

COLLABORATIVE GOVERNANCE FOR LARGE AIRPORT TERMINAL RENOVATION & EXPANSION PROJECTS WITHOUT SUSPENDING AIR: A CASE STUDY

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ABSTRACT

As the important and close connection structure, large airport terminal acts as the key facility to protect and maintain the overall operation function of the whole airport system. According to the existing global service capabilities, the actual needs of the airline operations, as well as air traffic forecast data, more and more airport terminal renovation & expansion projects in developing countries need to be carried out in the condition without suspending air. As a complex nonlinear system, the complexity of the large airport terminal renovation & expansion projects is much higher than those of the general construction projects. It has the characteristics of complicated organization structure, inconsistent demands of different units, conflicting working interfaces, complicated information management and so on. Hence, how to achieve the collaborative construction and operation effect in the condition without suspending air is one of the most important issues concerned by practitioners and researchers in the field of airport project management. Taking the Shanghai Pudong International Airport Terminal 1 project as the example, this paper analyzes the collaborative governance framework for large airport terminal renovation & expansion projects in the complex condition without suspending air including objective collaboration, organizational collaboration, resource collaboration, information collaboration and process collaboration, collaborative management offices also established as a bridge between service governance system and construction governance system.

KEYWORDS

Collaborative governance, Large airport terminal, Renovation & expansion projects without suspending air.

1. INTRODUCTION

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Airport infrastructure projects are always plagued by coordination problems due to their complexity and multiple parties involved. For the Large Airport Terminal Renovation & Expansion projects without suspending air (LATRE projects), the negative influence of the construction process on the normal operation of the airport terminals should be minimized and thus the coordination problem is more challenged. Generally, a LATRE project is led by a client organization that relies on formal contracts, for instance, Project Construction Headquarters (PCH), and shared collaborative goals to coordinate the activities of multiple parties involved. Meanwhile, the airport operation management sectors also participate in the major decision-making process of the project to ensure the regular airport operation can perform as planned. Taking Shanghai Pudong International Airport (SPIA) Terminal 1 (T1) project as an example, the airport Service Sectors (SS) contains Passenger Service Sectors (PSS), Operational Support Sectors (OSS) and Governmental Administrative Sectors (GAS). PSS include departments related to passenger service from the Airport Administration Corporation (AAC), Airlines (departments from check-in, ticketing, passenger services, baggage and cargo delivery), Commercial Corporations (CC, such as stores, restaurants, hotels and VIP services), and Passenger Awaiting Service Facilities (e.g. information service center, resting area & bathrooms). OSS include various types of equipment, facilities operation and maintenance sectors, such as baggage handling system, air conditioning and ventilation, communication information, water supply and drainage, power supply, elevator and other property facilities management. GAS include those departments such as Customs, Security Administration, Border Security Inspection, Animal and Plant Inspection and Quarantine, Fire Brigade, Public Transport Administration, as well as Public Safety Administration Sectors. Construction Organizations (CO) include contractors and subcontractors (professionalized in civil engineering, electrical and mechanical equipment installation, decoration, IT engineering services), equipment suppliers, material suppliers, supervisory and consulting companies. So the relationship between SS and construction participants as well as their role and responsibilities are required to be defined at the outset of the project to assume that the project can be executed effectively and properly in alignment with the project strategy.

The coordination problem of large airports construction project has been receiving growing attention. For instance, Gil, N. (2009) identified the major challenges that project clients face when developing cooperative project client-supplier relationships. Davies, A. et al. (2016) conducted a longitudinal study of how the project owner and operator developed and applied dynamic capabilities to design and deliver the highly complex and uncertain London Heathrow Terminal 5 project. However, little research discussed the solution to the conflicts between project management organizations and operation management organizations in decision-making process.

Existing research on project governance provides several insights into how to govern the relationship among different stakeholders at different organizational levels to work collaboratively in large construction projects. For instance, Bekker (2013) developed a conceptual model of project governance based on the three levels of project management proposed by Morris (2013): (1) the technical level, (2) the strategic level, and (3) the institutional level. Brunet (2016) proposed a governance framework for major public projects along three dimensions: those of greater

government efficiency, legitimacy and accountability. However, most research limits the scope of the project governance bodies to project organizations, such as project sponsors, project management office, and few of them consider the role of project operators in the project governance system. Therefore, a new project governance structure and process are required to develop to achieve more effective coordination between project construction system and operation system for LATRE projects. The purpose of this paper is to develop a collaborative governance model to address the inter-system coordination problems in LATRE projects based on a case study. Following this introduction, literature is reviewed and the methods are introduced. The next section presents the background of the case as well as the case study results. A conceptual framework for collaborative project governance, containing 5 key elements of collaboration are proposed based on its preliminary research results. Finally, the paper concludes with a recommendation for application of the framework in practice and suggestions for further research.

2. LITERATURE REVIEW

2.1 PROJECT GOVERNANCE

Project governance has become an important issue in the project management community and literature (Miller and Hobbs, 2005). The definitions offered for project governance vary from very narrow to very broad (Tuomas et al., 2014). Project governance employs principles for responding to project stakeholder demands, documentation procedures, communication and contractual arrangements (Ruuska et al., 2009). Tuomas et al. (2014) identified two views to project governance in the literature: a stream of literature that views project governance as external to any specific project and a stream that views project governance as internal to a specific project. The former stream mainly strengthen the vertical collaboration between the sectors and departments, while the later stream focus on the horizontal collaboration between stakeholders. The paper takes the later stream perspective which focusing on stakeholders management within a large Airport project.

2.2 COLLABORATIVE GOVERNANCE

Governance is “a set of coordinating and monitoring activities” that enables the survival of the collaborative partnership or institution (Bryson, Crosby, and Stone 2006). The term “collaborative governance” was initially used in the professional fields of education and health in the 1970s to generally describe cooperation across departments and disciplines in the administration of curriculum and public health services (Kirk & Andrea 2014) . Emerson et al. (2011) defined collaborative governance as the processes and structures of public policy decision making and management that engage people constructively across the boundaries of public agencies, levels of government, and/or the public, private and civic spheres in order to carry out a public purpose that could not otherwise be accomplished. Ansell and Gash (2007) proposed a contingency model of collaborative governance in the field of policy making and implementation including starting conditions, institutional design, collaborative process, facilitative leadership and outcomes. Emerson et al. (2012)

designed an integrative framework for collaborative governance including drivers, Collaborative Dynamics (Principled Engagement, Shared Motivation, Capacity for Joint Action), Collaborative Actions, Impacts and Adaptation. Rooted in management practices, collaborative governance mainly discussed horizontal network management in different management settings (Agranoff and McGuire 2001; Kamensky and Burlin 2004; Wright 1988). With the temporary organization situation, little research has focused on the collaborative governance in project management field. According to the project context, considering above models and frameworks, we can summarize collaborative governance in complex project environment as a process of conflicts treatment system for stakeholders collaboration management, the factors include objective collaboration, organizational collaboration, resource collaboration, information collaboration and process collaboration.

3. METHODOLOGY

This paper uses a single case study approach (Eisenhardt and Graebner, 2007), which is partly based on first-hand access to a unique case, i.e. Shanghai Pudong International Airport Terminal 1 project. The data for the study was collected from document archives and through over 5 interviews. The document archives were mainly collected by one of the co-authors of this paper, who was participating in all aspects of the design and construction process of the project as a consulting engineer. The study cannot be described as participant observation, but we used similar measures to control for subjectivity.

The interviews were executed with over 8 professionals who are from either airport service sectors or construction organizations actively participating in the project. Each interview lasted from 45 to 90 min. The interview questions were developed in an open-end format and then distributed and reviewed by professional practitioners and academicians prior to its use. The questions are classified into three main sections with the following objectives:

- (1) First section: To get an overview and general information of the project governance system, including service sectors and construction organizations.
- (2) Second section: To discover the conflicts between service governance system and construction governance system.
- (3) Third section: To investigate how service sectors and construction organizations address the conflicts within the governance system.

4. RESULTS AND DISCUSSION

4.1 THE CASE STUDY

4.1.1 BACKGROUND OF THE CASE

The paper chooses the project management of the renovation & expansion projects of T1 of SPIA as a case. For certain reasons, T1 is urgently needed to be renovated and expanded. However, due to the continuous rapid growth of air traffic, e.g. the average annual growth rate of passenger throughput at SPIA reached 9.56% from 2003 to 2015, owing to the facts that there are no other terminals or adjacent airports can

accommodate existing passengers, T1 has to be kept on normal operation status as before during the whole construction period.

4.1.2 COMPLEXITY CHARACTERISTICS OF THE CASE

It is a major challenge for both SS and CO groups to implement renovation & expansion construction while keeping operation for large-scale public buildings like T1, the project management of such kinds of projects is more complex than usual situation.

(1) A large number of stakeholders are involved. As mentioned in the introduction part, there are tens of different organizations and companies acting as stakeholders being involved in the case project, both from SS and CO groups.

(2) The construction conditions on job-site are harsh and hard. For example, there are always very crowded in the terminal building; the available site space for construction is very narrow; the construction period is highly compressed and the schedule should be strictly followed; furthermore, it is required to reduce mechanical applications as possible on site.

(3) The security & safety management risk is relatively high. It is essential to assure the homeland security and aviation safety for both SS and CO during the whole construction period.

4.2 CONFLICTS BETWEEN SERVICE GOVERNANCE SYSTEM AND CONSTRUCTION GOVERNANCE SYSTEM

Generally, the renovation & expansion construction activities and airport operation services of large-scale-airport terminals are two mutual interference, conflict business subsystems, with totally overlapped cross and interfaces of interior physical spaces and business activities.

Table 1 Conflicts of the case

Conflicts types	Service governance system	Construction governance system
Inconsistent work objectives	To ensure safe and smooth operation of the terminal, to provide high-quality travel experience and services for passengers	To achieve the project objectives such as cost, time, quality etc.
Different workflow	PSS, OSS and GAS have their own uniform processes and rules to coordinate and deal with any issues when involved in construction issues	Ask for the owner help to coordinate specific issues, then cooperate with the involved sectors
Differing in requests for decision-making response process	Require quick response or treating process to passenger services, safety management and other matters, even temporarily terminate on-site construction activities	On-site construction activities shouldn't be interrupted once have been started. And the alternative solutions should be initiated when necessary
Long-term Interface managing conflicts	Emotional contradictions tend to be derived from daily events when passengers always complain for noise, dust and flash etc. during long-term cooperation	The on-site staffs from CO are very prone to resist those from SS when construction works often constrained or even interrupted

As can be seen from Table 1, there are four major types of conflicts between SS and CO as for the renovation-&-expansion-while-operating projects. The first two of them are derived from inconsistent work objectives and different workflow. Generally the contractors (CO side) are willing to organize the subcontractors and suppliers to speed up the construction progress, even ignore the concerns from passengers and staffs in the terminal building, since they aim at obtain higher performance of project management and save the costs as scheduled. However, from the SS side, the most important mission for all the tens of the service-providing organizations or business units working in T1, is to ensure safe and smooth operation of T1, to provide high-quality travel experience and services for all passengers. Furthermore, the SS side, including PSS, OSS and GAS, have their own uniform processes and rules to coordinate and deal with any issues when involved in construction issues. The third one is difference in requests for decision-making response process between both parties. For the SS side, it is required to take quick response or treating process to those matters concerning passenger services, safety management, even temporarily terminate on-site construction activities. However, the on-site construction activities shouldn't be interrupted once have been started, and the alternative solutions should be initiated when necessary, considering that any change being off the original scheduled track will lead to claims for the contract. The last type of conflict is long-term Interface managing conflicts between SS and CO. It is easy to conclude that emotional contradictions tend to be derived from daily events when passengers always complains for noise, dust and flash etc. during long-term cooperation. Correspondingly, the on-site staffs from CO are very prone to resistant when construction works often constrained or even interrupted by those from SS, which resulting in conflict of relationships.

In general, Both airport passenger service and construction projects are the two subordinate business units of Shanghai Airport Authority Group (SAA). Therefore, both SS and CO must follow and achieve SAA's missions and vision, and be consistent with the overall goal. Thus the above-mentioned conflicts between SS and CO belong to cooperative conflicts with common strategic objectives.

4.3 COLLABORATIVE MANAGEMENT OFFICE

This section will introduce a new organization called Collaborative Management Office (CMO) which is established as a bridge between service governance system and construction governance system.

4.3.1 THE ESTABLISHMENT OF CMO

The construction of the airport terminal is performed while the regular airport service is provided independently. In the case, various service sectors and construction organizations participate in the project, which forms a complex interaction network. The service sectors includes Government Administration Sectors (GAS), Commercial Corporations, Airport Administration Corporation (AAC), etc. The construction organizations includes Project Construction Headquarters (PCH), contractors, equipment suppliers and consulting companies. The complex interaction network

increases the communication and coordination difficulty, which affects the decision-making process. To this end, AAC establishes Project Management Committee (PMC), whose members are transferred from other functional departments. Based on specialty and governance area, PMC sets up seven working groups, namely, terminal system working group, flight system working group, field area working group, electronics, electrical and communication working group, energy working group, airport security working group and business working group. Specially, PMO establishes CMO as an executive agency responsible for collaboration between construction organizations and service sectors. The members of PMO are mainly from airport service sectors.

4.3.2 THE ROLE OF CMO

CMO acts as a coordinators between the construction governance system and service governance system. Concretely, CMO coordinates the work of PCH, AAC and other operation and service sectors and solves on-site conflicts that occurs in the construction process of the airport terminal. CMO locates at the center of the communication network.

CMO acts as a coordinator for the service sectors. Firstly, CMO communicates with airport service sectors such as AAC to understand their requirement for regular operation. Secondly, CMO reviews the general construction scheme, construction schedule and design optimization and design alteration regarding to the airport terminal. Thirdly, CMO is responsible for supervising project quality, safety, schedule and costs.

CMO acts as a platform for information exchange with PCH and other construction organizations. Besides, CMO supports administrative license examination process and construction completion inspection certification process. In additions, CMO aids PCH in contract management and cost management. CMO also participates in collecting and compiling archival documents.

4.3.3 CMO-CENTRIC GOVERNANCE STRUCTURE

The case establishes a CMO-centric collaborative governance structure, which plays an important role in project governance during the project lifecycle.

In the case, 8 check-in-counters are designed to be reconstructed or decorated at a 12.8m high departures level. The construction area of each check-in-counter is isolated from the service area, where a large numbers of passengers, companies and service staffs walk. Therefore, the construction schedule of the 8 check-in-counters should meet requirements of the service sectors, such as airlines corporations, restraints, shopping malls, instant hotels, security departments, VIP-passenger service companies and AAC, which is difficult to fully realize in practice.

The CMO-centric collaborative governance structure is designed to solve this problem. Firstly, CMO communicates with the service sectors, such as AAC and government departments responsible for airport operation management, to understand their requirements and expectation on the construction schedule. Meanwhile, CMO needs to keep in touch with contractors to follow the draft of the construction schedule. Based on the service sectors' requirement, CMO proposes a revised

schedule as well as the 8 check-in-counters' distribution and operation solution. Then, CMO reports the schedule and solution to PCH, contractors and equipment suppliers to learn their views. Meanwhile, CMO will deliver the contractors' information about key construction techniques and milestones in the schedule to the service sectors. Such information exchange and discussion process will be performed for at least twice. Finally, a general construction schedule will be made and discussed in a group meeting that is organized by CMO and participated all project stakeholders. The schedule, if agree by all participators in the meeting, will be delivered to PMC to be implemented immediately. Subsequently, all service sectors should perform according to the schedule and actively cooperate with construction organizations in the aspects of service area and resource adjustment. According to the interviewees' response, the construction and operation process of the 8 check-in-counters performs well meanwhile service sectors can also provide high quality service.

4.4 A CONCEPTUAL FRAMEWORK OF COLLABORATIVE GOVERNANCE

For those complex and large-scale public projects implementing renovation and expansion construction while keeping operation like the case, the collaborative governance framework contains five main aspects, namely as objective collaboration, organizational collaboration, resource collaboration, information collaboration and process collaboration.

4.4.1 OBJECTIVE COLLABORATION

To get a clear and consistent objective, is to achieve the premise of collaborative management. The objective is firstly reflected in the demanded interests of certain parties. Different objective interests often determine the path-choice and activity orientation of the parties.

Actually, during the renovation and expansion construction while keeping operation, the interests objectives of SS and CO are not exactly the same. Therefore, CMO abide by the common strategic objective or vision from both sides, follow the common strategic objectives, named as safety, comfort, aesthetics, quality, progress, investment and other project control objectives. The objective has taken into account main business objectives from those of SS and CO.

4.4.2 ORGANIZATIONAL COLLABORATION

Organizational collaboration is the core of collaborative management framework for a multi-organization, multi-level complex project. It's required that SS and CO need to maintain normal operational service for the public. During the implementation of the whole construction process, SS and CO need to build a coherent joint-team. As mentioned in the case, CMO is the binder of the joint-team. When CMO was set to solve the problem of organizational collaboration, it will take the leading role to complete other collaborative governance works to achieve the ultimate goal of the project.

4.4.3 RESOURCE COLLABORATION

It is the most critical issue for all parties to meet normal resource demands. During the implementation of the Case, the resource demands from different participants is heterogeneous and dynamic. Resource collaboration management should be carried out from two dimensions: lateral and vertical, in order to achieve the best performance. The lateral dimension is to coordinate system resource among subsystems, while the vertical dimension is to optimize the internal resource configuration of the subsystems. In order to better coordinate the vertical dimension resource allocation activities, PCH and CMO respectively represent the management and assignment hub of the two subsystems resource. On the other hand, in order to achieve the horizontal dimension of the resource coordination scheduling, PCH and CMO also need to integrate different resource demands from homogeneous resources, homologous resources and same-way resources, to reduce the resource scheduling cost and optimize system resource configuration.

4.4.4 INFORMATION COLLABORATION

The main purpose and content of information collaboration are to consider the relationships between various elements in the life cycle, and the dynamic influence relationships among various parties during the construction process. We adopt various modern information technologies to integrate and manage project information.

Compared with new constructed projects, the renovation and expansion construction while operating projects are more complicated. Firstly, there are more information types and more information is generated as well as more transmission, interaction and processing workload among these information. Furthermore, there will be higher requirement for information management and feedback response.

CMO build a unified information collaborative management platform with a variety of information technology tools, such as the routine meetings, QQ group, Wechat group, information management system (project management system). Thus, a clear and diversification Information exchange and communication mechanism is set up. Consequently, all sectors and parties can easily and conveniently monitor the actual progress, quality and safety control of the project in real time, realize the all-round management of the whole process of the project and adjust the schedule structure in time.

4.4.5 PROCESS COLLABORATION

The main contents of the project process collaboration need to take into account both CO and SS. The collaborative object is the main work of the renovation and expansion projects while keeping operation, terminal expansion and cooperation management, including: terminal operation and maintenance, project planning, project design, on-site construction, system equipment installation and commissioning, terminal area property management and so on. During the whole construction process, SS and CO united to become a close joint-team and work together through the unified coordination of CMO. Meanwhile, CMO adopt interface

management to integrate organizational and maintenance process dimension, keep dynamic tracking and control of the collaborative management process.

5. CONCLUSIONS

The paper carried out case study for large airport terminal renovation & expansion projects without suspending air, proposed a project collaborative governance framework, analyzed the role of CMO and five main aspects within the framework including objective collaboration, organizational collaboration, resource collaboration, information collaboration and process collaboration. Objective collaboration aims to co-ordinate the different interests of the various stakeholder groups, the establishment of a unified objective of collaboration in order to achieve the best full life cycle effect of the project; Organizational collaboration refers to the rational organization structure and division of responsibilities design, through collaborative work, the establishment of equal consultation platform and working mechanism, the formation of a unified command project management team with mutual cooperation to achieve the ultimate goal of the project; Resource collaboration integrate different resource demands from homogeneous resources, homologous resources and same-way resources, to reduce the resource scheduling cost and optimize system resource configuration; the purpose of Information collaboration is to reduce information asymmetry and information transmission disorder by establishing collaborative information communication mechanism so as to ensure timely, smooth and accurate information flow; Process collaboration mainly refers to the coordination through the implementation of the design, procurement and construction, so that the operation and management units and the construction units can collaborate into a unified team.

Recently, the smooth and successful implementation of the Pudong International Airport T1 terminal's renovation & expansion projects in the condition without suspending air has proved that our research and the paper successfully combines the positive results of the current project management and governance cutting-edges at china and internationally and successfully push forward actively in some fields of the whole airport projects as well as providing strong support for the smooth operation of the whole airport system in Shanghai in the future. The implication gained can also be used to other projects both in other parts of China and other international countries.

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