# The Growth Trend of the Chinese Construction Industry after the Culture Revolution

Yilei Huang and Yong Bai, Ph.D., P.E.

University of Kansas

Lawrence, KS

U.S. architectural, engineering, and construction (AEC) firms doing business in China are minimally successful because they are unfamiliar with the Chinese market. To assist the U.S. AEC firms to become more competitive in the Chinese market, a comprehensive investigation of the Chinese construction industry after the Culture Revolution was conducted. The development of the industry was divided into three stages: the first stage from 1978 to 1992, the second stage from 1992 to 2001, and the third stage from 2001 to 2007. In each stage, the administrative framework, laws and regulations, procurement methods, and market structure were studied. Next, statistical data, such as value added of construction, Gross Output Value of construction, and the number of employees, were analyzed. In addition, the market shares of five types of construction firms in China were compared. The results of the research can help the U.S. AEC firms become more familiar with the Chinese construction market, and thus, be more successful in this market as they bid and compete for projects.

Key Words: China, Construction Industry, Growth Trend, Gross Output Value, Market Structure

## Introduction

In recent years, China has experienced huge economic growth. According to The World Factbook 2008, China stood as the second largest economy in the world measured by purchasing power parity and was the third largest measured by the official (bank) exchange rate. An important segment of the national economy, the construction industry increased greatly. From 2001 to 2007, the Gross Output Value of the Chinese construction industry had an average growth rate of 22.29% (China Statistical Yearbook 2008). The Chinese construction market was the third largest in the world in 2002, with a total construction value of \$404 billion dollars (Shen et al., 2003). From 2001 to 2007, the number of construction firms in China increased by 35.26% and the number of workers employed by Chinese construction firms increased by 48.47% (China Statistical Yearbook 2008). In 2007, four Chinese construction firms ranked in the top ten in Engineering News Record's The Top 225 Global Contractors, and China had the most construction firms ranked in The Top 225 International Contractors.

## **Problem Statement**

Despite China's huge progress in its national economy and construction industry, researchers still considered the Chinese construction industry a weak sector by international standards because of its inadequate legal framework and mechanism, low productivity, relatively unsophisticated construction equipment and technologies, and low international market share with limited types of projects (Xu et al., 2005). After China's entry into the World Trade Organization (WTO) on December 11, 2001, it was moving toward a more open and market-driven economy, and as a consequence many regulations with constraints on foreign participation were abolished or modified. Although the Gross Output Value of foreign funded construction firms in China is increasing, the number of firms has not increased since 2004. Their influence on the overall Chinese construction market is still small, and restrictions on project types undertaken by wholly foreign owned firms still exist.

Because of these remaining restrictions and the unfamiliarity of U.S. architectural, engineering and construction (AEC) firms with the Chinese construction market, they were only minimally successful in the Chinese market in terms of market share (Chui and Bai, 2009). To assist the U.S. AEC firms to become more competitive in this market, a comprehensive investigation of the Chinese construction industry must be conducted. Mayo and Liu (1995) reported the reform process of the Chinese construction industry from the late 1970s to mid 1990s. Li (2001) presented China's construction industry transition and the potential roles for improved foreign involvement. Low and Jiang (2003) analyzed the internationalization of Chinese construction firms. Lam and Chen (2003) studied the development of the construction legal system in China. While these studies are either out of date or focused on a particular area, few comprehensive studies have been found. This study presents an overview of the development of the Chinese role industry after the Culture Revolution, analyzes its growth trends in three time periods on economic indicators, number of employees, and market structure, and gives recommendations to U.S. AEC firms which are interested in conducting business in the Chinese construction market.

# Literature Review

Since 1979, China has been adopting an open-door policy for attracting foreign investment. In October 1992, construction industry reform was announced at the Chinese Party Congress Convention (Mayo and Liu, 1995). In December 2001, China was formally admitted to the WTO and committed to liberalize the construction market (Xu et al., 2005). Based on a review of previous studies, the development of the Chinese construction industry after the Culture Revolution is divided into three periods: the first stage of reform from 1978 to 1992, the second stage of reform from 1992 to 2001, and the third stage of reform from 2001 to 2007 (Huang, 2009).

During the first stage of reform, the administrative framework of the Chinese construction industry was consisted of the Ministry of Housing and Urban-Rural Development of China, National Development and Reform Commission, and People's Construction Bank of China (Lu and Fox, 2001; Bajaj and Zhang, 2003). The government assigned projects to contractors and provided all finances for construction works (Shen and Song, 1998). China had no unified construction law before 1996 and government administrative control had dominant influence to the

construction market (Lu and Fox, 2001; Shen et al., 2004). Assignment method was used widely as the major procurement method until 1984, when the Provisional Regulations on Tendering for Construction Projects was issued (Lu and Fox, 2001). There were three major types of construction firms, which were state-owned enterprises (SOEs), urban and rural collectives (URCs), and rural construction teams (RCTs) (Chen, 1998). SOEs were known for lack of autonomy and vagueness in property rights, while URCs and RCTs were market-oriented and had more flexible management but poor quality, low professional and management levels (Sha and Lin, 2001; Chen, 1998).

During the second stage of reform, the administrative framework had been developed into corporate organization system, tendering and bidding system, supervision system, and contract management system (Sha, 2004). The construction legal system was developed into three levels - laws, administrative regulations, and departmental rules (Lam and Chen, 2004). The two most important laws, the Construction Law and the Bidding and Tendering Law, were enacted in 1997 and 1999, respectively. Since the Bidding and Tendering Law was introduced, it had become a legal requirement to award all public contracts through bidding procedures (Shen et al., 2004). The number of contract bids increased from 20.7% in 1990 to 34.5% in 1995 (Shen and Song, 1998). The market share of SOEs dropped from 40.5% in 1989 to 26.8% in 2001; the market share of URCs and RCTs also decreased from 59.5% in 1989 to 39.8% in 2001; on the other hand, the market share of other types of firms (including foreign funded firms and private companies) increased from 0% in 1989 to 33.4% in 2001 (Zeng et al., 2005).

During the third stage of reform, China presented itself as a developing country in its WTO Commitment to achieve the maximum protection on the construction market, and therefore would open the doors in a progressive and limited way (Chui and Bai, 2009). To meet WTO principles, a special task team was established to review construction laws and regulations, and those with constraints on foreign participation were abolished or modified (Lam and Chen, 2004). The reform of SOEs was undertaken under government policies, and there were increasing private construction firms due to the privatization of some URCs and RCTs (Low and Jiang, 2003).

# Methodology

## Data Collection

Data on the Chinese construction industry from 1978 to 2007 were obtained from the China Statistical Yearbooks 1996 through 2008. Collected datasets include Gross Domestic Product (GDP), value added of construction, Gross Output Value of construction, the number of employees, and the number of firms and Gross Output Value of firms in each type including SOEs, URCs, RCTs, other types of domestic funded firms, firms funded by Hong Kong, Macao and Taiwan companies, and foreign funded firms. GDP refers to the final products at market prices produced by all resident units in a country or region during a certain period of time; value added of the construction industry refers to the final result of the activities of production and operation of firms of the construction industry in monetary terms during the reference period; Gross Output Value of the construction and installation firms during the given period of time (China Statistical Yearbook 2008).

#### Data Analysis

Data analysis was divided into three parts based on different stages of the development of the Chinese construction industry. In each stage, the growth of value added and Gross Output Value of construction, the number of employees, and market structure were analyzed. The correlations between related indicators, such as value added and Gross Output Value of construction, the number of all types of construction firms, were examined using the Pearson Correlation Coefficient. In statistics, the correlation coefficient indicates the strength and direction of a linear relationship between two random variables. Pearson Correlation is obtained by dividing the covariance of the two variables by the product of their standard deviations. The correlation is 1 in the case of an increasing linear relationship, -1 in the case of a decreasing linear relationship, and values in between in all other cases indicate the degree of linear dependence between the variables. The closer the coefficient is to either -1 or 1, the stronger the correlation between the variables (Rodgers and Nicewander, 1988). Comparisons were made between the market share of different types of construction firms measured in both number and Gross Output Value. The growth of domestic funded firms and foreign funded firms were also compared and the reasons for their growth trends were discussed.

# **Results**

# The First Stage of Reform from 1978 to 1992

# Value Added, Gross Output Value and Employees

Since 1979 China has been adopting an open-door policy, but the construction industry was not reformed until October 1992, therefore, in the first stage the Chinese construction industry was still controlled by the government and was largely under the traditional assignment system. During this period, the average growth rate (AGR) of Gross Output Value was about twice the AGR of value added of construction, as shown in Table 1 (the AGR of value added of construction were obtained directly from the China Statistical Yearbooks which used unexplained formulas). The AGR of the number of employees was relatively small at only 2.98% compared with the AGRs of other economic indicators. From 1980 to 1992, the number of employees increased by 64.46%, while the value added of construction increased by 623.78% and the Gross Output Value increased by 593.51%. These data reflected that the output values created by individual employees increased dramatically during the first stage of reform.

#### Market Structure

The number of RCTs was about five times more than the total number of SOEs and URCs on an average basis. However, RCTs had a decreasing growth trend, which was different from SOEs and URCs. The Pearson correlation of the number of all firms and SOEs was 0.964, and the Pearson correlation of the number of all firms and URCs was 0.930; on the other hand, the Pearson correlation of the number of all firms and RCTs was only 0.146. It indicated that the development of RCTs was not correlated with that of SOEs and URCs, and therefore did not have the same growth trend as the Chinese construction industry during the first stage.

value audea, Gross Gulpat value and employees from 1978 to 1992								
Year	А	В	С	Year	А	В	С	
1978	138.20	-	-	1986	525.70	739.53	913.60	
1979	143.80	-	-	1987	665.80	875.83	945.30	
1980	195.50	286.93	648.00	1988	810.00	1,043.37	968.20	
1981	207.10	-	-	1989	794.00	1,178.98	928.20	
1982	220.70	-	-	1990	859.40	1,345.01	1,010.70	
1983	270.60	-	-	1991	1,015.10	1,425.48	1,058.30	
1984	316.70	517.15	847.70	1992	1,415.00	1,989.90	1,065.70	
1985	417.90	675.10	911.50	AGR (%)	10.00	18.79	2.98	

Table 1Value added, Gross Output Value and employees from 1978 to 1992

Note: 1. Adapted from the China Statistical Yearbooks 1996 and 2008; 2. A: Value Added of Construction (100 million yuan), B: Gross Output Value (100 million yuan), C: Number of Employees (10,000)

# The Second Stage of Reform from 1992 to 2001

# Value Added, Gross Output Value and Employees

Table 2

Since the construction reform was introduced in 1992, the Construction Law was issued in 1997, and the Bidding Tendering Law came into effect in 1999, the Chinese construction industry had been developing at a higher speed and had huge changes. During this period, Gross Output Value grew much faster than value added of construction, as shown in Table 2. By 2001, Gross Output Value was almost eight times what it was 10 years before, while value added of construction was only four times. Although having different AGRs, they were still strongly correlated with the coefficient of 0.972. The number of employees had an AGR at about 8%, two times higher than in the first period, and it even surged by 41.66% in 1996.

value dadea, Gross Oulpul value and employees from 1992 to 2001									
Y	ear	А	В	С	Year	А	В	С	
19	992	1,415.00	1,989.90	1,065.70	1997	4,621.61	9,126.48	2,101.51	
19	993	2,266.46	3,253.53	1,138.10	1998	4,985.76	10,061.99	2,029.99	
19	994	2,964.69	4,653.32	1,445.90	1999	5,172.10	11,152.86	2,020.13	
19	995	3,728.85	5,793.75	1,497.87	2000	5,522.29	12,497.60	1,994.30	
19	996	4,387.35	8,282.25	2,121.87	2001	5,931.67	15,361.56	2,110.66	
					AGR (%)	10.20	27.98	7.95	

Value added, Gross Output Value and employees from 1992 to 2001

Note: 1. Adapted from the China Statistical Yearbooks 1996 and 2008; 2. A: Value Added of Construction (100 million yuan), B: Gross Output Value (100 million yuan), C: Number of Employees (10,000)

## Market Structure

The market share of SOEs and URCs dropped dramatically in both their number and Gross Output Value, as presented in Figure 1. On the other hand, the market share of other types of domestic firms increased considerably by over 35%. However, the Pearson correlation of the number of other types of domestic firms and all firms was only 0.644. This suggested that the growth of other types of domestic firms was not typically according to the overall development of the industry, and was much faster than the latter. The correlation coefficient of the number of foreign funded firms and all firms was 0.107, indicating that fewer foreign funded firms were conducting business in the Chinese market from 1995 to 2001.

Through the comparison of market structure in both the number of firms and Gross Output Value, it is clear that URCs produced the Gross Output Value which was actually half the percentage their number accounted for. On the contrary, the percentage of Gross Output Value that SOEs created doubled that of their number, indicating that the output value of individual SOEs was about four times that of individual URCs. Other types of domestic funded firms had a similar percentage for both their number and Gross Output Value. Therefore, the ratio of the output value of individual URCs, other types of domestic funded firms, and SOEs can be concluded as about 1:2:4.



Note: In each year, the left bar represents the percentage of number of each type of construction firms, the right bar represents the percentage of Gross Output Value of each type of construction firms. *Figure 1*: Market structure of the Chinese construction industry from 1995 to 2001

## The Third Stage of Reform from 2001 to 2007

## Value Added, Gross Output Value and Employees

After China was formally admitted to the WTO in 2001, constraints on foreign participation were abolished and the construction market was liberalized to foreign AEC firms. During this period, value added of construction had a very similar AGR with that in the second stage, while the AGR of Gross Output Value dropped to 22%, as seen in Table 3. Despite their AGR difference, value added of construction and Gross Output Value shared a synchronous growth trend with the Pearson correlation of 0.999. The number of employees increased steadily with the AGR of 6.68%, and exceeded 30 million in 2007.

value daded, Gross Oulput value and employees from 2001 to 2007									
Year	А	В	С	Year	А	В	С		
2001	5,931.67	15,361.56	2,110.66	2005	10,133.80	34,552.10	2,699.92		
2002	6,465.46	18,527.18	2,245.19	2006	11,851.09	41,557.16	2,878.16		
2003	7,490.78	23,083.87	2,414.27	2007	14,014.10	51,043.71	3,133.71		
2004	8,694.28	29,021.45	2,500.30	AGR (%)	10.66	22.29	6.68		

Value added, Gross Output Value and employees from 2001 to 2007

Note: 1. Adapted from the China Statistical Yearbooks 1996 and 2008; 2. A: Value Added of Construction (100 million yuan), B: Gross Output Value (100 million yuan), C: Number of Employees (10,000)

# Market Structure

Table 3

The number of SOEs and URCs had been decreasing, having their correlation coefficients with all firms around -0.9, which suggested that they had less influence to the industry's development than before, as displayed in Figure 2. Other types of domestic firms had become the major contributor in both their number and Gross Output Value. Foreign funded firms had a 29.29% AGR on their Gross Output Value, and their market share had surpassed that of firms funded by Hong Kong, Macao and Taiwan companies. The number of the latter also dropped, reflecting that foreign funded firms had become more competitive compared with firms funded by Hong Kong, Macao and Taiwan companies after China's WTO accession.

## **Conclusion and Discussion**

During the first stage when the Chinese construction industry was largely controlled by the government, value added of construction and Gross Output Value grew at the AGRs of 10.00% and 18.79%, respectively, much faster than the number of employees at the AGR of only 2.98%. It reflected that the output values created by individual employees increased dramatically. The number of RCTs decreased dramatically as a result of the reform. During the second stage when the unified construction laws were issued, Gross Output Value and the number of employees grew at even higher AGRs of 27.98% and 7.95%, respectively, compared with those during the first stage. The market share





Figure 2: Market structure of the Chinese construction industry from 2001 to 2007

of SOEs and URCs decreased, while the market share of other types of domestic firms increased considerably by over 35%. During the third stage when China had entered the WTO, value added and Gross Output Value of construction experienced steady growth with the AGRs of 10.66% and 22.29%, respectively. The number of employees increased at the AGR of 6.68% and exceeded 30 million in 2007. Other types of domestic firms had become the major contributor to the Chinese construction industry. Foreign funded firms had an AGR of 29.29% on their Gross Output Value, and their market share had surpassed that of firms funded by Hong Kong, Macao and Taiwan companies.

After China's admission to the WTO and due to its continually modernizing its laws and regulations, foreign funded firms have broken the barriers into the Chinese market and have gained more market share. As the Chinese government encourages more construction projects to be built to international standards, U.S. AEC firms that are interested in conducting business in China have a good opportunity to enter this market, one with huge potential. At the same time, U.S. AEC firms will also need to consider their vulnerability compared with local firms, and have to become familiar with Chinese government policies, laws and regulations, and local business environment.

Although the study presents a comprehensive investigation of the development of the Chinese construction industry after the Culture Revolution, limitations still exist, which include: 1) collected data did not cover all aspects of the Chinese construction industry, 2) data analysis was conducted in general and limited areas, and 3) the study did not consider the problems the Chinese construction industry had encountered and the challenges it will face in the near

future. Further study is recommended on analysis on more specified fields, such as productivity, quality and safety issues, and project delivery and management methods. Future research may also focus on topics such as what problems the Chinese construction industry had encountered during each stage and what impacts they had brought, what challenges the Chinese construction industry will be facing if it continues to grow at its current tendency, and how Chinese construction firms will compete with foreign construction firms in the domestic market and in the global arena.

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