

# Analysis on the governance structure of large-scale AEC project transaction

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As there exist numerous problems in institution, mechanism and organization aspects of large-scale AEC projects, this paper, starting from the relationship between transaction classification and contract structure, aims at further discussing on the governance structure of projects transaction by economics paradigm. The cost of project transaction and the accommodation of responsibilities and interests among stakeholders are put in first place. Based on the analysis of driving factors and construction characteristics, a double-level governance structure framework of large-scale AEC projects is initially built, which is composed of unified governance inside government and trilateral governance among legal persons. Then the project governance structure of Shanghai Hongqiao Integrated Transportation Hub (SHITH) is taken as an example for empirical analysis.

**Keywords: Transaction Cost, Large-scale AEC Projects, Governance Structure Framework**

## 1. Introduction

The large construction projects have shown numerous characteristics, such as large-scale investment, long-term duration, complicated techniques and uncertain risk with many stakeholders involved. Traditionally, it is common that scholars always pay more attention to management paradigm about AEC project, namely the one that is focused on the quality, duration and cost to improve the life-cycle performance of project organization through the enhancement of project management techniques and optimization of management methodology. However, many phenomena, such as the disorder of monitoring and multiple institution setting in government organization, as well as the unclear obligation of legal persons and uncertain regulation in contracts, have gradually been aware of during the implementation of construction practice. All of those lead to non-rational allocation of power, responsibility and interest among stakeholders, followed by participant corruption, environmental damage and social conflicts, finally the negative externality of the whole project gradually come into being. Therefore, it has gradually been a mainstream to take the

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project as a temporary organization from the perspective of economics paradigm, which, concentrating on the transaction cost as well as the disposal of responsibility and right in joint organization, makes a firm combination between contract classification and governance structure according to different transaction.

## **2. Governance Review**

The concept of 'governance' not only contains the control of national macroeconomic policies and regulations, but also includes the collaboration and continuous improvement in project organization at the micro realm. Therefore different social stratum has different views of governance. The Commission on Global Governance (1995) made a standard definition of global governance starting that 'Governance is the sum of many ways individuals and institutions, public and private, manage their common affairs. It is a continuing process through which conflicting or diverse interests may be accommodated and co-operative action taken', which includes formal and informal institutions and regimes. R.A.W. Rhodes (1996) integrated all the meanings and then summarized six separate definitions of governance, those are: as the minimal state to reduce the expenditure and cost in managerial activities; as corporate governance to guide, control and supervise the operation of organization; as the new public management to introduce incentive structures into public provision and private sector management methods; as a socio-cybernetic system to cooperate and interact between governmental and non-governmental organization, between public and private sectors; as the good governance emphasizing on efficiency, legislation and responsibility of public service system; as the self-organizing networks on the basis of mutual trust and benefit. Rhodes initially summarized all the realm of governance, starting to refine the connotation and its denotation systematically.

Recently, it can be illustrated that the governance basically exists in the form of a temporary organization in company. The traditional project theory emphasizes the project management techniques to improve the workflows, while modern project theory goes to the other perspective which regard the project as a contract organization. Turner (2003) clearly defined the project as a temporary organization to which resources are assigned to undertake a unique, novel and transient endeavour managing the inherent uncertainty and need for integration in order to deliver beneficial objectives of change.

It could be understood that the definition vary as different views of research perspectives and theoretical principle. Up to now, researching on the project governance developed into the following two levels: corporate governance and project governance. Association for Project Management (APM)(2004,2007), Klakegg et al(2008) paid attention to corporate governance, describing the governance of project management should be attributed to the board of directors rather than the project management activities in temporary contract organization. Government and company should define the right project, program and portfolio, supporting the means by which the board and other major project stakeholders are provided with timely, relevant, and reliable information to achieve strategic goal. When it comes to multi-owners, the mechanism of decision-making and reporting arrangements should be established and each owner can be assured that its reasonable stewardship responsibilities will be met. Many scholars and institutes like Turner(2006), Project

Management Institute(PMI)(2008) and The Office of Government Commerce (OGC) (2007) focused on the levels of project governance and pointed out that project governance involves a set of relationships between the project's management, its sponsor(or executive board),its owner, and other stakeholders according to the view of temporary organization. It provides the structure through which the objectives of project are set, and the means of attaining those objectives and monitoring performance are determined. Finally it ensures a project is completed as plan and that its ultimate objectives or benefits are delivered.

Additionally, Winch(1989) introduced the transaction cost into AEC project and company, stating the construction projects are merely temporary coalitions among different companies with diverse vision resulting to distinct socio-economical benefits. Then a conceptual framework was set up (2001) throughout the project lifecycle for understanding the governance of AEC project process, drawing on transaction cost economics, which is widely studied by a scholar named Williamson. At the same time, Turner(2001) described governance structures adopted by successful project-based organizations, and how they use them to manage the interface between projects and their clients. Two roles were observed at the interface, labelled the broker and steward. The necessities of those two roles were raised, finding that the governance structure should match with the complexity of project transaction, otherwise the transaction cost will inevitably be increased, which demonstrated a stark contrast between the classically managed organization and project-based organization. Lee(2009) showed that transaction cost incurred by general contractors and sub-contractors varied according to the type of relationship established. Then the model of transaction-cost-based profit was used in both competitive and partnership relationships, simulating the parameters affecting the nature of the sub-contracted work. Finally the conditions and relationships under which general contractors' profits were optimized have been determined. Zerjav(2012) applied the concept of asset specificity to process-level design and engineering knowledge and induced a theoretical framework on the basis of local and expertise specificity of assets, explaining the different specificity lead to different modes for intra-firm governance of work packages in design and engineering. Therefore, many scholars have been aware of the importance by studying on the topic of transaction cost in project governance from economic perspective.

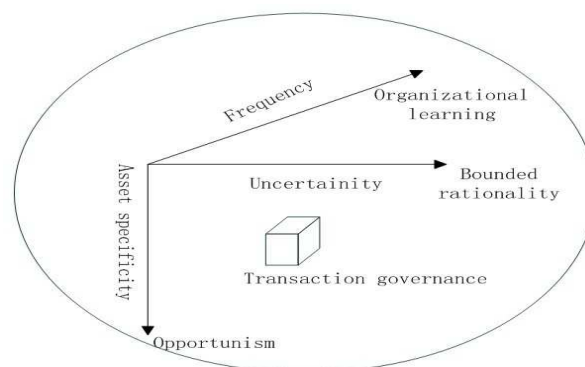
The paper comes up with the general concept of project governance on the basis of literature review. Unsurprisingly, it's a continuing improving process in the specific institutional context of a temporary contracting organization, which can be assured that its reasonable organization structure and vertical integration will be matched. Meanwhile, aiming at effectively control of transaction cost, it ensures a project completed in accordance with plan from clear coordination of responsibility and benefits among stakeholders and that its social and economical effectiveness is ultimately delivered. Also, the paper analyzes the relationship between transaction type and contracting classifications from transaction cost theory, and at the same time, a framework of double-level governance structure which is suitable for large-scale AEC project under DBB is initially proposed, that is unified governance inside government and trilateral governance among legal persons. Finally the transaction of ex post control and dispute settlement mechanism of previous structure were explained, which has been widely and practically implemented in project management.

### 3. Relation among Transaction, Contract and Governance

Commons (1934) put three principals of social relationship about conflict, mutuality and order together, regarding that the transaction is not the production exchange, but the ownership transference among human beings. A transaction from the idea of Williamson (1985) occurs when a good or service is transferred across a technologically separable interface. One stage of activity terminates and another begins. The theory of transaction cost do its efforts on the market, hierarchy, and hybrids to be well adapted to the cost and benefit in different institutional contexts, giving a static framework to economical organization, which is the prerequisite for a company in decision-making about whether to implement the vertical integration or not.

#### 3.1 Factors of Transaction Cost

The economics of production focuses on the driving factors of transaction cost. More specifically, it contains three elements, which are contingency factors, behavioural factors and context. Contingency factors are the features of transaction composed of uncertainty, frequency and asset specificity. Behavioural factors are the ways in which managers typically respond to previous features, namely bounded rationality, learning and opportunism, respectively. The last is the institutional context within which the transaction is embedded, which in turn is situated within the broader national socio-cultural context. The framework is presented in Figure 1.



**Figure 1: The transaction governance framework (Winch, 2001)**

#### 3.2 Matching Transaction, Contract Classification and Governance Structure

A two-by-three matrix was proposed by Williamson(1985), which described six classifications of transaction to which governance structures must be matched. The relationship between asset specificity and frequency on the premise that uncertainty is well known is summarized and is presented in sufficient degree to pose an adaptive, sequential decision requirement.

Three contract classifications including classical contracting, neoclassical contracting and relational contracting were put forward. The rights and responsibilities of classical contract are accurately measured, with both emphasizing on the punishment and claim of contract breach instead of long-term maintenance of contract. Without third-party intervening, the

emphasis of classical contracting is therefore on legal rules, formal documents, and self-liquidating transactions, which is suitable for standard transaction. Neoclassical contracting shows preference to long-term contract relation, emphasizing on the establishment of regulation with third-party and developing a more flexible contract mechanism. It is suitable for occasional transaction of mixed and idiosyncratic investment. Rational contracting may or may not include an 'original agreement', it only gives a brief introduction of contract framework. Rational contracting has no details about the contract arrangement, it only contains overall goals, adaptive principle, contingency handler and dispute mechanism, which is suitable for mixed, idiosyncratic recurrent transaction.

Compared with transaction governance based on contract theory, transaction cost theory deals with issues from the perspective of organization theory. The different classifications of transaction are selected by specific governance structure, with the preference on ex post governance, certain relationship gradually occurs. The classical contracting is similar to market governance, while neoclassical contracting is relate to trilateral governance and rational contracting will be organized in bilateral or unified governance. The inter-relationship is illustrated in Table 1.

**Table 1: Match of Governance Structures with Transaction and Contract Classifications (Williamson, 1985)**

|           |            | Investment Characteristics                       |   |                       |
|-----------|------------|--|---|-----------------------|
|           |            | nonspecific                                      | mixed   | idiosyncratic         |
| Frequency | occasional | Market Governance<br><br>(classical contracting) | trilateral governance<br>(neoclassical contracting)   |                       |
|           | recurrent  |  | Bilateral<br>Governance<br><br>(Rational contracting) | Unified<br>Governance |

### 3.2.1 Market Governance

As for recurrent non-specific transactions, whether to maintain original relationships or start with new partners, who are easy to find at lower transaction cost, could be decided by their previous experience. But when it comes to occasional non-specific transaction, although the opportunism could not be avoided from their experience, it is worth learning from the other buyers in purchasing similar products, as those products have higher standardization.

### 3.2.2 Trilateral Governance

Mixed and idiosyncratic of occasional transactions, to a certain extent, are related to trilateral governance. Because those transactions refer to specific investment, so they are hard to transfer into other applications or the transaction cost is a little bit higher, meanwhile, it is difficult to solve under market governance. Whereas, the establishment of special governance structure as for lower frequency is so hard to get compensation that an intermediate institutional situation is needed under trilateral governance, which is similar to neoclassical contracting and should rely on the third party to cope with certain affairs.

### **3.2.3 Special Governance**

Special governance structure is raised in the mixed and idiosyncratic of recurrent transactions. The demonstration of 'fundamental transformation' is more prominent owing to the characteristics of nonstandard. It contains bilateral governance and unified governance.

The characteristics of bilateral governance are to keep the rights of self-determination. Not all the assets have superior specificity to mixed and recurrent transaction, so it is conducive to achieve scale economy when purchased outside the organization. Compared with vertical integration, outside purchasing could get away from bureaucracy among organization and keep stronger motivation among stakeholders. Absolutely, Market purchase will face with the problem of adaptability and the signing of contract fee. When the adaptability is proposed, the clause of mutual trust should be made to ensure the contract revised to a certain degree.

Unified governance is operated inside a company without market intervention. The higher asset specificity is, the more specialization and individualization of human and materials value will be. The selection of organization mode has different adaptive influence over asset specificity in order to achieve scale economy. Vertical integration could unite the whole proprietary rights from price mechanism in market rather than using administrative method to operate, which could ultimately avoid the existence of temporary agreement to be continuous searched, designed and revised. Compared with bilateral governance, the vertical integration could thoroughly make the price and quantity transformable, thus achieving the maximization of overall transaction benefits. Additionally, the unified governance has certain advantages on supervision and inspection. However, with the emergence of complexity, the 'Management of diminishing benefit' resulted from information distortion is inevitable on arrival and the 'firm boundary' is particular outstanding at the same time. Lazy behaviour will gradually accrue without effective supervision.

## **4. Transaction Governance in Large-scale AEC Project**

### **4.1 Governance structure under DBB project management mode**

Nowadays, the transaction in construction project has comparatively higher asset specificity and lower frequency, so it refers to neoclassical contracting, which is adapted to trilateral governance. As more innovation and practice are involved in rapid development of real project, trilateral governance has different demonstration under different project management styles. A typical project management mode named DBB is introduced, followed with the analysis of ex post control of contract and dispute solution mechanism.

Consulting or designing company are always entrusted by owner responsible for pre-phase work and assist them in construction bidding under DBB. Contractors provide design and construction proposals to owner and, at the same time, choose the appropriate sub-contractors and suppliers. During the whole process, the owner representative, general construction contractor and construction engineer (supervision group in China) are all responsible for quality, duration and cost. The status of engineer is prominent, who is the construction supervisor and contract manager with many rights to regulate owner and

contractor, such as contract explanation, variation request, construction claim dealing and contract price revision. From the perspective of transaction governance structure, the intervention of engineer has three functions. First is to diminish passive influence of bounded rationality over the transaction as the role of owner representative. Those owners sometimes are short of industrial knowledge and technical skills, therefore they hardly have the ability to reasonably and efficiently coordinate the relationship among variety of contractors. Second is to cope with variety of activities between owner and contractor to effectively solve conflicts and contradiction during the construction process, ensuring thorough benefits will be got by both parties as the contractual manager and pre-arbitrator. Third is to act on behalf of owner to monitor and manage contractors as the construction supervisor, making sure that all the goals are accomplished and the opportunism of contractors will be restrained to a large extent.

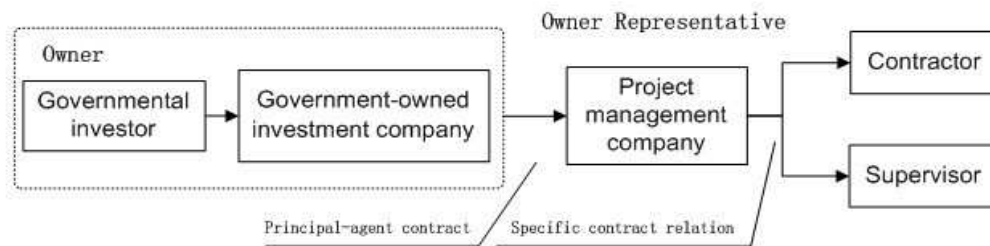
The information asymmetry obviously exists between owner and contractor during transaction, which poses a great challenge to ex post control including payment, risk control, and construction supervision. The contract relation between owner and contractor is on an equal basis under DBB with the engineer mainly delegated to supervise the process. Additionally, the well-directed clauses of FEDIC, such as the regulation of performance security, guarantee and retention money could efficiently get away from the contractor's opportunism. If any party is dissatisfied with solution, the issue would be resorted to Dispute Adjudication Board (DAB), who will handle it with the help of engineer. If the proposer still not be satisfied with the solution, the arbitration will get involved until it is ultimately solved.

#### **4.2 Principal-agent in AEC: Demonstration of Transaction under DBB**

The demonstration of transaction under DBB between owner and contractor varied on the basis of economical reform and unique construction management. From self-construction mode under planned economy, state-owned company mode and construction headquarters mode, gradually to widely spreading mode of principal-agent system nowadays, which has achieved remarkable effectiveness in practice. The specialized project management units are always chosen by authority through public bidding, and they are responsible for construction implementation from the control of investment, quality and duration, then delivering the production at the end of construction. During that time, the agent units fulfil the function of owner according to contract, while their rights and status depend on the degree of owner's authorization.

Large-scale AEC projects generally set up a project company or entrust government-owned investment company as the representative of governmental owner, who is responsible for managing the whole process of investment, loan repayment and facility operation. The project management company is always responsible for specialized work in construction management, thus forming the following management model, which is 'government-the government-owned investment company-construction management company'. The principal-agent relationship, at the same time, has changed from 'owner-contractor' to 'owner-owner representative -contractor' (Figure 2). It is found that there exist two levels of transaction, which are the one between owner and representative, and the other between representative and contractor. It not only has the characteristics of normal project governance about higher

asset specificity and greater uncertainty, but also makes them much more salient owing to complicated techniques, plenty of participators and highlighted schedule mission.



**Figure 2: Form of principal-agent**

#### 4.2.1 Asset specificity

Asset specificity is a level that one asset could be allocated to the other alternatives on the premise that other production value is not underestimated. It could not only induce complex ex ante motivation, but also arise ex post governance structure reaction. As for contractor, the fixity of a project in site selection results to site specificity of transaction, a variety of temporary facilities and machinery will gradually create production-site specificity owing to higher relocation costs after start-up. During the implementation of a project, physical asset specificity exists because of heavy demand of structural members, building materials, etc. Meanwhile, design concept and unique construction techniques varied according to different characteristics, leading to human asset specificity. As for owner, the most important factor is the duration of a project, because the financial evaluation, investment decision and force majeure etc. all have great influence over it.

Government often set up project legal person to meet the requirement of regulation in construction project. Therefore, compared with specialized company owner, such as real estate companies, the human material and financial resource are much simpler, which will lead to huge transfer cost. Additionally, many factors in large-scale project often have unique techniques and environmental requirements, leading to the asset specificity outstanding.

#### 4.2.2 Uncertainty

Uncertainty includes initial and secondary uncertainty. When it comes to AEC project transaction, certain consequences such as the critical information hidden by owner, the regulation broken by contractor, the coalition between contractors, equipment suppliers and other stakeholders are demonstrated obviously. Large-scale project has strong socio-economic influence, therefore project transaction suffers from higher initial uncertainty in the beginning. Meanwhile, stakeholders with different benefit requirements have communication disorders, which will enhance the secondary uncertainty and behaviour uncertainty.

#### 4.2.3 Frequency

Compared with continual industrial project, large-scale AEC project is government-oriented infrastructure with one-time characteristics. Owner is only responsible for construction and



operation, thus having lower frequency with contractor. Moreover, the implementation of vertical integration in order to reduce transaction cost seldom exists in the company.

#### 4.2.4 Fundamental transformation

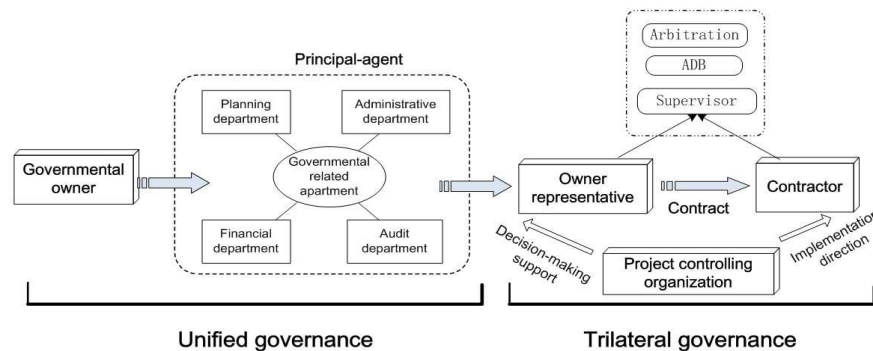
The contractor who is selected from previous bidding will establish dependent relationship with owner because of the continuous increasing asset specificity. The transformation of contractor will affect the process of construction and even result in the termination of transaction. So 'fundamental transformation' of transaction cost is particularly prominent during the project transaction. Selected contractors have advantage over previous competitors and then stand out from the original bidders, gradually transferring into bilateral dependence, which pose higher requirement to the transaction governance.

### 4.3 Governance Structure Framework of Large-scale AEC Project Transaction

As can be seen from previous statement, there are two levels of governance structure under principal-agent system. The governmental owner is the planning department or users. The owner representative is a special construction management center established by government, who are usually the institutions or government-owned investment company. The contractors are construction units selected from competitive bidding.

#### 4.3.1 Framework of Governance Structure

According to the characteristics of large-scale AEC project transaction and on the basis of relation between transaction and governance structure, a framework is built in Figure 3.



**Figure 3: Governance structure framework of large-scale AEC project transaction**

#### (1) Unified governance

Large-scale AEC project transaction has higher asset specificity, while government generally set up special construction management institutions to increase the frequency of transaction. Thus this kind of relation is suitable for unified governance structure.

The relation between representative and government investment institutions is inner principal-agent managed under the administrative regulations. Lower cost of principal-agent and the flexibility of operation is the advantage of intra-cooperation, which could adapt to

continuous transformation and seldom revise temporary agreement. Additionally, unified governance is good at supervising and it could effectively deal with 'diminishing benefits of management' resulted from information distortion owing to complicated hierarchical structure inside organization through ex post control mechanism, which also limits opportunism arise.

## (2) Trilateral governance

The transaction between owner representative and contractor is suitable for trilateral governance. The contractor generally uses construction management mode of DBB thereafter receiving a project. Trilateral governance is a mixed governance structure, which depends neither on administrative regulation, nor market rules to arbitrate.

Owner and contractor are independent units. Contractor usually gets more benefits through cost reducing by the improvement of construction technology. At the same time, it has special regulation about the rights and responsibilities of both parties by learning from standard contract regulations and project management practices, thus leading to well control and supervision of project in transaction. Besides, in order to maintain the continuity of contract in large-scale AEC project on dispute settlement, trilateral governance would rather formulate certain multi-level mechanism than directly resort to law court.

### **4.3.2 Ex post control**

Ex post control from owner to representative mainly relies on administration, financial approval, audit and inspection. Meanwhile, the control from representative to contractor should be carried out as the contract clause. According to the characteristics of project transaction, it could add 'milestone issues' of payment as the supplementation. As for the project with good final evaluation, we could draw up payment schedule, which could effectively avoid recurrent work of construction evaluating and calculating.

According to significant features on the progress of the target in large-scale AEC projects, it is particularly important to introduce project controlling organization, which will use processed information flows to direct or control material flows by collection, analysis and transmission of scheduling information. It will provide owner with integrated information management service to ensure the best decision-making during the whole process. While some practitioners may argue that the added project controlling organization will absolutely increase the supervision cost of transaction to a project, such an assumption is uneconomic and counterproductive. Others argued that the application of such organization in effective planning is always fruitful and that negative project outcomes such as cost and schedule overruns can be mitigated by increased emphasis on front-end controlling. Because the transaction cost induced from information asymmetry and opportunism is higher than the entrance cost of controlling organization from real practice.

### **4.3.3 Dispute Settlement Mechanism**

The dispute mostly arises between owner representative and contractor. Many methods of dispute settlement in trilateral governance structure are developed, including coordination of

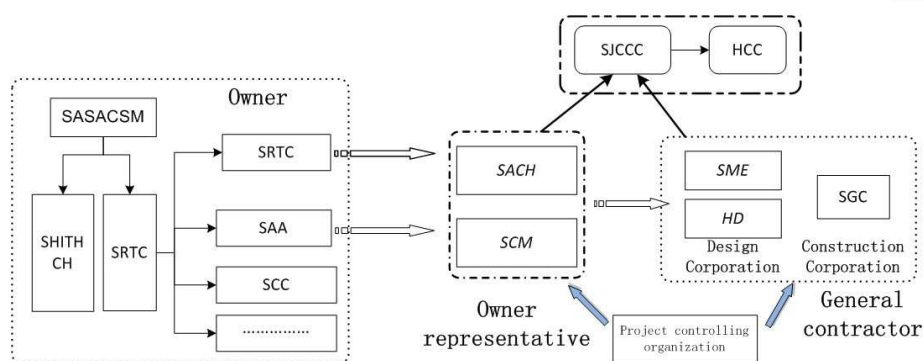
supervision, Alternative Dispute Resolution (ADR) and arbitration. ADR has many different forms, such as negotiation, conciliation, mini-trial, dispute review board (DRB) and dispute adjudication board (DAB). According to the different dispute situations among stakeholders, we usually consider solutions in economical viewpoint. Arbitration has dual attributes of contractual and judicial function. Those two sides accept solutions after arbitrating should give up previous lawsuit, any side is opposed to the settlement neither has right to resort to law court, nor could give proposal to other institutions for variation. Compared with ADR, the requirement is much stricter with longer time-consuming and higher cost. Therefore, this kind of dispute settlement mechanism is not highly cost effective.

## 5. Case study: Shanghai Hongqiao Integrated Transportation Hub

SHITH, one of biggest projects during the period of ‘the 11th five-year plan’ in Shanghai, is an important multi-functional infrastructure as the conveyance system of Shanghai Expo. It is an integration of different types of transportation, such as aviation, railway, maglev transportation, subway, highway, city bus, taxi, etc. It takes 13km<sup>2</sup> with a complex overall construction layout including eight project programs, twelve investment entities, over twenty operational entities and one hundred construction entities. Meanwhile, it also contains relevant infrastructures of office work and business service.

### 5.1 Project Governance Structure

SHITH construction headquarters (SHITHCH), the leading organization responsible for the overall planning and mission, is set up by relevant departments of municipal government (State-owned Assets Supervision and Administration Commission of Shanghai Municipal Government (SASACSM)). The related state-owned company or governmental departments are responsible for airport, magnetic levitation train, high-speed rail and subway in the core unit of SHITH, Shanghai Rainbow Investment Corporation (SRTC) is in charge of investment and coordination. Shanghai Airport Construction Headquarters (SACH) and Shanghai Construction Management Company (SCM) are commissioned by SRTC, being a project management company, executing professional construction management during the process. The unique governance structure is illustrated in Figure 4.



**Figure 4: Project governance structure of SHITH**

The relation between owner units (SRTC, Shanghai Airport Authority (SAA) and Shanghai Chengtuo Corporation (SCC)) and SACH (belonging to SAA) are inner principal-agent. Although SRTC and SAA are different legal entities, both are subsidiaries directly under Shanghai municipal government. Additionally, SAA is one of the three most important shareholders of SRTC, so the transaction relation is similar to unified governance. The problems come out from implementation were basically all solved from intra-communication and coordination, which decreased the transaction cost to a great extent.

The multi-level trilateral governance structure is established between owner representative (SACH and SCM, etc.) and other contractors. The owner representative contracted with Shanghai Municipal Engineering Design Institute (SME) to undertake the design management of the entire region, while the Hua Dong Design and Research Institute (HD) was responsible for the traffic center. Shanghai Construction Group Company (SGC) was chosen to take charge of the construction management of traffic center. Then owner representative selected Shanghai Jianke Construction Consulting Corporation (SJCCC) as the supervision group, who is responsible for the main project items, such as terminal, traffic center and maglev transportation station. As the supervision group has high quality and rich experience, they effectively reach an agreement between SACH and contractors, which reduce much cost and time. Meanwhile, if the dispute raised from real work could not be well solved by supervision group, High Coordination Committee (HCC) will act as the role of ADB in time to solve the dispute successfully. Owing to the effectively coordination between supervision group and higher committee, there were seldom disputes reaching the arbitration step.

## **5.2 Transaction Characteristics of Project**

As the project has short construction period with complicated techniques in interface, time inevitably becomes the most limited resource after contracting, which reflects the time specificity at larger. The process goals in construction could not allow any discontinuity or termination of transaction, meanwhile, the ex post control of transaction must be assured. At the same time, numerous asset, material and human resource are added during the implementation to face with continuous market change, the conflicts and interface problems from original uncertainty will inevitably occur and should be treated carefully.

SRTC, as a company consisted of governmental department members, invests, operates and manages this large-scale project. In general, the owner has bounded rationality because of the information asymmetry. The technology and management level is not better than specialized project management company in real practice, so project governance structure in the market situation is always chosen to motivate the owner representative through the limitation of contract's binding clause to maximize the benefits of owner's rights.

Meanwhile, opportunism behaviour among stakeholders always exists. It demonstrates some strategic opportunistic behaviours such as information hiding, camouflage and distortion. The project controlling office was set up, whose purpose is to search and sort out information to ensure fluent communication. When conflict and contradiction appear, the whole achievement and overall goals are always paid attention to get the Pareto effect.

Generally, contractor will not be changed after pre-bidding, otherwise the transaction cost will increase. 'Fundamental transformation' has been prominent, owing to the chosen contractor has advantage over competitors with the acceleration of asset specificity, ranging from the bidding status to bilateral dependency. The trust mechanism between owner representative and constructor is of vital importance to promote the fulfilment of partnership.

### **5.3 Analysis on the Transaction Cost**

The implementation of unified governance and bilateral governance has achieved certain effects from the real project practice. Much transaction cost in construction dispute has been settled down at ex post control through supervision and coordination, stemmed from construction and financial supervision Groups, as well as the fast intermediation from HCC. At the same time, the duration has unprecedentedly cut down compared to similar projects conducted in China, due to the reduction of transaction cost, leading to more efficient and effectiveness of daily work and multi-cooperation.

Absolutely, it is indispensable to supervise the process of construction due to the uncertainty of transaction and the presence of contractor' opportunism. In order to guarantee the construction mission, owner representative has many monitoring and coordination methods added besides the controlling of construction or financial supervision. The establishment of project controlling organization, who is responsible for the planning formulation and execution, tracking the workflow and realizing the project mission by macro and micro perspective. The schedule it focuses on is not limited to simple planning, it also involves the house demolition and relocation, design preparation and operation management. After accurate searching, processing and transferring information, it could assure in time feedback, thus reducing the transaction cost and risk derivation to a large extent.

## **6. Conclusion**

Through reasonable matching about the transaction characteristics, contract classification and governance structure, this paper has outlined the governance structure framework of large-scale AEC project transaction from the economic paradigm on the basis of transaction cost theory. It pointed out that the universal application of the large-scale AEC projects in China is the mechanism of unified governance inside government and trilateral governance between owners and contractors nowadays. Finally, the actual case of SHITH confirms its specific application process, and provides a unique perspective and method for the study of construction project governance. The implementation of double-level governance structure will more or less spread as AEC projects developed in the future.

## **References**

Association for Project Management (2004) Directing change: A guide to governance of project management, (available online <http://www.apm.org.uk/DirectingChange>)

Association for Project Management (2007) Co-directing change: A guide to the governance of multi-owned projects, (available online <http://www.apm.org.uk/CoDirectingChange>)

Commission on Global Governance(1995) *Our Global Neighborhood: Report of the Commission on Global Governance*, New York, Oxford University Press.

Commons, John R.(1934) *Institutional Economics*, Madison, University of Wisconsin Press.

Hyun-soo Lee (2009) "Transaction-cost-based selection of appropriate general contractor-subcontractor relationship type." *Journal of construction engineering and management* 12: 1232-1240.

J. Rodney Turner (2001) "Mechanisms of governance in the project-based organization: Roles of the broker and steward." *European Management Journal* 19(3): 254-267.

J. Rodney Turner, Ralf Muller (2003) "on the nature of the project as a temporary organization." *International Journal of Project Management* 21:1-8.

J. Rodney Turner(2006) "Towards a theory of project management: The nature of the project governance and project management." *International Journal of Project Management* 24(2):93-95.

Guangshe Jia, Guangbin Wang (2003) "study on project controlling model for the large AEC project in China." *China Civil Engineering Journal* 3: 7-10.

Klakegg, O.J., & Williams, T.,(2008) "Governance frameworks for public project development and estimation." *Project Management Journal* (3):S27-S42.

Macneil, L. R.(1978) "Contracts: Adjustments of long-term economic relations under classical, neoclassical, and relational contract law." *Northwestern University Law Review* 72: 854-906.

Office of Government Commerce (OGC)(2007) *Managing successful programmes-3rd Edition*, London, The Stationery Office.

O. E. Williamson(1985) *The Economic Institutions of Capitalism*, New York, Free Press.

O. E. Williamson(1996) *The Mechanism of Governance*, New York, Oxford University Press.

PMI(2008) *The Standard for Program Management-Edition 2*, Project Management Institute.

R.A.W. Rhodes(1996) "The new governance: governing without government." *Political Studies* 44(4):652-667.

Vedran Zerjav (2012) "Internal governance of design and engineering: The case of the multinational firm." *Journal of construction engineering and management* 1: 135-143.

Winch, G.M.( 2001) "Governing the project process: a conceptual framework." *Construction Management and Economics* 19: 799-808.