

Feng Guo, Tian Huang

# Study on System Coupling Interaction of Large-Scale Construction Companies Programme Contracting and Firm Growth

**Abstract** Constant changes in the construction market have resulted in individual projects being challenged to meet the long-term growth needs of large construction companies. Change should be based on the construction of this new model project group, to achieve better interaction, and to allow for a more rapid enterprise development. This paper is based on the system coupling analysis of large-scale construction enterprises and construction projects. A clear system presents itself and forms the basis of the system construction, institutional change and mechanism of the path between base construction projects and business growth.

**Keywords:** large construction companies, programme contracting, firm growth, coupling interaction, system

## 1 Introduction

At present, China's economic development is in a steady rise. In an effort to promote the "second five" development planning process on urban construction, a large number of urban residential housing, commercial facilities and construction of necessary infrastructure are appearing nationwide. Industrial land and urban transport infrastructure also maintain a relatively strong construction pace. National statistics show that in 2014 the total investment in construction amounted to  $968 \times 10^9$  CNY, an increase of 11.1% over the previous year. New projects were tracking a total investment of  $40.3478 \times 10^{12}$  CNY — up by 13.6%. The number of new projects was 415,482, representing an increase of 53,199 in 2013 (National Bureau of Statistics of People's Republic of China, 2015). China's large construction companies in this good momentum of China's

economy played an important role in promoting its share of the 2014 GDP with a commanding  $63.6463 \times 10^{12}$  CNY, of which the national construction industry output represented 7% of China's GDP, and real estate maintaining a strong 6%.

With the continuous progress of urbanization, China's large construction companies are facing long-term changes in the market environment, presenting both opportunity and challenge. The current single-mode requires the construction of large-scale construction project management and project construction companies to remain as two separate layers — a condition which has been unable to meet the needs of business growth. To undertake a project, maximizing overall efficiency, and to maintain sustainable development, large construction companies must reconsider what a good project construction group must do to deliver overall success.

The concept and development of coupling interaction, a means of attaining such success and sustainability, is the result of both experience and observation at the project group level.

Currently, the program management theory in the field of large-scale construction enterprises growth has yet to be deepened to the bottom of the existing problem. From the existing research institutes and literature, the large-scale construction scholars group rarely mentions the program and coupling interaction between business growth and large-scale construction project construction group, leaving a large research gap. The following areas, presented in a multi-module concept involving resources, knowledge management and an overall system module will provide a means of further understanding Coupling Interaction. The system module contains the formal and informal systems of two sub-modules.

## 2 Large construction firm growth and system

Large construction companies, in order to legally operate,

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Feng Guo (✉), Tian Huang  
School of Civil Engineering, Central South University, Changsha 410083, China  
Email: gf8785@126.com

must meet with China's Construction Enterprise Qualification Standards. Strict requirements involving civil engineering, construction, equipment installation, pipe-line engineering and renovation construction must be maintained. In addition, the "Construction Enterprise Qualification Standards" demand that enterprises maintain a registered capital of  $3 \times 10^9$  CNY and net assets of more than  $360 \times 10^6$ , nearly three times the average annual income of  $1.5 \times 10^9$  CNY.

Sun (2010) noted that business growth is an imbalance in the balance of the process, from the size, market, resources, region, financing, management ability, entrepreneurship, and, mental strength. In the environment of these eight systems in simultaneous operation, every enterprise will experience imbalances when jumping to a new level. In large construction companies, quantitative and qualitative change are embodied in two aspects: quantitative refers to the construction companies on a business scale, the number of new construction projects, the total assets, expansion and increase in overseas markets; qualitative change refers to the change in corporate structure, management concepts, changes in resource allocation, regime change and evolution. Quantitative triggers qualitative. Qualitative reacts and adjusts. Large construction companies' group construction project is actually a process of knowledge accumulation, positively affecting the evolution of the enterprise system.

North (2008) was the first person who defined the concept of the system, pointing out that the system is a composed interaction of political, economic and social enforcement of human design, forced into informal (social taboos, customs, cultural traditions and behavioral practices) and formal regulations (property, statute, regulation, etc.). Large construction companies in the construction process for a single project face a relatively static informal system and a well-developed formal system. With eight major companies operating competitively under this system, the balance is not as easily broken. If the construction business, in order to pursue the maximum benefit under the existing institutional structure, fails to meet the requirements of the situation, then it must find induced factors for institutional change (Guo & Liu, 2011).

### 3 Programme and the system

Project groups are the groupings or the collections of a series of subprojects of construction companies undertaken in a certain period of time, sorted on the bases of the objective measurements of their circumstances. There are some connections between these subprojects conducted successively or at the same time, and they are the choices made by construction enterprises after they have determined their development strategies. The set of "project groups" in this research is not taken in a general sense as

that in the view of some few owners of the projects, but in a more pluralistic sense, in the perspectives of a variety of owners. The project groups of large-scale construction enterprises are usually divided into homogeneous groups (see housing construction projects or railway projects as an individual) and heterogeneous project groups (see housing construction projects and railway projects as one entirety).

The subprojects of the project groups help to achieve the overall growth of large-scale construction services, and therefore in the management process, each subproject may use the same set of constraints management. This brings large construction companies a new management concept. Liu (2011) concludes that the program management activities should be coordinated to protect all sub-organizations, to avoid the scarcity of resources, in keeping with corporate strategic objectives and program management.

When selecting the project group from within the system, large construction companies need to consider developing their own system for the project group and to promote the project group rather than restricting its development in its growing role. The construction of the project group is a long-term process. As a project group guideline, each sub-project's mutual contacts, resources, and funds can be flexibly utilized as long as it meets with the sub-system characteristics and the overall objectives.

## 4 Programme and firm growth system module: double coupling interaction analysis

### 4.1 Coupling connotation

The phrase "coupling interaction" comes from the field of physics and refers to the similarity of the two having a static and dynamic interactive system. It has been found that the formal system and the informal system must be integrated with each other and promote each other. Otherwise the system will produce severe deformation, reducing the stability of the entire enterprise and existing markets and threatening the program as a whole.

### 4.2 System module coupling interaction process

The program and firm growth system coupled interaction process, shown here in *Figure 1*, includes the construction group and project group homogeneity and heterogeneity of the project. For example, large construction companies using the scanning system, hope to achieve an effective feedback system.

Communications and interoperability between system sub-projects are built on the same overall strategic objective basis. System diagnostics debugging runs through a large group of construction companies in their choice of projects, organization, implementation and

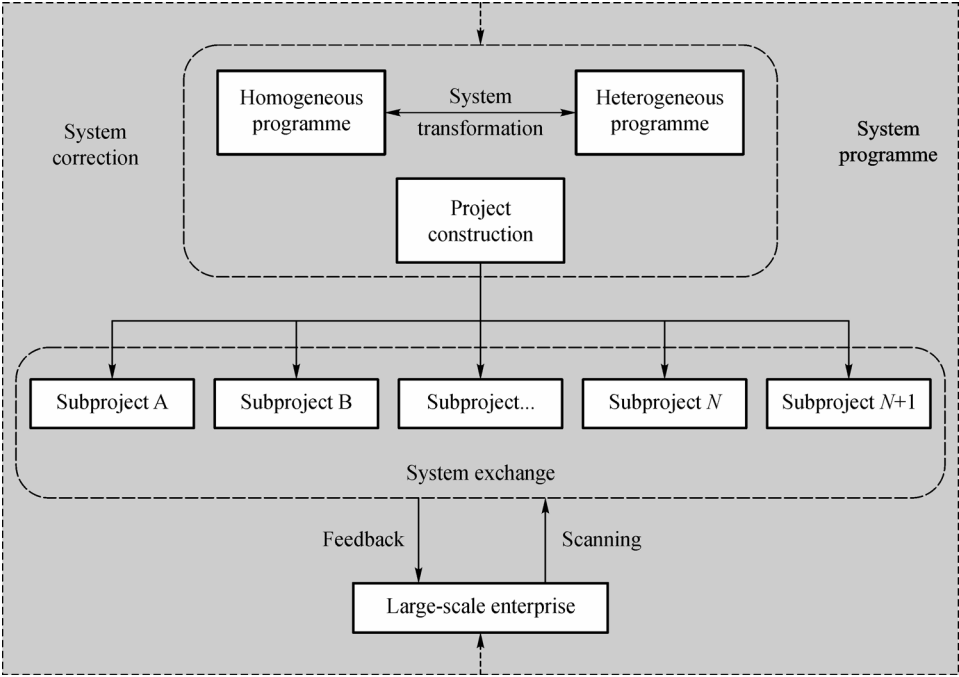


Figure 1. Programme and business growth coupled interaction process.

evaluation processes. The use of data generated in these processes is useful in order to evaluate the situation and in turn optimize the enterprise system.

4.3 Programme construction business growth coupled with the mechanism of interaction

Large construction companies group their projects under construction, with such coupling mechanism of interaction and such flow of positive effects upon their growth caused

by the program as presented here in Figure 2.

(1) During the period of construction, relying on group construction can effectively reduce transaction costs, while enabling the convergence of individual rationality and collective rationality. Williamson believes that transaction costs are mainly influenced by two factors, one factor of participants that measure human rights and abide by human rights; the second are bad environment factors, notably the social environment, cultural environment, and, economic environmental impact. In business, when these two aspects

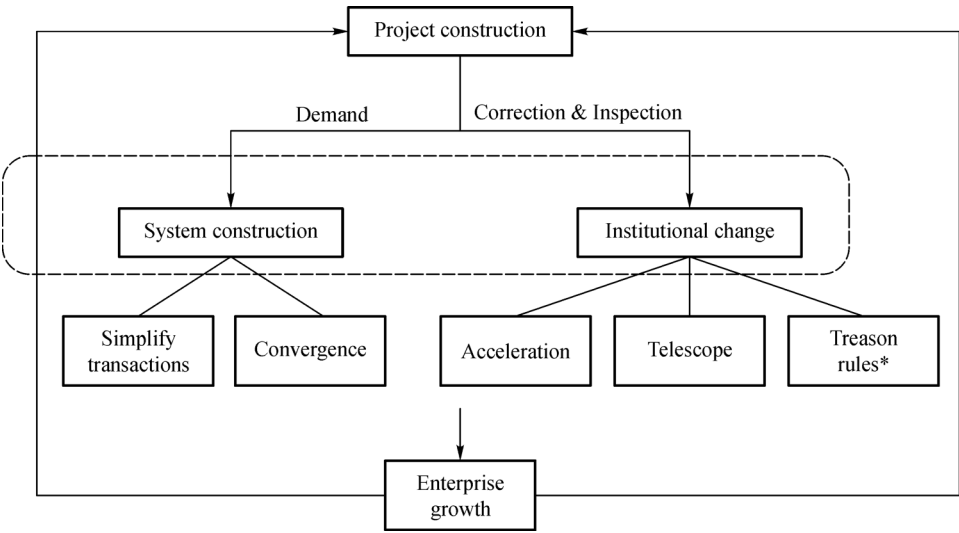


Figure 2. Programme and firm growth system level diagram. \*Treason against the law is when construction’s spirit of enterprise and social customs or habits (or both) are inconsistent with the overall benefits of the project. It’s reasonable to avoid the business growth process in light of the risks involved.

are not present, the balance of rights and obligations is jeopardized. Relying on the characteristics of the system program is often more effective, because the select group of projects reflects the overall strategic objectives of the enterprise to achieve business growth. After business growth we will have a larger market, more funds, and greater resources. The realization of the project group quality, scheduling, and increased customer satisfaction will have played a role in promoting healthy conditions.

(2) Phase coupling interaction mechanisms of institutional change can be analyzed using game theory. There were rational discussions of the mechanism of evolutionary game theory to business growth. Program construction as a building contractor business is not only a trend in today's construction market environment, but also a guide for institutional change and direction of the enterprise. Treason against the law in this case is when construction enterprise spirit and social customs or habits (or both) are inconsistent with the overall benefits of the project. Finally, it's reasonable to avoid the business growth process in light of the potential risks.

## 5 Conclusions

(1) Large construction companies should be clear about their own strategic goals. The programme contracting to form a good coupling interaction can promote the growth of large-scale construction enterprises.

(2) Large construction companies should seek to

maximize the benefits in the process by paying attention to the formation of the project group. By playing a role in inducements, program construction can effectively reduce transaction costs and achieve quantitative and qualitative changes.

(3) In the coupling interaction, scanning systems, feedback and transformation promote business growth allowing the project construction group an important achievement in the process.

(4) Large construction companies group construction projects are of great practical significance. Coupling with an interactive enterprise system can provide a guiding role in the development of large construction companies.

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