

An Overview of the Construction Industry in China

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I. Introduction

1. The objectives of this article are to describe the current status of the Construction Industry (CI) in China, to highlight its achievements, and to identify the main constraints preventing the CI from assuming a more effective and efficient role in China's impressive economic development. The article starts with a review of the role of the CI in the country's economic development. It describes the current structure of the industry and the respective roles of different government agencies and other participants such as the owners, contractors, design institutes, consultants etc. The article also reviews the current business environment in which the industry is operating and various related policy and reform initiatives of the government. The last section summarises the key issues faced by the industry, and some suggestions to overcome those. It is based on the past World Bank studies on the construction industry as well as the experience of a large number of Bank projects in different sectors.

II. China's Economic Development and Role of the Construction Industry

2.1 Impressive Economic Development. China has achieved remarkable success in economic development since the introduction of the "opening-up" policies in 1978. A sustained growth rate of over 9% per year of the Gross Domestic Product (GDP) was accomplished through a judicious combination of economic reforms and rational investment in various sectors. China's per capita income measured in terms of GNP has increased ten-fold in the past 15 years, from Rmb 379 in 1978 to about Rmb 3680 in 1994. At the same time total investment in fixed assets, which reached Rmb 1637 billion in 1994, have been growing at an average rate of 19.5% per year for the last ten years. Total value of exports and imports reached US \$ 236.7 billion in 1994, with an annual growth rate of 14.6% during the 1986 - 1994 period. As the economy grew rapidly the government successfully introduced reforms which improved the investment environment in the country. Consequently, the utilisation of foreign capital reached US \$ 43.2 billion in 1994, corresponding to an average annual increase of 28.1% from 1986 to 1994.

2.2 Size and Growth of the Construction Industry. China's construction industry is huge and widespread. Today the whole of China could be described as one large construction site! Currently the annual output of the CI is about US \$ 93 billion - it employs nearly 24 million people (more than 5% of the total labour force); it accounts for more than 6% of the GDP, and has been growing at an average annual rate of nearly 10% since 1979. The high growth rate of CI is attributable to extreme shortage of infrastructure and building space. This growth rate is likely to remain high in the foreseeable future. Statistics show that the percentage contribution of the CI to China's GDP has been increasing since 1978 - in 1994 it stood at about 6.5%, compared to 4.7% and 3.8% in 1991 and 1978 respectively (Annex 1). However, the share of China's CI in GDP is still low compared to the developed countries, which implies a strong potential for further growth of the CI.

2.3 Enterprises and Labour Force. China's CI is composed of three distinct categories of construction forces, namely: State Owned Enterprises (SOEs); Urban and Rural Collectives (URCs); and Rural

Construction Teams (RCTs). In 1994, there were more than 94,000 construction enterprises in China employing over 24.0 million workers. These were composed of about 7,250 SOEs with 8.18 million employees, 16,980 URCs with 6.36 million employees and 69,840 RCTs with nearly 9.7 million employees. The rapid growth in construction since 1979 has expanded the construction labour force, which increased from 9.8 million in 1980 to over 24 million in 1994.

2.4 Output Indicators. The gross output value of the construction industry which was Rmb 34.7 billion in 1980 had reached Rmb 768.4 billion in 1994. The major construction investment outputs, for this period, could be listed as: 110,000 megawatts of new electrical generating capacity; 117 million tons of cement production; 7,484 km of new railway lines; 41,300 km of new highways, 340 million tons of additional harbour cargo-handling capacity; more than 10 new major railway stations in big cities; over 2 billion m² of new residential housing; 9.3 billion m² of rural housing, and a large number of public facilities. This was complemented by some 25.4 million tons of additional steel production, 312 million tons of additional coal production and 183 million barrels of additional petroleum recovery.

The Chinese Vice Premier Mr. Zou Jiattua greets CIB Vice President Dr. Shin Okamoto.

2.5 CI's Linkages to the Rest of the Economy. Construction typically contributes 5% to 9% to the GDP in developing countries and provides critical backward and forward linkages to the rest of the economy. In the case of China, the backward linkages are quite significant - over 10,200 design institutes (0.75 million employees), 1,380 supervision agencies (71,000 employees) and very large construction material and service industries. A rough estimate of the employment ratio between construction enterprises and direct and indirect employment in the material and service industries is 2:1. The CI also generates large "forward linkages" to the economic activities which use the constructed facilities. Since construction in China is a labour-intensive industry, the value added by the CI itself is rather low (6.5% value added to GDP in 1994) compared with other industries.

2.6 Overseas Contracting Business. Chinese enterprises are increasingly getting involved in international contracts for engineering projects, manpower services, and overseas enterprises. Since 1979, about 219,900 workers have been sent abroad and the cumulative dollar amount of overseas contracts is reported to be US \$ 38.3 billion, of which the 1994 figure alone was US \$ 6 billion. Most of these contracts were for civil works in the developing countries. This has helped the development of the CI at home as well. Licenses for construction enterprises abroad are issued by the Ministry of Foreign Economic Relations and Trade (MOFERT), mainly to SOEs. Every year, several Chinese corporations have appeared in the list of the top 250 international contractors, published by the Engineering News Record (ENR). In this regard, Chinese contractors could benefit a lot by first competing against foreign contractors within China.

Vice Minister of Construction Mr. Mao Rubai with Don Buck, President of Fluor Daniel Construction Company, the Conference Keynote Speaker.

2.7 Demand. As indicated earlier, the demands on the CI are closely related to the national fixed capital construction investment scale, which has been increasing rapidly along with the country's economic growth. China's fixed capital investment in 1991 was Rmb 550.88 billion, 65.2% of which was in the construction and installation fields. In 1994, the total fixed capital investment had reached Rmb 1,637 billion, with 63.5% or Rmb 1,039.9 billion used in the construction and installation fields. CI is very sensitive to the national economy; this was evidenced during the recent austerity programme period when the government slammed brakes on the State Fixed Investment through a slowdown in approval of new projects and a credit squeeze. However, since early 1995, construction activities have picked up again all over China and the short term prospects look good. The recently formulated Ninth Five-Year Plan (1996-2000) calls for Rmb 13,000 billion worth of national fixed capital investment over the plan period with about 60% for construction and installation. Housing and infrastructure will be two key elements of this large construction activity.

III. Structure of the CI in China

The University of Florida Organisers: R. Wayne Drummond, Raymond Issa, Robert Cox and Weilin Chang.

3.1 The construction industry started to change in the early 80s with the introduction of economic reforms and the opening up process. At the central level, the government started to introduce regulations to set the basic ground rules and at the enterprise level, the entities were gradually given flexibility to operate as "commercial entities". The World Bank also made a modest contribution in this process by introducing for the first time competitive bidding and international contractors in China. One of the Bank's early projects, Lubuge Hydro Power, demonstrated the advantages of competitive bidding, efficient management, advanced technology, cost effectiveness, quality control and early project completion. Since then, China's CI has come a long way in adopting commercial behaviour. However the journey ahead towards a "socialist market" system is still long and arduous. Today, competitive bidding of some sort is widely used in China (para 4.4).

3.2 **The Emergence of MC.** The Ministry of Construction (MC) was established at the end of the eighties to take the lead role in implementing the new strategies for developing the industry. Prior to that it was a Construction Commission. MC's comprehensive responsibilities include formulating policies, preparing development programmes, monitoring implementation, training personnel, improving construction technology and managing standards, surveys, design and construction institutions. The central organisation of MC is mirrored in the Construction Commission of the provinces and three independent cities. The line ministries at the center also have their mirror image structure in the provinces. The bureaus of the line ministries and the local construction commissions handle the bulk of the construction in China.

3.3 **The Core Agencies.** The State Planning Commission (SPC), which is responsible for preparing long-term investment plans, has a key role of approving all major projects of the line ministries and municipal governments. Under the current system, the government investment projects are divided into three categories: large-size, medium-size and small-size. Large-size investments which are projects of national scope are becoming increasingly rare; currently about 7% of the total investment falls in this category of projects managed by SPC. The **State Administration for the Building Materials Industry (SABMI)**, a separate agency under the State Council, is responsible for all building materials. SABMI mainly administers the manufacture and mining of the building materials, such as cement, bricks, tiles, lime, glass, etc. The State Reform Commission (SRC) which has overall responsibility for macro-economic reforms, has been coordinating with MC, SPC and other line ministries to facilitate the reforms in the CI. The People's Construction Bank mainly provides construction credit inside the country. It is responsible for issuing loans to construction projects according to the credit quota issued by the People's Bank of China and reviewing the construction projects at various stages. The Ministry of Foreign Economic Relations and Trade (MOFERT) is responsible for overseas contract business, giving approval for the enterprises to work overseas and taking general administration roles for the Chinese construction enterprises abroad.

W89 Joint Coordinator Geoff Carter and Kim Stanley in the Forbidden City.

And again in the Forbidden City! Sonia Cedres de Bello from Venezuela and Kim Stanley.

4 **The Line Ministries.** As indicated earlier, the various line ministries have the lead role for their respective sectors. Currently, China has 28 ministry level government agencies including ministries, commissions and administration. Each line ministry has its own network of design and research institutes, construction bureaus, and so on. Most line ministry issue their own sector specification, and in some cases construction regulations.

5 **The Contractors.** The contractor is always a key entity in any construction activity. As mentioned

earlier, China has three distinct construction categories, namely, state-owned enterprises, urban and rural collectives, and rural construction teams. Joint ventures and sub-contracting within these groups is common. There are no private contractors in China yet. SOEs did most of the construction in the past, but their relative share is now decreasing. SOEs which comprise both local units authorized by municipal governments and central ministry-affiliated enterprises, have done most of the construction work of China's infrastructure projects. For some years, notable progress has been achieved in reforming these enterprises in terms of commercial behaviour, operational autonomy and competitive bidding. However, SOEs still face many unsolved problems, i.e., poor management, old technology and excessive labour force. The Urban Collectives and Rural Teams, on the other hand, have been developing fast; they now account for over 60% of the construction labour force and output value. They are different from the SOEs in that: (a) they are market-oriented and need not rely on assignment of projects, but can more easily look for work in the marketplace; (b) their management has more flexibility with respect to size and workers benefits of the unit; and (c) they are largely motivated by self-interest because the team's profit is firmly linked to the staff members' income and benefit. Their output quality, however, is relatively poor, and the professional and managerial levels are lower than those of the SOEs. They need modern construction technology, better equipment, proper credit, and more-educated personnel to improve their quality of construction. The Rural Construction Teams which previously were the main source of labour force, are increasingly taking on more construction works.

6 Foreign Contractors. Any foreign contractors wishing to enter China's CI must be approved by MC and concerned municipalities. Up to now, MC and municipal governments have given licenses to 118 foreign contractors who have implemented about 140 construction projects.

7 Design Institutes. China has a well established system of design institutes. In 1994, nearly 10,250 design institutes employed 752,000 employees, double that of 1990. About 44% of the employment in this field is under the administration of line ministries, the rest is managed by municipal governments.

Participants in Tianmen Square: Hazel Studstill (USA), Faridah Shafia (Malaysia) and Kim Stanley.

8 Supervision and engineering consultants. The need to develop construction supervision capacity was felt once contracts started to be awarded to "outside" contractors. In the early 1990s, about 400 supervision companies were established and approved by MC and the Ministry of Personnel which employed about 7000 engineers. In 1994, the approved supervision agencies numbered 1,383 and employed 71,000 staff. Some of these new companies are off shoots of ministries and design institutes as the latter had to reduce their respective work force. Engineering consulting is a new and fast growing field in China. While design institutes had done some consulting work in the past, they were not called consultants.

9 Associations. There are two types of associations -- contractor's associations that deal mainly with the government to improve the CI and to protect their vested interests, and the academic organizations that promote academic and technical exchanges. The second type is very common in China: presently several national academic societies and many provincial or sector level societies are involved in civil engineering and architecture. Contractor's associations are somewhat new in China. The International Construction Association was established in 1988 to protect the interests and rights of the member enterprises. The China Construction Association, an association crossing all sectors and regions, was established recently.

A well filled Conference Hall.

3.10 Construction Equipment. Construction equipment is generally considered to be a weak link in the CI in China. Enterprises mostly own their equipment; leasing or rental facilities are minimal. In general, the available equipment is old and out dated; much of which is not fully utilized and at times poses a heavy burden to the enterprises. Although about 30% of construction equipment is currently deemed old and out-of-date, it must still be used because the enterprises lack money to buy new equipment.

3.11 Construction Material. Construction material generally accounts for 60% of total construction costs. Every year, China's CI consumes 20-30% of the country's total steel production, 70% of cement, 40% of timber, 70% of glass, 50% of paint and 25% of plastic products. Even though the state planning of building materials production and supply through the quota system, has reduced significantly in the last decade overall, about 50% of building materials are still produced and supplied through the State Plan system mostly for large projects. Currently, cement and plate glass are the two main building materials covered heavily under the quota system. Building material prices, previously controlled by the State have mostly been liberalized according to the market, but given the transitory nature of the price reforms, a rational price structure is yet to develop. Building materials are consuming a huge amount of raw material resources. China is an intensive user of raw materials and transport system compared even to other developing countries.

IV. The Business Environment for the CI

4.1 The Legal Framework. China has not had a unified construction law in the past, but one is under preparation and is expected to be issued soon. The proposed **Construction Law** will hopefully cover such topics as qualifications for entrance into the CI, contracts among different sections, quality of construction, investment benefits, market regulations, and procedures in construction projects. The new law will unify existing regulations issued from different sources and govern all activities in the CI.

4.2 The Regulatory Frameworks. A number of regulations have been issued over time by MC and other line ministries on qualification of contractors, design specifications, competition etc. These regulations are available from the China Construction Regulations Compilation published by MC every two years. One of the more successful regulations has been on the qualification for the contractors and design institutes. MC has the right to approve the qualification level of contractor and design institute. Each project, depending upon its nature, will require a certain level of contractor qualification to work on it. Design and construction specifications are usually prepared and issued by the line ministries for their respective sectors.

The responsibility for assuring the quality of the works also rests with respective ministries or local agencies. Each municipality now has a quality control office to monitor the works quality in accordance with the specifications. There is an elaborate system for establishing unit prices and inflation factors in China. There are offices called Quota Stations in most cities and line ministries to revise the quota (unit prices and adjustment factors) periodically -- usually, half yearly or annually.

4.3 Qualifications. Starting in 1989, MC has successfully issued service regulations on the qualifications for administration of construction enterprises, design institutes, and supervision agencies. With the assistance of line ministries and local governments, MC has evaluated all construction enterprises and classified them into five categories according to the requirements of various sectors. This rating system is generally working well to provide a basis for pre-qualifications of contractors for different types of projects. The same kind of qualifications have been applied to the design institutes, supervisors and others.

The Conference Panel:

Daud Ahmad (World Bank) Mao Rubai (Vice Minister of Ministry of Construction, China) Shin Okamoto (Vice President) Wim Bakens (CIB Secretary General) R. Wayne Drummond (UF, USA) and Weilin P. Chang (UF, USA).

4.4 Competitive Bidding. Since 1984, China has been pursuing project bidding for contracts. Currently all 29 provinces, cities and autonomous regions are using bidding for contracts to varying degrees. In the line ministries, bidding process is now used extensively; in the Ministry of Communication about 80% of highway projects and all water transport projects are being awarded through bidding. The Ministry of Railways has also started to use bidding in its infrastructure contracts.

Despite the progress mentioned above, the system for competitive bidding is not yet fully established, and needs further improvements. The main obstacle to competitive bidding in China is the old culture where jobs were assigned. Today one witnesses a combination of bidding and assignment taking place at the same time in what may be called 'partial bidding', if there is such a thing. Another constraining factor is the lack of separation in the respective roles of the "owner", the "engineer" and the "contractor", without which true competitive bidding is not possible. Bidding documents, procurement procedures, and qualification requirements for construction enterprises and design institutes are not standardized, and ambiguous in some cases. A new Bidding Law is under preparation which should help remove some of the difficulties.

4.5 Quality Control. Construction quality is recognized as a critical problem in China: everyone talks about it. According to the China Building Industry Yearbook, about 80% of the construction undertaken in 1994 was rated as acceptable quality. Quality of construction undertaken by line ministries is generally better than that of provincial enterprises, and the quality of construction by SOEs is considered to be much better than that of the urban and rural collectives. The quality of work done by rural construction teams is the weakest, with associated waste of the construction material. The reasons for low quality of construction range from poor designs, materials, weak management, ambitious completion targets and lack of worker skills etc. Improving quality of construction is one of the major challenges facing China's CI today.

4.6 Tax Framework. The basic tax obligations of the construction industry are stipulated in the state finance and tax regulations. Varieties of taxes and fees are applicable which are separated into engineering construction and management taxes, as well as national and local taxes and fees. The major applicable tax categories are: income tax; operation tax; value added tax; urban construction/maintenance tax; house tax; land usage tax; etc. The tax rates vary within sectors and locations and could be heavy in some cases. Usually the various taxes and fees for a typical civil contract could add up to 20-30% for urban public utility fee and 10-20% for taxes and local fees.

4.7 Construction Credit Financing. Availability of construction credit, or the lack of it, is another major constraint in China. While a number of established Banks like the Construction Bank of China and the State Development Bank are in the business of project financing, this facility is generally available to large national projects only. Short term financing is sometimes available to construction enterprises from local banks, but the terms are usually expensive. Most enterprises, therefore, operate without access to credit facilities. There are several major issues related to the financial aspects of CI: (i) available working capital for construction is rather low - in 1984, construction working capital accounted for about 18% of construction gross output value; recently this figure has declined to about 8-10%. (ii) Contractors usually face serious arrears in payments mainly due to shortage of available funds with the project entity, even at an early stage of implementation.

Today, construction triangular debt accounts for a large portion of China's total triangular debt. (iii) Available investment funds based on initial cost estimates are usually insufficient. According to recent research in construction projects, about half lacked adequate financing at the time of budget approval. (iv) The system of advanced payments to the contractor is weak. It is important that China improves the financial aspects of contracting by improving the payment system to the contractor and also making construction financing more easily available.

4.8 Human Resource Development. Whereas the contractual, responsibility system has developed rapidly, the corresponding development of managerial skills has not taken place. Construction management is still considered to be a serious problem in China.

On the other hand, profit motivation is so strong that most enterprises work with short term goals. The past system of management still largely affects current construction practices. Serious consideration has not been given by the construction enterprises and design institutes to training. MC has been trying for a number of years to put in place a national programme for different aspects of the construction industry, but the task is daunting. This should be a high priority for China to train project owners, engineers,

managers, technicians and workers alike to perform more effectively in a changing industry environment.

V. The Challenges Ahead

5.1 Reforms in the CI are very difficult, particularly since CI is not a single sector. Many government agencies are involved in regulating the CI and managing construction activities. It is therefore difficult for the CI to cast off often conflicting requirements from various ministries and government agencies in order to realize its potential for effective operation. The MC is not yet in a position to act as the lead agency to coordinate the construction activities in various sectors. While significant progress has been made during the last decade in commercialization of the CIs, the reform process by its very nature is not systematic and a number of conflicting/confusing legal issues still exist.

5.2 The **Key Challenges** faced by China's CI are summarized below.

1. Improve the quality of construction. In the past, trying to find projects and completing them without cost overrun was the main concerns of all involved parties, and the quality of construction was often compromised. A number of quality control requirements have been introduced lately, including a recently approved 'Quality Promoting Outline' issued by the Prime Minister to improve the production quality, construction quality and services quality. The outline programme covers measures to strengthen or improve quality consciousness. It is hoped that enhanced government attention would improve the construction quality.

- Improve supporting environment for the CI. This includes the following aspects:

a) The existing regulatory framework is incomplete and the legitimate interests of the enterprises cannot be protected. The ability of construction associations to improve the CI is limited.

b) The respective roles of the "employer", the "engineer", and the "contractor" need to be defined and separated. Current overlapping in the roles of owner, contractor, and engineer in government hampers the development of competitive bidding and effective contract management. The required separation in roles will require extensive training programmes.

c) China needs to establish and clarify the internal procedures for the bidding process and standardize the bidding documents and contract agreements to the extent possible. It is hoped that the proposed Bidding Law would help achieve these objectives.

d) The many constraints on the financial aspects need to be addressed. This includes the difficulties in obtaining construction finance, funding shortages, slow payments to contractors, numerous and at times heavy taxes, etc.

e) There is an urgent need to establish an effective mechanism through which construction equipment is made available to contractors.

f) The production and supply system of construction materials needs urgent improvements. The role of the government needs to shift from one of producer/supplier to that of regulator and quality monitor.

g) China's needs for human resource development for the CI are massive. The educational and training needs to produce managers, engineers, technicians and workers are increasing due to growing volume of CI and the rapidly changing business environment, and,

h) The government needs to re-evaluate the present quota system through which construction prices, adjustment factors and profit margins are determined and make this system more market oriented.

2. **Enhance China CI role in international business.** For China to attain a reasonable share of the international market, it has to overcome its domestic quality issues through intensified training of skilled

workers and managers. China could also further open its domestic market to foreign contractors, so that the Chinese contractors could benefit from the experience of competition with foreign contractors at home while availing the "home field advantage".

