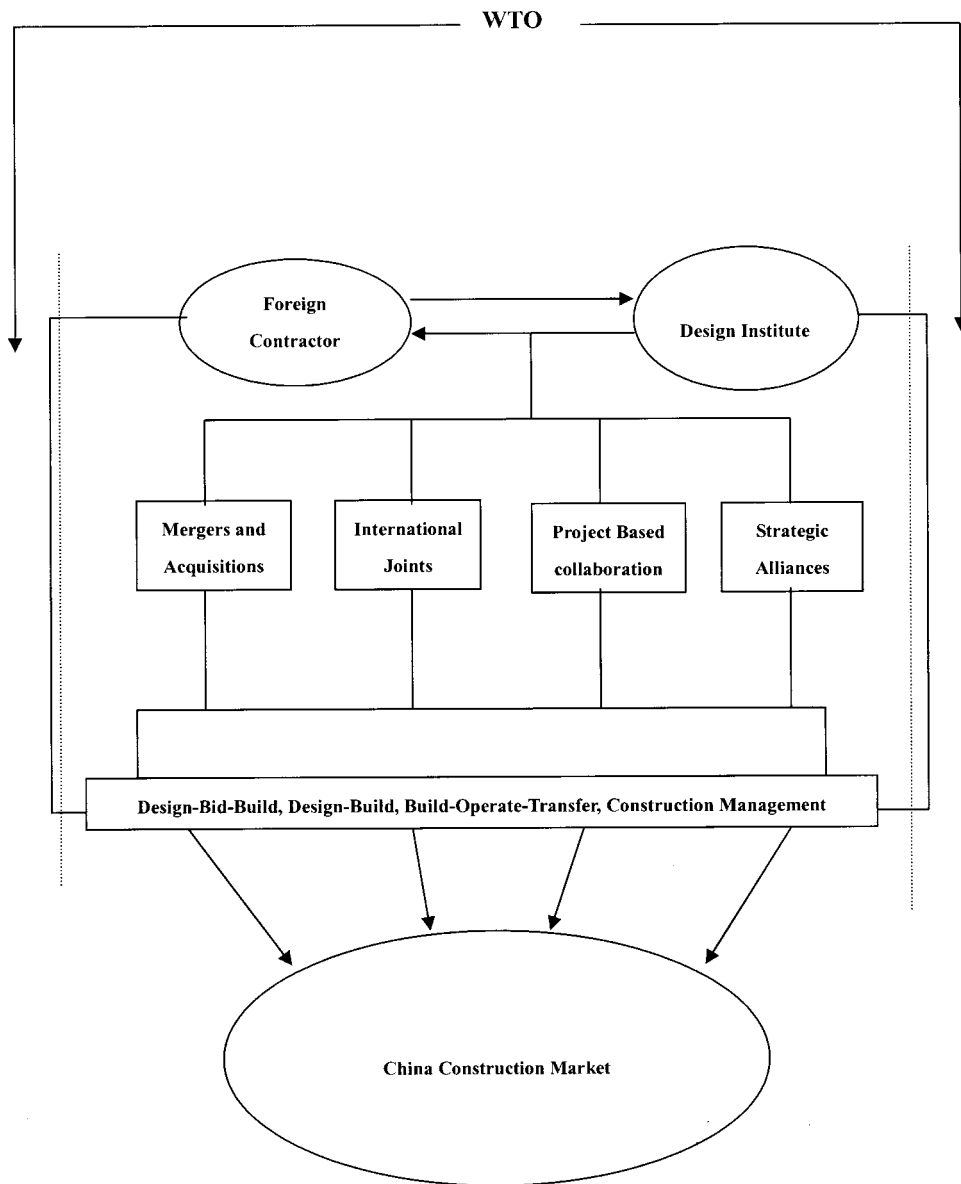


Fig. 1. Pattern of foreign contractors' development formations in China

tendering and the design/bid/build procurement method were adopted in the 1980s and became increasingly popular (Wang et al. 1998). Flanagan and Li (1997) highlighted areas where U.K. companies could "invest" in China. These areas were finance and BOT, technology and transfer of technology, management and consultancy skills, real estate development, design, construction, construction materials and components supply, education and training, environmental technology, and others. However, design/build was not identified as an opportunity.

Yang et al. (1997) studied the project management practices of various types of enterprises, for example, computer and communication companies and light industry in Pudong, China. Based on their survey, they argued that project management approaches in Pudong were behind those of Western countries as the more sophisticated project management techniques and computer-based tools were seldom used. One of the drawbacks of their investigation was that no construction companies were included in the enterprises they surveyed.

Shen and Song (1998) described the Chinese construction competitive tendering system, but no contractual issues regarding

design/build were addressed. Wang (2000) presented foreign-local joint design problems in China but indicated no specific project delivery method.

Pheng and Leong (2000) discussed the cross-cultural management of projects in China based on a case study of hotel construction. The paper identified many problems relating to communications between expatriates and the local staff of partners and authorities. While turnkey contracting with a foreign contractor was mentioned, the paper ignored the procurement process.

Luo (2001) reported that Sinoforeign construction joint ventures performed well, but a significant degree of risk in construction joint ventures in China, due to differences in management systems, technological practices, and cultural backgrounds between partners, has also been revealed (Shen et al. 2001).

Recently, Meng (2002) studied the guarantee system for contractor's performance and client's payments in the Chinese construction industry but did not discuss the pitfalls for foreign contractors venturing into China. The BOT project delivery route in China has been discussed extensively; e.g., Wang et al. (1998); Ye and Tiong (2000); and Xu et al. (2004) analyzed international

contractors' practices in China and offered integration approaches for international contractors.

Research Methodology

The research undertaken consisted of pilot studies, e-survey, and case studies. Pilot studies began in September 2001 and were completed in 2002 (Xu et al. 2005); this paper presents the key findings from the e-survey; and the case studies will be reported in a separate paper.

The e-survey was based on the pilot studies and an extensive literature review. Commencing in February 2003, the writers contacted a number of foreign contractors, design institutes, and foreign investors by e-mail and telephone. These enquiries were used to find out whether the respondents were willing to complete an e-survey form. Most of those contacted were known to the writers. Five of the respondents were found by the "snowball" method, that is, the respondents were introduced by contacts' contacts. The e-survey form indicated that the respondents' names would be kept strictly confidential in the research report. Attempts to increase the number of respondents through sending 14 "cold" e-mails to relevant foreign contractors and foreign investors were unsuccessful. This confirmed the view of Xu et al. (2004) that little primary data would be gathered without connections in the Chinese construction industry.

The e-survey questions were designed to investigate issues relating to foreign contractors' strategic alliance-based design/build delivery. The questions were concise, not leading, and allowed space for respondents to comment freely. For example, one question relating to the SWOT analysis of foreign contractors asked respondents to rank a list of factors (identified from the literature review and pilot study) according to a five-point scale (where 1, 2, 3, 4, and 5 stand for unimportant, less important, somewhat important, important, and very important, respectively). While the list was a good starting point, it was recognized not to be exhaustive, and therefore respondents were also invited to add their own factors.

A total of 36 e-survey questionnaires were sent out, 22 of which were returned completed. The respondents covered the areas of Beijing, Shanghai, and Xi'an, and 11 were from foreign contractors. Their occupations were regional managers, senior engineers, and project managers. Five of the respondents were from clients (foreign investors), of which three were country managers and two were division heads.

According to the pilot study, foreign contractors are unlikely to sustain their business without collaboration from design institutes (Xu et al. 2005); therefore design institutes were included in the e-survey. Six respondents were from design institutes, of which three were directors and the other three department heads. As some of the respondents preferred to use Chinese to answer the questions, a Chinese version of the e-survey was provided.

Contractors from Hong Kong, Macao, and Taiwan were not included in this research as they are not counted as foreign contractors according to the National Bureau of Statistics (NBS 2002). As shown in Table 1, the nationalities of the foreign contractors included the United States, the United Kingdom, Japan, Norway, and Singapore. Three of the foreign contractors were listed in the top 10 of the *ENR* top 225 international contractors in 2002. According to NBS (2002), 16 foreign contractors were registered in China in 2001. The regulation that allows foreign contractors to qualify as wholly foreign owned construction enterprises came into effect in September 2002 (MOC 2002). Although

Table 1. Profiles of Foreign Contractors That Responded by Nationality

Country	Number of respondents
United States	4
United Kingdom	1
Japan	2
Norway	1
Singapore	3
Total	11

accurate figures relating to the number of foreign contractors in China in 2003 are not available, it is reasonable to regard the surveyed foreign contractors as representative. Statistical analyses of the completed survey questions were carried out using descriptive analysis (mean value analysis, standard deviation, and ranking). The e-survey results included a SWOT analysis of foreign contractors, the usage of design/build by foreign contractors, and the use of strategic alliances between foreign contractors and design institutes.

Strengths, Weaknesses, Opportunities, and Threats Analysis of Foreign Contractors

As noted in *Art of War*, a widely recognized military strategy book (Sun 1963), "know the enemy and know yourself and you can fight a hundred battles with no danger of defeat." SWOT analysis helps foreign contractors to understand their strategic positioning. Analysis of the e-survey by ranking according to the mean number of points awarded by the respondents showed that a "good customer services attitude" was ranked as the most important characteristic among foreign contractors' strengths. A discussion of the factors in their ranked order is provided below.

Strengths

1. Good customer services attitude: Generally, foreign contractors have a good reputation in relation to their approach to customer services, covering the whole process of design and construction. This stems from foreign contractors coming from a market economy environment, where customer care is the key to success in the marketplace. A good approach to customer services is a benefit to foreign contractors when they bid for construction projects.
2. Strong financial backup: Sophisticated clients may require financial support from contractors. The budget for infrastructure construction in Beijing for the 39th Olympic Games 2008 is RMB 180 billion, of which RMB 90 billion is to be sourced from such financing channels as BOT (China Business Newspaper 2002).
3. Strong design/build capacity: In the United Kingdom, significant numbers of both public and private sector projects are based on design/build delivery, which covers areas such as housing, industrial, retail, leisure, health, offices, and utilities (Anumba and Egbuomwan 1997). In the United States, use of design/build in the public sector has increased since 1992 after several years of use in the private sector (ASCE News 1992; Molenaar and Songer 1998). One reason for this is to spur innovation in the building process. Innovation provides the opportunity for improved quality and more cost-effective solutions to a client's construction needs (Songer et al. 1994).

4. Wide international business connections: This strength has two meanings in terms of foreign contractors' marketing. First, foreign contractors' international business contacts might provide business information or even directly recommend them to potential clients (i.e., foreign investors in China). Second, Chinese clients might prefer foreign contractors if the latter could help the former in marketing outside China. For example, a Chinese industrial park developer may like to engage a foreign contractor who can provide leads to attract foreign investors.
5. State-of-the-art technology: Chinese construction technology is not behind that in developed countries. It is not a difficult task for local firms to design and construct technology-intensive projects such as high-rise buildings and flyovers. However, foreign contractors' state-of-the-art technologies in areas such as the design/build of nuclear power stations, intelligent buildings, and tunnels differentiate them from their local competitors.

Weaknesses

1. Higher operation cost compared to local competitors: One of Porter's generic strategies for company success is cost leadership in a competitive environment. The central part of this strategy is to be less expensive than competitors in the whole range of a company's activities (Warszawski 1996). However, the survey shows that foreign contractors have higher operational costs compared to local competitors. The higher cost may be caused by expensive office overheads, the high salaries of expatriates, and costly materials.
2. Lack of "Guanxi" (local connections): One may come across the term Guanxi often in the textbooks of Western university business schools. It is normally referred to as business connections, but Guanxi is disliked by the Chinese government as it has been closely linked to nepotism and corruption. While not all Guanxi are illegal, Guanxi-based business practices favor those who have good local connections. Foreign contractors' Guanxi (or relationships) with relevant authorities, clients, subcontractors, and suppliers influence their competitiveness in China.
3. Unfamiliarity with local design and construction codes: Chinese design and construction standards and codes were established in the 1950s based on the former Soviet Union construction system. After about 50 years of modifications and improvements, the design and construction standards and codes in China are unique and thus difficult for foreign professionals to master in a short timeframe.
4. Lack of local track record: Since foreign contractors are relatively new in China it takes time for them to build up a local track record. In many cases, a local track record is one of the criteria for contractor selection.

Opportunities

1. Foreign direct investment (FDI) projects: FDI offers a new market segment in the Chinese construction market. The amount of inward FDI to China has remained among the highest in the world. There was a total of about US \$4.4 billion in FDI in 2001 (NBS 2002). Foreign contractors generally begin overseas operations by accepting initial works from their own government or from a compatriot multinational enterprise investing abroad. It is also consistent with current Chinese regulations that the areas of work of foreign contractors are constrained to FDI and other foreign-funded

- projects (e.g., World Bank, Asia Development Bank, donor-specified projects, etc.) (Xu 2003).
2. Design/build projects: Design/build is a modest and emerging market segment (Xu 2003). Currently Chinese design/build providers are mainly active in the petrol and chemical engineering sector. Foreign contractors may exert their design/build expertise to enter the market.
3. BOT projects: The first BOT project in China, the Shajiao B Power Plant in Guangdong Province, was transferred to the Chinese side successfully in September 1999. The project, which began in 1989, had generated a total of 46.2 billion kW·h of electricity by July 1999. More BOT projects in China are expected because of the need for improved infrastructure to service economic growth and lack of government funding. However, some policymakers argue that the concession arrangements should not be used too often as they might compromise the country's sovereignty. Consequently, some proposed BOT projects were not able to proceed.
4. Diversifying into real estate development: Real estate development investment has surged in recent years, totaling RMB 622.8 billion from January to November 2002, which is 28.2% higher than that in 2001 (CEIN 2003). Some foreign contractors have established their presence in China as real estate developers. They enjoy tax benefits as foreign investors and have full control of the projects, but this entry mode requires foreign contractors to be familiar with real estate practice in China. Currently, the maximum duration for land ownership by developers is 50 years for residential and commercial buildings and 70 years for industrial use. Previous housing allocation policy has been reformed and changed to the housing purchasing allowance policy. Mortgages are now offered by local banks to Chinese citizens.

Threats

1. Sinoforeign joint-venture construction firms: Foreign contractors are allowed to establish international construction joint ventures with one or more Chinese partners in China by law. There are two types of international joint ventures (IJVs) in terms of degree of equity involvement available in China: equity-based IJV and IJV with minimum equity involvement (Xu et al. 2005). The top five risk factors in IJVs in East Asian countries have been identified as the client's cash flow problems; financial problems in a partner's parent company; inconsistency in government policies, laws, and regulations; economic fluctuation; and poor relationship (incompetence of subcontractors/suppliers) (Bing et al. 1999).
2. Chinese construction enterprises: The number of Chinese construction enterprises was 96,374 in 2001, of which 8,264 were state-owned enterprises (SOEs) (NBS 2002). Through the process of accommodating and adapting to international best practice, Chinese construction enterprises have the opportunity to consolidate their domestic market share and venture into new markets overseas (Xu and Wang 2001).
3. Chinese design institutes: Xu et al. (2004) studied the current position of the Chinese design institutes, which are currently reinventing themselves as modern engineering consultants.
4. Chinese privately owned contractors: The number of privately owned contractors is increasing every year; many are small and medium enterprises (SMEs), to which the government has not given sufficient support in terms of favorable tax rebates, loan considerations, and cross-border businesses. There are many restrictions on permits for such enterprises:

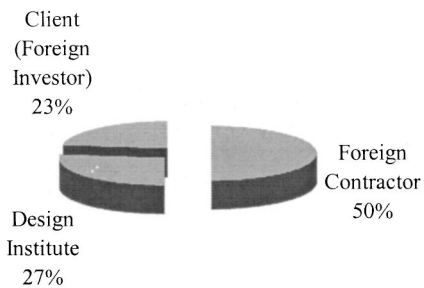


Fig. 2. Proportion of types of respondents

for example, obtaining and upgrading licenses, accessing bank loans, and undertaking construction projects. However, SMEs are competitive because they do not have large overhead burdens and are free to adapt to suit the market.

Utilization of Various Project Delivery Routes for Foreign Contractors

Fig. 2 demonstrates the findings from the research regarding the usage of the different approaches to project delivery for foreign contractors, clients (foreign investors), and design institutes, respectively. Three respondents to the e-survey did not answer this question: they were a foreign contractor, a client (foreign investor), and a design institute. From the various project delivery routes available, design/build was indicated as being used the most by both foreign contractors and clients (foreign investors) in China, as shown in Fig. 3.

Design/Build Delivery Using Strategic Alliances

The idea of design/build is that the design and construction of a project are in the hands of one firm (Bower 2003). The client specifies the requirements for the proposed project and then the prequalified design/build contractors submit their tender documents, including preliminary designs and cost estimates. Finally, based on the evaluation of the tenderers' submissions, the project is awarded to the design/build contractor who best meets the client's requirements, not necessarily the lowest bidder. Design is undertaken by either the contractor's in-house designers or by an external consultant.

In China, a foreign contractor usually needs to collaborate with a design institute or institutes for a design/build project, at

Table 2. Importance of Strategic Alliance Relationships between Foreign Contractors and Design Institutes

Questions	Answer	Number of respondents	Percentage (%)
Do you think foreign contractors need to collaborate with Chinese design institutes for their design/build construction projects in China?	Yes	21	95.45
	No	1	4.55
Is a strategic alliance with design institutes essential for foreign contractors in China?	Yes	16	72.73
	No	6	27.27
Is a strategic alliance with foreign contractors essential for design institutes in China?	Yes	14	63.64
	No	8	36.36

least for the completion of the detailed design, as the acquisition of a license for engineering design would be costly. Such collaboration could take a variety of forms, including mergers and acquisitions, IJVs, project-based collaboration, and strategic alliances (Xu et al. 2004). Strategic alliances offer flexibility and long-term prosperity for both the foreign contractors and the design institutes.

Importance of Strategic Alliance Relationships between Foreign Contractors and Design Institutes

As shown in Table 2, 95.45% of the respondents believed that foreign contractors need to collaborate with Chinese design institutes for design/build construction projects in China, while only 4.55% of the respondents (i.e., one respondent) did not believe this to be necessary. A majority of the respondents, 72.73%, suggested that a strategic alliance with a design institute is essential for foreign contractors in China. A slightly lower proportion, 63.64% of the respondents, thought that design institutes needed to form strategic alliances with foreign contractors.

More than half of the respondents, 57.14%, stated that the strategic alliance is the most effective form of collaboration, as shown in Table 3. Across the sample, 28.57% of the respondents indicated that project-based collaboration is most effective, 9.52% of respondents suggested IJVs, and only 4.76% (i.e., one respondent) chose acquisitions. One respondent did not answer this

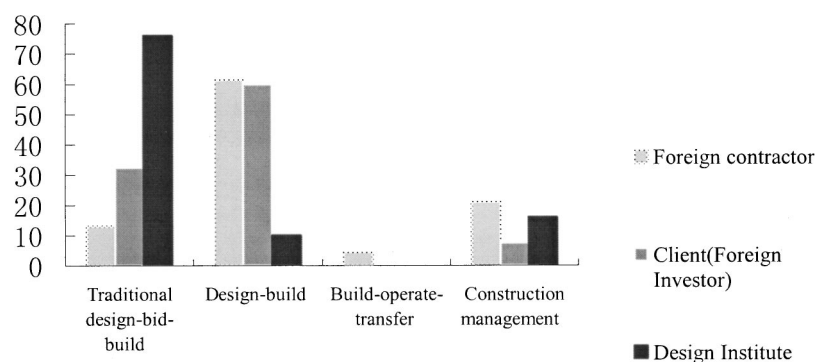


Fig. 3. Proportions of project deliveries

Table 3. Forms of Collaboration

Question	Forms of collaboration	Percentage (%)	Rank
What is the most effective collaboration form that a foreign contractor can pursue with a Chinese design institute?	Strategic alliance	57.14	1
	Project-based collaboration	28.57	2
	International joint venture	9.52	3
	Acquisition	4.76	4

question; on the e-survey form the respondents were advised to ignore any question that was not within their specialized knowledge or experience.

Strategic alliances have been discussed largely in the context of international business over the past two decades (Büchel et al. 1998). Moreover, there are underlying ambiguities regarding the definitions of strategic alliances, collaborations, and joint ventures, stemming partly from theoretical concepts that transcend the arrangement, such as interfirm cooperation, mutual trust, synergistic strengths, and complementarities. Parker (1994) noted that international alliances, partnerships, and consortia are generically called "joint ventures." Simonin (1999) examined the role of knowledge ambiguity pertaining to the process of knowledge transfer in international strategic alliances. Simonin presumed that all forms of collaboration were strategic alliances, without giving a definition for the term. Chen (2002) defined strategic alliance as an interfirm cooperative arrangement over a given economic space and time for the attainment of some strategic objectives, but treated joint ventures as one type of strategic alliance.

In the context of collaboration between foreign contractors and local partners in China, the writers contend that strategic alliances should be distinguished from mergers and acquisitions, IJVs, and project-based collaboration so that foreign contractors have a concrete basis on which to approach different forms of collaboration (Xu et al. 2005). In this research, strategic alliances are defined as voluntary long-term, interfirm cooperative arrangements with flexibility for the participating parties. The flexibility enables the participating parties to have the right rather than the obligation to defer, abandon, contract, and initiate decisions regarding the collaboration in response to changes in the market. This contrasts with the other forms of collaboration.

A foreign contractor could form a strategic alliance with a local partner in one or more cities in China to cover the whole process from business development through tendering, design, and construction to handing over the project to the client. Under strategic alliance arrangements, separate contracts between the foreign contractors and the local partners can be incorporated for different stages of individual projects, taking into account the unique legal conditions in China.

Strategic alliances provide participating parties an effective channel to utilize external resources. However, there are costs involved in the strategic alliance arrangements. These could consist of the costs for trying to guard against opportunism, creating a unique image for the strategic alliance, resources for coordinating the participating parties, and company branding.

Critical Success Factors of Strategic Alliances between Foreign Contractors and Design Institutes

Respondents were required to rank the factors they believed were critical to the success of a strategic alliance between foreign con-

Table 4. Critical Success Factors for Strategic Alliances between Foreign Contractors and Design Institutes

Factor	Mean	Standard deviation	Rank
Mutual trust	4.47	0.61	1
Synergistic strengths and complementarities	4.37	0.68	2
Market demand for services	3.95	1.08	3
Flexibility for both parties	3.53	0.90	4
Staff from both parties understand strategic alliance agreement	3.47	1.02	5
More overseas-trained local professionals and managers	3.42	1.22	6
Minimum change of top managers from both parties	3.42	1.26	6
Local government support	3.32	1.16	7
Legal contract for individual projects	3.26	1.33	8
Less dispute than other forms of collaboration	3.11	1.05	9
Chinese central government support	2.89	1.05	10
More expatriates to be involved	1.89	1.05	11
Fewer expatriates to be involved	1.84	1.21	12

tractors and design institutes (3 respondents did not answer this question). As shown in Table 4, mutual trust was ranked first. Under strategic alliance arrangements the collaborating parties have the right but not the obligation to trust each other, but if mutual trust can be realized, the strategic alliance is likely to be successful. Trust normally comes from both the reputation (intangible asset) of the trustee organization and their capacity (tangible asset) to adhere to the commitment.

Synergistic strengths and complementarities were ranked second. This means that the collaboration should be mutually beneficial. Strategic alliances between highly competitive foreign contractors and design institutes are considered synergistic strengths. Synergistic strengths and complementarities enable the collaborating parties to utilize external resources effectively and therefore reduce the costs. The goals of collaborating parties could be congruent or incongruent but they must be dependent on one another to perform. Synergistic strengths and complementarities emphasize that the collaborating parties are able to provide value to each other as well as adding value for the client.

The survey also showed that market demand for the services provided by a foreign contractor–design institute collaboration is strongly related to the success of the collaboration and is ranked third. This finding could be interpreted as showing that the collaboration is business oriented. If the market demand were reduced or disappeared, there would be no point in maintaining the strategic alliance.

Flexibility for both parties was ranked fourth among the success factors. With the flexibility provided by strategic alliances, the collaborating parties can be quick both to reduce external capacity as prices fall and to increase external capacity as prices rise. The scope for renegotiation should avoid the confrontation caused by conflicts of interest.

That staff from both parties understand the strategic alliance agreement is ranked fifth. Often senior and middle management are familiar with the agreement, but to facilitate the collaboration,

Table 5. Selection of Design Institutes for Strategic Alliances

Type of design institutes	Mean	Standard deviation	Rank
Medium-sized design institute	0.45	0.51	1
State-owned design institute	0.41	0.50	2
Large-sized design institute	0.38	0.50	3
Design institute with above-average profit margin	0.32	0.48	4
Design institute with average profit margin	0.27	0.46	5
Privately owned design institute	0.23	0.43	6
Design institute with below-average profit margin	0.05	0.21	7
Small-sized design institute	0.00	0.00	8

all levels of staff from both parties should understand the strategic alliance agreement.

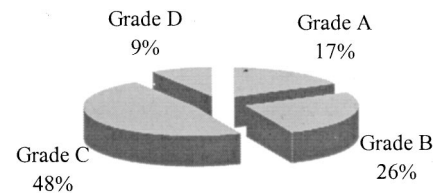
Minimum change of top managers from both parties and more overseas-trained local professionals and managers were ranked as the sixth success factor. Although the execution of a strategic plan should not rely on particular managers, stability of top managers is one of the conditions for consistency in company policies. More overseas-trained local professionals and managers are required to facilitate the strategic alliances. Institutional and cultural differences may cause a communication breakdown among expatriates, local staff, design institutes, and local authorities. Overseas-trained local professionals and managers could effectively link expatriates and local staff from all parties whenever communication problems arose.

Local government support would enhance the strategic alliances, and this was ranked seventh. Visibly or invisibly, the local government in any country usually shows favor to local companies, even if the country is a WTO member. Collaboration with local design institutes can help foreign contractors to overcome this disadvantage. The collaborating parties contribute to the local economy through taxes, employment opportunities, and stimulating improved quality services from the local supply chain. This in turn creates harmony between foreign contractors and local governments and communities in China.

It is important to note that the legal contract for individual projects was ranked eighth. As suggested in the definition of strategic alliances, there is no legal binding between the parties involved in strategic alliance arrangements at the corporate level, and so a legally binding contract is used at the project level. Given current construction practices in China, legal contracts are needed to define the risks and responsibilities of the parties involved at the project level.

The ninth ranking factor is that fewer disputes are expected than from other forms of collaboration, although conflicts of interest may cause dispute. Chinese central government support would provide priorities for the strategic alliances, and this ranked tenth. Central government support may influence the bargaining power of the strategic alliance by using government-controlled resources such as approval/disapproval of licenses, providing currency conversions, or repatriation of profits. However, this is rarely given to normal construction businesses.

The factors of fewer versus more expatriates being involved are contradictory; these are ranked twelfth and thirteenth, respectively, and further, their mean values are very close, 1.89 and 1.84. One can conclude that the number of expatriates involved is not critical to the success of strategic alliances.

**Fig. 4.** Design institute grades in 2002 (Department 2003)

Design Institute Selection for Strategic Alliances

Most of the design institutes are willing to collaborate with foreign contractors (Xu et al. 2004). Medium-sized, state-owned, and large-sized design institutes are rated the first, second, and third most suitable strategic alliance partners for foreign contractors, as shown in Table 5. Most of the design institutes were state owned and are currently under ownership restructuring. The grading criteria of design institutes can be found in the Appendix.

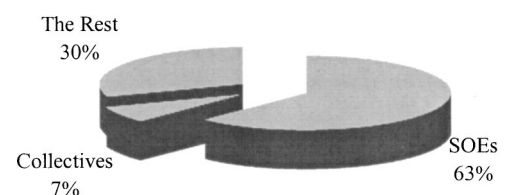
The large, medium, and small-sized design institutes are equivalent to grades A, B, and C, respectively. As shown in Fig. 4, there were 1,707 Grade A, 2,521 Grade B, 4,670 Grade C, and 883 Grade D institutes. The number of Grade D design institutes is to be reduced to zero gradually, according to current reforming schema.

As shown in Fig. 5, there were 7,212 state-owned design institutes, 836 collective design institutes (towns and village enterprises), and 3,447 joint stock and privately owned design institutes in 2002 (Department 2003). The ownership of joint stock design institutes is shared by major designers, individual investors, firms, and governments. It was initiated in 1993 and fully endorsed in 1999. More information about and analysis of design institutes can be found in Xu et al. (2004).

A large-sized design institute might have some 200 architects and generate RMB 1.1 billion a year. Usually it will collaborate with more than one foreign contractor. To this end, foreign contractors' needs might be better met by a large-sized design institute, but, they tend to ask a higher price.

Design institutes with above-average profit margins are ranked fourth. The same-sized design institutes might not have the same level of profitability. With revenue of RMB 93.1 billion and a profit of RMB 10.07 billion, the average revenue per head of the Chinese design institutes was RMB 120,230 in 2002 (Department 2003). The purpose of asking this question was to test the respondents' view about profitability of a design institute regardless of other features. Design institutes with average profit margins were ranked fifth. The survey shows that the existing profitability of design institutes is a criterion of foreign contractors' partner selection.

Privately owned design institutes were ranked sixth. For historical reasons, this kind of design institute is usually small sized, although the total output of the whole private sector has surpassed that of the state-owned firms since 1989. Normally they are prof-

**Fig. 5.** Types of design institutes in 2002 (Department 2003)

itable and owned by registered architects or engineers. Some of them still have maintained administrative links with state-owned design institutes.

Design institutes with below-average profit margins were ranked seventh. No respondent selected small-sized design institutes.

Conclusions

The paper offers a SWOT analysis for foreign contractors in China. The e-survey results provide evidence for foreign contractors to understand their position in the Chinese construction market. Focusing on foreign direct investment and using design/build are suggested as the best opportunities for foreign contractors in China.

From the various project delivery routes available, design/build is indicated as the most appropriate for both foreign contractors and clients (foreign investors) in China. Unlike design/build in Western countries, foreign contractors' design/build strategy needs to incorporate design institutes and foreign direct investment. Foreign contractor–design institute strategic alliances have been identified as the most appropriate type of collaboration, with project-based collaborations rated as second most appropriate.

The underlying philosophy of strategic alliances is to reserve the right rather than the obligation to utilize external resources or supply resources to collaborating parties. The flexibility of strategic alliances enables foreign contractors to exploit new opportu-

nities without a large amount of equity commitment.

While the critical success factors identified for strategic alliances between foreign contractors and design institutes were not surprising, they do provide a focus for international collaboration theories. Mutual trust, synergistic strengths and complementarities, market demand for services, flexibility for both parties, and minimum change of top managers were ranked as the top five critical success factors for strategic alliances between foreign contractors and design institutes in China.

Also based on the findings of the e-survey, a general guideline relating to design institute selection for foreign contractors' strategic alliances has been provided. The selection is based on the types, sizes, and profitability of the design institutes. Medium-sized, state-owned, and large-sized design institutes are rated first, second, and third most suitable strategic partners for foreign contractors, respectively.

The detailed SWOT analysis, ranking of success factors, and selection of design institutes of collaboration provides unique perspective for those wishing to pursue international construction collaboration in China. Moreover, the results provided by this research offer a valuable reference for the practice of foreign contractors, design institutes, and China construction policymakers.

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Appendix. Grading Criteria of Design Institutes

Criteria	Grade		
	A	B	C
Track record and financial standing	1. Independent legal person, more than 15 years of design experience, with good reputation in the sector 2. Independently undertook more than 3 large projects, which have been accepted by the clients, with good quality and profitability 3. Good social responsibility and financial strength, with no less than RMB 6 million as registered capital	1. Independent legal person, with more than 10 years of design experience 2. Independently undertook more than 3 medium-scale projects, which have been accepted by the clients, with fair quality and profitability 3. Fair social responsibility and financial capacity, with no less than RMB 2 million as registered capital	1. Independent legal person, with more than 6 years of design experience 2. Independently undertook more than 3 small-scale projects, which have been accepted by the clients, with fair quality and profitability 3. Have social responsibility and necessary financial capacity, with no less than RMB 0.8 million as registered capital
Professionals	1. More than 80 professionals and technicians in all necessary disciplines, having capacity to undertake design of 2 large-scale projects at the same time 2. Engineer in charge shall be a senior engineer with more than 12 years of design experience and have been in charge of design or participated in design of more than 2 large-scale projects 3. More than 10 senior engineers who have been in charge of design in their respective disciplines of no less than 2 large-scale projects, more than 2 Grade 1 registered architects, and 4 Grade 1 registered structural engineers, more than 20 senior engineers who have been in charge of or participated in the design of more than 2 large-scale institutional or commercial projects in their respective disciplines	1. More than 30 professionals and technicians in all necessary disciplines, having capacity to undertake design of 2 medium-scale projects at same time 2. Engineer in charge shall be a senior engineer with more than 10 years of design experience and have been in charge of design or participated in design of more than 2 medium-scale projects 3. More than 5 senior engineers who have been in charge of design in their respective disciplines of no less than 2 medium-scale projects, more than 1 Grade 1 registered architect, and 2 Grade 2 registered structural engineers, more than 10 senior engineers who have been in charge of or participated in the design of more than 2 medium-scale institutional or commercial projects in their respective disciplines	1. More than 15 professionals and technicians in all necessary disciplines, having capacity to undertake design of 2 small-scale projects at same time 2. Engineer in charge shall be a senior engineer with more than 10 years of design experience and have been in charge of design or participated in design of more than 2 small-scale projects 3. More than 4 senior engineers who have been in charge of design in their respective disciplines of no less than 2 small-scale projects, more than 2 Grade 2 registered architects and 2 Grade 2 registered structural engineers, more than 5 senior engineers who have been in charge of or participated in the design of more than 2 small-scale institutional or commercial projects in their respective disciplines

Criteria	A	Grade	
		B	C
Technology	4. Meeting the requirement of proportion of sector-leading discipline and other disciplines	4. Meeting requirement of proportion of sector-leading discipline and other disciplines	4. Meeting requirement of proportion of sector-leading discipline and other disciplines
	1. Own at least 1 engineering patent, technology, or software meeting the basic requirement of domestic advanced computer application and prominent application in design 2. Able to utilize potent, special technology and software to undertake design independently 3. Able to collaborate with foreign firms for design or independent design in foreign countries, having capacity for project management	1. Able to design by using advanced technology independently 2. Having capacity for project management 3. Able to make computer application	1. Able to design by using advanced technology 2. Having certain capacity in project management
Facility and application of equipment	1. Having necessary advanced equipment, which meets Grade 1 criteria set by relevant authorities	1. Having necessary equipment, which meets Grade 2 criteria set by relevant authorities	1. Having necessary equipment, 50% drafting by CAD, computer management documentation for files and drawings, able to use computer to design and design management;
	2. 100% drafting by CAD, 90% feasibility studies and conceptual design by CAD, 90% conceptual design selection by CAD, computer management documentation for files and drawings, gradually realizing computer management for design projects through engineering software, having fairly established computer network management 3. Having permanent offices, each professional shall have an average of no less than 12 m ² office area	2. 100% drafting by CAD, 80% feasibility studies and conceptual design by CAD, 80% conceptual design selection by CAD, computer management documentation for files and drawings, able to use computer to design and design management, having fairly established computer network management 3. Having permanent offices, each professional shall have an average of no less than 10 m ² office area	2. Having permanent offices, each professional shall have average of no less than 10 m ² office area
Management	1. Established management system centered by design projects, with effective quality, progress, and cost control	1. Having management system centered by design projects, with quality, progress, and cost control	1. Having management system centered by design projects
	2. Established organizational structure, standard system, quality system, and ability to use dynamic management, obtained ISO 9001 certificate	2. Having effective quality management system and technology, operation, human resources, accounting, and documentation management system	2. Having effective quality management system and technology, operation, human resources, accounting, and documentation management system
Achievements and awards	1. More than 3 awards in recent 4 years for provincial or above-excellent engineering design, excellent software, or excellent standard design	1. Participated in editing of national, sectoral, or local engineering construction standards, codes, price index, or standard design	NA
	2. Edited more than 2 or participated in editing more than 3 national, sectoral, or local engineering construction standards, codes, price index, or standard design		

Source: MOC (2001).

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