# STRATEGIC ANALYSIS OF LARGE CHINESE CONSTRUCTION ENTERPRISES

**Jian Kang [1] Charles Y.J. Cheah[2], and David A.S. Chew [3]**

*1 PhD Candidate, School of Civil and Environmental Engineering, Nanyang Technological University, Blk N1, #B4b04, 50 Nanyang Avenue, Singapore 639798*
*2 Assistant Professor, School of Civil and Environmental Engineering , Nanyang Technological University, Blk N1, #01b-35, 50 Nanyang Avenue, Singapore 639798*
*3 Associate Professor, School of Civil and Environmental Engineering , Nanyang Technological University, Blk N1, #01a-20, 50 Nanyang Avenue, Singapore 639798*

The concept of competitive advantage has been widely studied in the academic field and applied to various industries in many western countries. However, practical cases and empirical findings related to the Chinese construction industry remain lacking. To help construction enterprises in China identify and structure critical sources of competitive advantage, this research aims to build a conceptual model based on findings gathered from a series of case studies. Relationships among the variables within the model are subsequently verified and refined through statistical analyses of survey results, which are obtained separately. The conceptual model combines two main streams of strategic management theories – industrial organization theory and resource-based view. The case studies consist of 11 large Chinese construction companies and the survey has a sample size of 54 valid responses. In the model, it is postulated that there are two major sources of competitive advantage: competitive strategy and imperative resources and competencies (iRC). Furthermore, these variables interact with one another. In this paper, the conceptual model and selected findings are presented. The analytical results show that two competitive strategies – differentiation and market/product diversification, directly affect firm performance as measured by sales growth and profit growth.

Keywords: China; Construction industry; Competitive advantage; Resource-based view; Strategy

## INTRODUCTION

Traditionally, the concept of competitive advantage has been widely studied in the academic field and applied to various industries in many western countries. However, the Chinese construction industry has not drawn adequate interest from mainstream management academics as compared to other industries such as manufacturing and services (Cheah and Chew, 2005). Over the years, strategic management studies building on either practical cases or empirical findings related to the Chinese construction industry are seriously lacking. Indirectly, this becomes one of the factors hindering the development of competitive advantage in Chinese construction enterprises.

Today, an increasing number of construction enterprises in China are competing intensively in the domestic as well as overseas markets. Unfortunately, many of these

[1] e-mail: PG04220485@ntu.edu.sg
[2] e-mail: cyjcheah@ntu.edu.sg
[3] e-mail: caschew@ntu.edu.sg

Kang, J, Cheah, C Y J and Chew, D A S (2005) Strategic analysis of large chinese construction enterprises. *In:* Khosrowshahi, F (Ed.), *21st Annual ARCOM Conference*, 7-9 September 2005, SOAS, University of London. Association of Researchers in Construction Management, Vol. 2, 655-64.

companies are plagued by poor profits (Kang, et al, 2004). As an important participant in the Chinese construction industry, large construction enterprises are confronted with the task of keeping themselves competitive in terms of profits and future growth. This paper aims to identify and structure some critical sources of competitive advantage in order to help large Chinese construction enterprises improve their performance. It also fills the gap between western theories of strategy and applications to the Chinese construction industrial context.

The structure of this paper in fact parallels the actual research process adopted. First, some fundamental principles of strategy are reviewed, and the preliminary form of conceptual model is built. The case studies of 11 companies are subsequently described, which are used to establish the critical variables in the conceptual model. The structure of the model is further refined based on the findings gathered from a questionnaire survey. Finally, the paper ends with some discussions of the results and conclusions.

## CONCEPTUAL FOUNDATIONS

According to Kale (1999)'s definition, *competitive advantage* refers to the ability of a firm to outperform its rivals on some performance criteria, such as profitability and market share. One source of competitive advantage can be traced from the industrial organization theory. This theory implies that the so-called "above-industry-performance" emerges from the positioning of a company within an industry, which in turn is primarily determined by a company's strategy. A great many researchers have discussed corporate strategy before. Among them, Porter (1980, 1985)'s generic *competitive strategies* is perhaps the most popular one, which include cost leadership, differentiation and focus. *Cost leadership* requires management to focus its attention on competing on cost. *Differentiation* is concerned with creating something that is perceived by the buyers as unique, and a *focus* strategy means that a company would compete in only limited functions or market segments. Based on these notions, Kale (1999) argues that competitive strategy is a major source that contributes to the development of competitive advantage.

Another theoretical source of competitive advantage comes from the resource-based view (RBV) – another mainstream of strategic management theories. RBV is formulated on the assumption that firms are fundamentally heterogeneous in terms of their resources and competencies. It indicates that firm's *resources and competencies* are the major sources of competitive advantage if they could meet four criteria: value, rareness, non-substitutability, and imperfect imitability (Barney, 1991). Effectively, based on these notions, this paper also defines the term 'imperative resources and competencies' as the resources and competencies of a firm which would meet these four criteria and contribute to its competitive advantage.

Figure 1 shows the basic conceptual model, which has been developed using the above predications. It assumes that in the Chinese construction context, competitive strategies and selected imperative resources and competencies (hereafter referred to as iRC) of a firm are two major sources of forming competitive advantage. The individual components and their associated scope and significance will be discussed next.

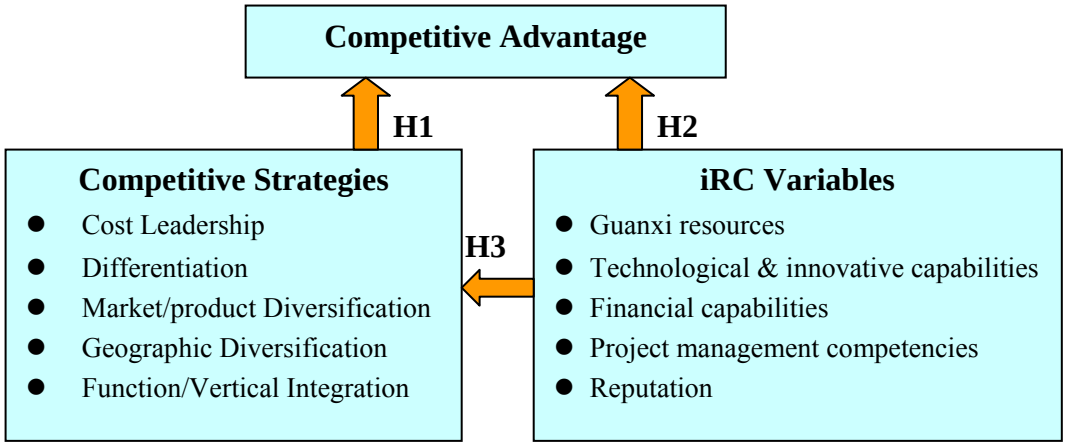


**Figure 1 A Conceptual Model for Competitive Advantage of Large Chinese Construction Enterprises**

## IDENTIFICATION OF RESEARCH VARIABLES THROUGH CASE STUDIES

In the research project, the case studies of 11 large construction enterprises are conducted. The selection of the case companies is based on their relatively strong performance and local reputation in China. These eleven companies are: China HuanQiu Contracting & Engineering Corporation (HQCEC); China Non-ferrous Metal Industry's Foreign Engineering & Construction Co. Ltd. (NFC); China Railway Construction Corporation (CRCC); SINOPEC Engineering Incorporation (SEI); SinoHydro Corporation (SINOHYHRO); China State Construction International Co. Ltd. (CSCIC); China Petroleum Engineering & Construction Corporation (CPECC); Tianjin Construction Engineering Main Contracting Co. Ltd. (TCEMC); China Harbour Engineering Company Tianjin Port Construction Corporation (CHEC-TPCC); Beijing Urban Construction Engineering Co. Ltd. (BUCEC); and Shanghai Construction Group (SCG). Among them, four are regional companies based in Shanghai, Beijing and Tianjin; the others are national wide companies. During the case study process, interviews were conducted with senior and middle-level managers. From the case studies, selected findings and interview outcome, which are related to the identification of variables in Figure 1, are discussed below.

### Competitive Strategies

As pointed out in the previous section, Porter (1980, 1985)'s competitive strategies mainly include *cost leadership*, *differentiation* and *focus*. The cost leadership and differentiation strategies can be thought of as the *mode of competition,* which refers to a firm's decision on the methods of developing competitive advantage. Meanwhile, *focus* can also be interpreted as related to the *scope of competition*, which refers to a firm's decision on the breadth of developing competitive advantage (Kale & Arditi, 2002). Observations drawn from the case studies show that most of companies pursue the following modes of competition listed in Table 1.

**Table 1**: Mode of competition of case companies

| Mode of Competition | Key Issues within each Mode |
|---|---|
| Cost Leadership | (1) Cost of material and equipment procurement; (2) Manpower cost; (3) Cost control during the construction process; (4) Administrative cost; (5) Subcontracting cost |
| Differentiation | (1) Reputation; (2) High quality projects; (3) Advanced technology; (4) Guanxi resources |

The *scope of competition* can vary in three dimensions: *market/product*, *geography* and *function* (Cheah, 2002). In the construction context, the dimension of market/product refers to the different types of projects and market segments, such as the construction of residential/commercial buildings, civil works, environmental engineering, industrial facilities and infrastructure projects. The dimension of geography implies the act of diversification into different domestic, regional and international markets. The dimension of function relates to vertical integration/disintegration of different functions. For a contractor, it would imply backward integration into engineering design or construction materials/equipment manufacturing, and forward integration into real estate development. Observations drawn from the case studies show that companies have indeed diversified into different types of projects and functions, but some firms had been reluctant to diversify into other regions. Table 2 presents selective information of some companies to illustrate on the scope of competition.

**Table 2**: Scope of competition of some selected case companies

| Company | Market/product | Geography | Function |
|---|---|---|---|
| SCG | Civil Engineering; Commercial Building; Steel Structural Works | Shanghai; Beijing | Manufacturing of construction materials and equipment; Real estate development |
| TCEMC | Civil Engineering; Commercial Building; M&E services | Tianjin | Steel component fabrication; Construction technology development and consultancy; Real estate development |
| CRCC | Railways, Toll Roads, Water conservation projects, Power projects | 19 different regions in China | Design, Supervision, Equipment installation, Technical consultation |

## iRC Variables

The five main iRC variables identified through the case studies include: Guanxi resources, technological and innovative capabilities, financial capabilities, project management competencies, and reputation.

***Guanxi resources.*** Some researchers (Zhu, 2001; Chen, 1998) reported that the Chinese construction environment has a high degree of institutional uncertainty, such as a lack of developed legal and regulatory systems, excessive administrative procedures and diverse regulations, and a lack of legal enforcement and supervision. In order to overcome these unfavourable conditions, Park and Luo (2000) illustrated that firms in China may turn to Guanxi connections with related parties in the so-called "task environment" to reduce the uncertainties. The observations drawn from the case companies confirm this view and shows that most of them have built Guanxi

resources with government/regulatory bodies, clients, financial institutions, research institutes and subcontractors/suppliers.

***Technological and innovative capabilities.*** Some scholars had noted that in the construction industry, technological innovation can contribute to the growth in market share through the provisions of new or improved products and services and the reduction in production cost (Slaughter, 1998). The case companies had the following features in this aspect:

1. Internal exploration as well as external collaboration with domestic and international research institutes;
2. Setting up technological innovation centers to absorb, introduce, spread and evaluate new technologies;
3. Allocating sufficient funds for innovative studies – in most of the case companies, the R&D expenses amount to 0.5% - 1% of the total revenue;
4. Encouraging all employees in the company to take part in the innovation process by providing training and various incentives;
5. Setting up technical database to collect useful data from different sources;
6. Promoting a value of corporate culture that encourages innovation in technologies.

***Financial Capabilities.*** It has been reported that in the Chinese construction industry, there is a serious lack of financial resources and channels to many construction companies (Chen, 1998). Therefore, the ability to acquire financing from banks and other financial institutions is one major capability that needs to be cultivated. Most of the case companies have fostered this ability by setting up Guanxi connection with financial institutions or by raising capital as publicly listed firms. Another financial capability that has been identified is investment planning and execution. Most companies have pursued long-term investments in the real estate industry and equipment manufacturing and also made short-term investments in various types of projects. The last capability observed is financial management, the activities of which include setting up a total budgeting system, enhancing financial information communication system and internal auditing.

***Project management competencies.*** Put simply, project management competencies are structured to ensure that a project is completed on time, within budget and with a desirable level of quality (Cheah and Chew, 2005). In most case companies, project management remains as a key function, and the activities mainly include schedule management, cost management, quality management, contract management and procurement management. In the case analyses, it is found that project management competencies are usually supported and cultivated jointly by IT strategy, human resource strategy, organizational structure and culture – a series of key variables that have been identified by Cheah and Garvin (2004).

***Reputation.*** Although corporate reputation is seen as an intangible asset, Fombrun (1996) suggests that it produces a significant long-term competitive advantage. In the case studies, it is found that reputation is mainly derived from high quality projects and advanced technology.

In summary, based on the case studies, the conceptual model in Figure 1 helps to formulate a few hypotheses of the connections among competitive strategies, iRCs and competitive advantage:

*Hypothesis 1 (H1): Competitive strategies, which include cost leadership, differentiation, market/product diversification, geography diversification and function/vertical integration, can contribute directly to the development of competitive advantage.*

*Hypothesis 2 (H2): iRCs, which include guanxi resources, technological innovative capability, financial capability, project management competencies, and reputation, can directly structure competitive advantage.*

*Hypothesis 3 (H3): iRCs may also have direct influences on competitive strategies.*

# QUESTIONNAIRE SURVEY

The hypotheses in the conceptual model in Figure 1 are verified by the use of a questionnaire survey. In this section, the sampling procedure is first described. Then, some descriptive statistics for the measurement of each variable are given. Regression analyses are subsequently conducted to analyze the relationships among the variables in the conceptual model. Some of these findings will be discussed.

## Sampling Procedure

The questionnaire was meant to target larger and more influential construction companies in China. It was expected to be filled in by middle or higher level managers of these companies. The sample was selected based on the local reputation of the companies or their ranking in the Engineering News Record's "Top 225 International Contractors" listing. Clearly, the procedure did not target for a simple random sample, since random sampling usually gets a very low response rate in China (many managers in the Chinese companies are not willing to reveal certain information unless they have reasonably good "guanxi" (relationship) with the researcher). Instead, 230 questionnaires were sent out by the authors' collaboration parties in China, who have close relationships with the targeted companies. A total of 77 questionnaires were returned. Therefore, the effective response rate for this research study is 33%. Among these 77 questionnaires, 23 were deemed not suitable due to the small size of the company. In this research, the definition of large company is similar to that adopted by Amboise (1991), of which the number of employees is greater than 500. Some questionnaires returned also contained missing information on some parts of the questionnaire and were hence discarded. Finally, 54 valid responses were deemed suitable for the analysis described in this paper.

## Measurement of Variables

The variables examined in the questionnaire can be grouped into three categories: performance, competitive strategies and iRC variables. The questions designed to test each variable are developed based on the interview results and case study findings. A survey question, which is designed to examine the issue of cost leadership, is presented here as an illustration. In that question, cost leadership was measured by (1) cost of material and equipment procurement; (2) manpower cost; (3) cost control during the construction process; (4) administrative cost; (5) subcontracting cost. The respondents were asked to choose one or more items or nominate their own items which they thought they have advantages over their main competitors. The results were collated using a scale of 0-6, in which 0 means none of the items was chosen, 1

implies that only one of the items was chosen, and so on. In order to determine whether a company has indeed implemented a cost leadership strategy, the results were transformed into dummy variables (0, 1). The transformation process is largely judgmental and is based on the study of the whole sample population. This is because whether a cost leadership strategy is implemented is purely a relative concept – it should refer to the other companies in the industry. Here, the mean value is used to transform the variables into dummy variables. Values greater than the mean would be assigned as 1, while values less than the mean are assigned as 0. It should be mentioned that due to the variability of the design format of each survey question, the measurement process also varies.

Table 3 shows the mean, standard deviation and value scale of the variables.

**Table 3**: Measurements of research variables

| Research Variables | Mean | Std. Deviation | Value Scale |
|---|---|---|---|
| **Performance (Dependent Variables)** | | | |
| Sales growth | 2.98 | 1.462 | 1-5 |
| Profit growth | 2.42 | 1.391 | 1-5 |
| Overall performance | 2.702 | 1.3331 | 1-5 |
| **Competitive Strategies (Independent Variables)** | | | |
| Cost Leadership | .42 | .499 | 0-1 |
| Differentiation | .62 | .491 | 0-1 |
| Market/Product | .52 | .505 | 0-1 |
| Geography | .50 | .505 | 0-1 |
| Function | .54 | .503 | 0-1 |
| **iRC variables (Independent Variables)** | | | |
| Guanxi Resources | 3.546 | .73470 | 1-5 |
| Technological and Innovative Capabilities | 1.81 | 1.205 | 1-5 |
| Financial Capabilities | 4.08 | .788 | 1-5 |
| Project Management Competencies | 3.292 | .7725 | 1-5 |
| Reputation | 2.987 | .90258 | 1-5 |

n=54

## Selective Analytical Results

Due to the limitation of length, this paper will only show and discuss the testing of Hypothesis H1 in the conceptual model. A regression analysis is used to test the relationship between competitive advantage and competitive strategies, and the results are presented in Table 4. Competitive advantage, which serves as the dependent variable, is represented by the growth rates of sales and net profit. The measure of "overall performance" is given by the average of sales and net profit growth rates.

**Table 4**: Results of regression analysis for firm performance

| Variables | Sales growth (Model 1a) | Profit growth (Model 1b) | Overall performance (Model 1c) |
|---|---|---|---|
| Cost Leadership | .181 | .013 | .106 |
| Differentiation | .303** | .327** | .337** |
| Geography | .143 | .143 | .153 |
| Market/Product | .285** | .202 | .262** |
| Function | -.029 | -.037 | -.035 |
| Adjusted $R^2$ | .294 | .173 | .273 |
| F-Value | 5.246*** | 3.135** | 4.830*** |
| Sig. of F-Value | .001 | .016 | .001 |

n=54

*P≤0.1; **P≤0.05; ***P≤0.01

It can be seen that the adjusted $R^2$ in Model 1a, 1b and 1c are 0.294, 0.173, and 0.273 respectively. Although the value of adjusted $R^2$ seem to be low, the F-statistics are

indeed significant, indicating that the independent variables do explain the variation of the dependent variable. In fact, some past researchers (Kale, 1999; Park & Luo, 2001) have accepted regression models with adjusted $R^2$ that are below 0.3 (sometimes even as low as 0.11). Therefore, it is deemed that the three models support Hypothesis H1. Specifically, it indicates that differentiation and market/product diversification can contribute to the development of competitive advantage at a 5% level of statistical significance.

**Discussion of Results**

As Porter (1980, 1985) points out, a firm cannot pursue cost leadership and differentiation at the same time, for it would face the risk of being 'stuck in the middle'. The research results confirm this view for the Chinese construction context (since the independent variables "differentiation strategy" and "cost leadership" are not concurrently significant). The reason that the differentiation strategy, instead of cost leadership, has a stronger relationship with performance is due to the excessive competition that exists in the Chinese construction industry. Many under-performing companies still remain in the industry because of high exit barriers (Shanghai Jinxin Security Research Institute, 2002). These companies, especially small and medium-sized enterprises among the under-performing group, often lower their price to acquire new projects. In some of the projects, the price could even be lower than the project cost in order to prolong their survival in the industry. On the contrary, large companies have more resources and competencies to support them to distinguish from their competitors. Therefore, they can acquire more projects and profits by adopting a differentiation strategy instead of a cost leadership strategy.

Other than differentiation, the findings in Table 4 also confirm that market/product diversification can contribute to a strong firm performance. As mentioned previously, market/product diversification implies that companies are competing in different types of projects, such as road, tunnel, bridge, subway, airport, railway, and dam, etc. The reason behind this finding is that diversification can often reduce risks, which may be faced by a focus strategy that targets only one type of market segments. Furthermore, market/product diversification fully utilizes the experiences, resources (such as manpower, equipment, etc.) and competencies (such as project management competencies) developed in one type of projects and synergize these resources and competencies with applications to other types of projects.

The results do not support the notion that geographical diversification could influence performance. One possible factor is the protectionist policy of the local regional government in China. In order to protect local benefits, secure short-term profits and lighten the pressure of local employment and fiscal problems, many local government and authorities have chosen to lower the entry barriers to their local construction companies (Shanghai Jinxin Security Research Institute, 2002). This would aggravate the level of competition inside the local industry. At the same time, the local government might elevate the entry barriers to companies from other regions, thus making it difficult for them to secure new projects in the region.

The results also do not support the notion that vertical integration could influence performance. This means that vertical integration may not be a viable strategy for large construction companies in China (although it should be mentioned that many firms have successfully applied this strategy in other countries Cheah (2002)). One possible explanation is that although vertical integration could reduce operational risk and transaction costs (such as backward integration into the manufacturing of

equipment and materials and forward integration into real estate development), it cannot utilize resources and competencies developed in the existing construction business to venture into other similar projects. For example, a few categories of iRCs – Guanxi resource with original clients, project management competencies and technological and innovative capabilities, have limited "expansion value" into the upstream and downstream businesses.

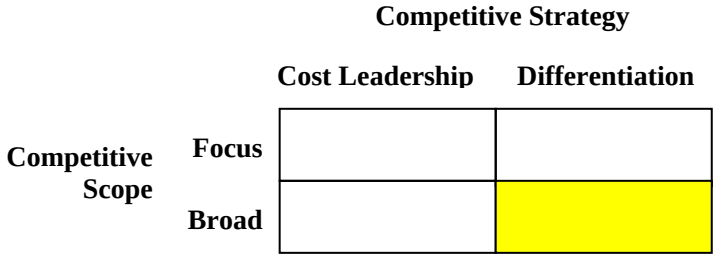


**Figure 2 Competitive Strategy Adopted by Large Chinese Construction Companies**

Figure 2 is adapted from Porter (1980, 1985)'s notion of generic strategy. From the findings of Model 1a-1c, it can be concluded that large Chinese construction companies mainly adopt the differentiation strategy and the market/product diversification strategy concurrently, which belongs to the shaded box in the figure.

Finally, this paper only presents one of the regression models that verifies the relationships between competitive advantage and the variables of competitive strategy. There are also other models developed to examine the relationships between (1) competitive advantage and iRC variables; (2) competitive strategy and iRC variables. These models are also tested and interpreted in conjunction with established strategic management theories.

## CONCLUSIONS

Due to a virtual knowledge gap between western theories of strategy and the Chinese construction industrial context, large Chinese construction enterprises have not gained sufficient insights and contributions from the academic world to help build their competitive advantage. This research project embarks with an aim to fill this gap. Based on a series of case studies, some variables of competitive strategy and iRCs are identified as sources of competitive advantage, and a conceptual model is developed. Using the feedback gathered from a questionnaire survey, the relationships among these variables are verified. The results show that the competitive advantage of large Chinese construction companies is mainly affected by adopting the differentiation strategy and the market/product diversification strategy.

## REFERENCES

Amboise, G D (1991) *The Canadian small and medium-sized enterprise: situation and challenges*. Institute for Research on Public Policy, Nova Scotia.

Barney, J B (1991) Firm resources and sustained competitive advantage, *Journal of management*, **17**(1), 99-12.

Cheah, C Y J and Chew, D A S (2005) Dynamics of Strategic Management in the Chinese Construction Industry, *Management Decision*, forthcoming in **43**, 2005.

Cheah, C Y J and Garvin, M J (2004) An Open Framework for Corporate Strategy in Construction, *Engineering, Construction and Architectural Management*, **11**(3), 176-188.

Cheah, C Y J (2002) *Fundamental Analysis and Conceptual Model for Corporate Strategy in Global Engineering and Construction Markets*, PhD Dissertation, Massachusetts Institute of Technology, Cambridge, MA.

Chen, J J (1998) The characteristics and current status of China's construction industry Construction. *Management and Economics*, **16**, 711-719.

Fombrun, C J (1996) *Reputation: Realizing value from the corporate image*. Harvard Business School Press, Boston Mass.

Hamel, G and Prahalad, C K (1994) Competing for the future. *Harvard Business Review*, July-August, 122-128.

Kale, S (1999) *Competitive advantage in the construction industry: firm specific resources and strategy*, Ph.D. Thesis, Illinois Institute of Technology

Kale, S and Arditi, D (2002) Competitive Positioning in United States Construction Industry. *Journal of construction engineering and management,* **128**(3), 238-247.

Kang, J, Cheah, C Y J and Chew, D A S (2004) Analysis of the Chinese Construction Industry: A Structured Approach. *In: 4th International Conference on Construction Project Management*, 4-5 March 2004, Singapore, 81-89.

Male, S and Stocks, R (1991) *Competitive advantage in construction.* Butterworth Heinemann, Stoneham, Mass.

Park, S H and Luo, Y (2001) Guanxi and organizational dynamics: organizational networking in Chinese firms. *Strategic Management Journal*, **22**, 455-477.

Porter, M E (1980) *Competitive strategy: techniques for analyzing industries and competitors*. New York: Free Press.

Porter, M E (1985) *Competitive advantage: creating and sustaining superior performance.* New York: Free Press.

Shanghai Jinxin Security Research Institute (2002) *Report of Chinese Construction Industry*. Dec, 2002.

Slaughter, E S (1998) Models of construction innovation. *Journal of Construction Engineering and Management,* **124**(2), 226-231

Zhu, H and Hu, X (2001) China's construction regulatory systems. *Building Research & Information*, **29**(4), 265-269.