MANAGING MEGAPROJECTS THROUGH A PROGRAM MANAGEMENT APPROACH: LESSONS FROM SHANGHAI EXPO CONSTRUCTION

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ABSTRACT

Over past three decades the number of construction megaprojects has increased exponentially in responding to fast economic growth in China. However, these megaprojects are usually besetting with many problems, such as cost overruns, extensive delays, environmental pollution, and conflicts amongst contracting parties. How to establish an effective management system to deal with these issues poses challenges to many clients. In the Shanghai Expo Construction, the program management approach was employed to establish an effective management organization by the client. It has successfully procured megaproject with high performance. This paper proposed five Critical Success Factors (CSFs) for utilising program management to manage megaprojects. The proposed CSFs were validated through case data and content analysis. It is believed that these findings of this paper can enhance the understanding of program management in general and provide insights in managing megaprojects in China in particular.

KEYWORDS

Program Management; Critical Success Factor; the Shanghai Expo Construction

INTRODUCTION

As the biggest Expo site in history, the Shanghai Expo owned 136 pavilions and more than 160 supporting facility buildings with a total floor area of 2.3 million m^2. Therefore its construction was a complex megaproject composed of multiple constituent projects (Ding 2010). The client, the Shanghai Expo Construction Headquarters (SECH), faced multiple challenges, such as huge numbers of investors, a mega construction scale, fast construction mode, over 40,000 migrant workers being involved, and an extremely compressed completion deadline. In order to attain the prescribed goals in the compressed duration, the program management approach was introduced and employed by the client as a major approach to manage the megaproject and accomplish the prescribed objectives. As a result of the success in program management, all the pavilions and supported facilities in the site completed smoothly in time without any record of safety or environmental accident.

Program management can be defined as "the centralized coordinated management of a program to achieve the program's strategic benefits and objectives" (PMI 2006). After entering the 21th century, program management has developed into a new research field in the discipline of "project management". This approach has been advocated by many practitioners and institutions (Beenleer 2009; PMI 2006; Rasdorf et al. 2010). In the construction of the Shanghai Expo Site, the client also adopted this approach and attained great achievements in managing megaproject with multiple goals attained. However, not all the megaprojects managed with the program management approach are successful. Previous studies on megaprojects seldom fully explain the philosophy on how to adopt the program management approach and employ it successfully in managing megaprojects.

Thus, this paper attempts to discover ingredients of success for the implementation of program management in the Shanghai Expo Construction. The objectives of this paper are to: (1) identify the critical success factors (CSFs) for program management though a structured literature review; (2) examine the CSFs for program management of megaprojects by the Shanghai Expo case data.

PROGRAM MANAGEMENT AND ITS ROLE IN MANAGING MEGAPROJECTS

Since modern "project management" emerged between 1960s and 1970s (Kerzner 2001), "project management" and "program management (or programme management)" have been used interchangeably in many fields (PMI 2000; Lycett et al. 2004). In 2003, Archibald first distinguished a program from projects, and pointed out that a program is "a long-term undertaking that includes two or more projects requires close cooperation". In 2004, the Project Management Institute (PMI) based in the United States, one of two major project management institutions in the world, first defined program management in its core standard, PMBOK 3rd edition. In 2006 the other major project management institution, the International Project Management Association (IPMA) based in Sweden also advanced its definition of program management in their new core standard, ICB-IPMA Competency Baselines (Version 3.0); within IPMA defined a program as "a set of related projects and required organizational changes to reach a strategic goal and to achieve the defined business benefits."

With exponential increase of construction megaprojects worldwide over the past decades, program management has received growing concerns from institutions and scholars. In 2008, University of Oxford established a BT's center for major programme management, the first global teaching and research center specializing in program management, at the Saïd Business School. Bent Flyvjerg, a well-known Denish scholar in the research on megaproject, moved to the Oxford and led the center at the same year. Arrto et al. (2008) also affirmed that program management originally roots in practice of megaprojects. Lycett et al. (2004) agreed with his opinion, stating that program management can be regarded as a new tool that integrates and manages a program with the intent of achieving benefits at the overall program level.

Moreover, growing concern also has received from the industry and practitioners. According to a survey on program management service in US (Rasdorf et al. 2010), there is a huge demand for external program managers in public and private sectors, who can manage multiple related projects. In UK, program management also receives an extensive support from practitioners (Shehu and Akintoye 2009). In China, stimulated by fast economic development and urbanization growth, program management service has developed into a new business for some construction management consultancies in China (SKCPM 2011).

METHODOLOGY

This paper arose from the first authors' nearly-three-year consultancy experience serving for the Shanghai Expo Construction. Literature review and case study methods were both employed to identify and validate the CSFs for program management. The whole study could be divided into two phases.

In Phase 1, an exploratory structured literature review on program management was designed and conducted to identify program management articles in the mainstream journals in the field of construction engineering and management over the past decade (2000-2010). This method is adopted by Ke et al. (2009). Firstly two search engines, "Scopus" and "ISI Web of Science", were both employed to identify journals which published the most program related articles. Since program management was first defined in the beginning of the 21st century (Archibald 2003), the search time span was set as the period between 2000 and 2010. "Program management" related keywords were employed in the "title/ abstract/ keyword" fields under the sub-area of engineering. Since the threshold for journal selection was two articles, only four journals were identified by the two search engines: International Journal of Project Management (IJPM), Journal of Civil Engineering and Management-ASCE (JCEM), Leadership and Management in Engineering-ASCE (LME), and Journal of Asian Architecture and Building Engineering (JAABE). In these identified journals, only 38 journal articles were found. Based on these identified journal articles, a broader literature search on program management was conducted in related other journal, conference proceedings, books, and other sources. This was to establish a solid theoretical foundation for identifying the CSFs for program management. By reviewing these literatures, five CSFs for program management were identified. All the literature review work was conducted in January 2011.

In Phase 2, a case study on the Shanghai Expo construction was conducted to validate the CSFs identified in Phase 2. The case selected took full consideration for its significant performance. An inductive approach was employed to smooth gaps between empirical findings and theoretical concepts (Siggelkow 2007). Data was collected through participant observation, work letters and reports, meeting minutes, archival records and site interviews. All these data collection took place between November 2007 and April 2010.

THE CSFs FOR PROGRAM MANAGEMENT IN MEGAPROJECT

Searching Critical Success Factors (CSFs) for a given type of project can be implemented by the literature review method (Chua et al. 1999). This paper also adopted this research method to search for CSFs for program management. Table 1 shows the relevant categories of CSFs for program management by previous studies.

Table 1 Categories of CSFs for program management

CSFs / Previous Studies	Program objectives definition	Program organization & governance	Program control & processes	Program Leadership	Program stakeholder management
Lycett *et al.* (2004)	√				√
Swan and Khalfan (2007)	√				
Buuren *et al.* (2010)		√			
Shehu and Akintoye (2009 and 2010)	√	√	√	√	
IPMA (2006)				√	
ICCPM (2008)				√	
PMI (2006)	√	√	√		√
Reiss *et al.* (2006)	√	√	√		√
Crawford and Nahmias (2010)		√		√	√
Pellegrinelli et al (2007 and 2009)	√	√	√	√	√
Kim et al. (2009)	√	√	√		√
Total	7	7	5	5	6

Program Objectives Definition

Program objectives definition takes the first place as the most critical factor for program management throughout the program life cycle. It can be defined as "the definition and formalization of the expected benefits that a program is intended to deliver (PMI 2006)". Nowadays construction project is "moving towards a more complex regime of objectives" (Swan and Khalfan 2007). Especially in megaprojects, besides project objectives that must clearly defined for every sub-project within the megaproject; megaprojects also need define their objectives at the program level. These objectives not only include the key objectives of time, cost, quality and safety, but also comprise sustainable development issues and benefits of all the stakeholders involved, such as major contractors, community, government departments, and the public (Swan and Khalfan 2007). These issues are indispensable for the successful delivery of projects. This is because that these objectives reflect the complex demands of megaproject, such as the politics sensitivity, public's and communities' supports, and environmental impact (Altshular and Luberoff 2003; Bruzelius et al 2002; Capka 2006; Clegg et al. 2003; Flyvbjerg et al. 2003). Therefore, establishing a blueprint of program objectives at the planning phase is vital to manage megaprojects.

Program Organization and Governance

The program organization usually comprises three main parts: (1) a main board (strategic decision committee); (2) a program board (executive committee); and (3) a matrix multiple-project management organization (Reiss et al. 2006). This program management form also can apply to procure a megaproject. Buuren et al. (2010) reaffirmed the importance of program boards in program management, stating that this form can realize a multi-level governance integration. Additionally, the program management office (PMO) deserves necessary attention for its important role in program internal coordination and control (Marsh 2001).

Program Control and Process

Since megaproject usually has overall strategic objectives at the program level, program central control is important and indispensable to establish the corresponding overall control system. This is different from common project control. Between 1980s and 1990s, a German scholar, Greiner, first advanced the project

controlling theory and developed a graphic and alphanumeric information and documentation system (Granid). This system has been successfully practiced in many megaprojects in Germany and Sweden, such as Munich International airport, the East West rail Link in Germany and the new Gotthard railway tunnel in Sweden (gibGREINER 2011). This system can be regarded as original program control aiming to establish an overall program control system through utilizing the information technology. Nowadays more and more scholars affirmed the importance of program control in ensuring overall objectives of the program (Shehu and Akintoye 2009 and 2010; Pellegrinelli et al. 2007). Besides the information technology that is utilized in the program control, program control process also is indispensable to program control. These processes are usually managed by functional departments of the program organization respectively to sustain timely control on various program objectives.

Program Leadership

Program leadership involves organization governance, team building, program organizational culture, risks evaluation, cross-functional communication and other issues (Crawford and Nahmias 2010; Shehu and Akintoye 2010; IPMA 2006). Excellent leadership can ensure the program organization on the right track toward the program objectives. IPMA has been strongly engaged in development and promotion of these fields since its establishment, and published many important standards, such as ICB-IPMA Competency Baselines (IPMA 2006). Another new project management institution based in Australia, the International Centre for Complex Project Management, also issued the Complex Project Manager Competency Standards in 2008.

Program Stakeholder Management

Since a megaproject involves a wide range of business partners, industry, politicians (Clegg et al 2003), stakeholder management also plays an important role in program management. Recently the delivery of megaprojects is impacted in most cases by an increasingly complex stakeholder environment partnership (Tawiah and Russell 2008). Many scholars conduct studies on various key stakeholder relationships (Lycett et al. 2004; Reiss et al. 2006). Previous studies mainly involve three key stakeholder relationships in megaprojects: (1) the relationship between program manager and project managers within the program (Lycett et al. 2004); (2) the relationship between the client and the major contractors within the program (Davies et al. 2009); (3) the relationship between the program management organization (the client) and the government (Hu and Le 2009).

CASE STUDY

Program Objectives Definition

In the Shanghai Expo case, the client first conducted an analysis on the expectations and benefits of all the major stakeholders and formulated them into a program definition draft. After two rounds of internal discussion, program objectives were defined in the core document, the Outlines of Shanghai Expo Construction. During construction duration, program objectives updated regularly. The major program objectives are shown in table 2.

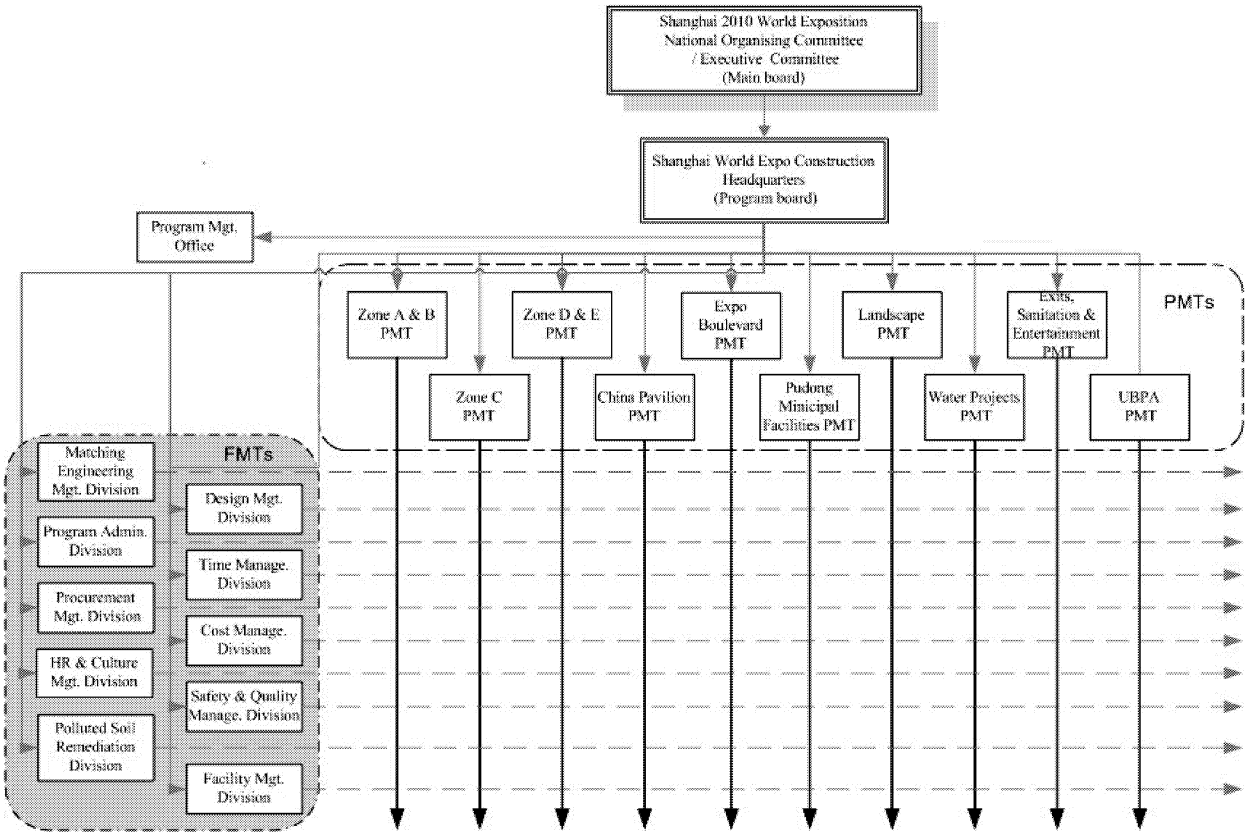
Table 2 Program objectives of the Shanghai Expo Construction

Type	Definition
Schedule	The construction megaproject taken charge by organizer could be completed before trial operation in April 2010.
Investment	T overall investment of the Shanghai Expo construction could be controlled within approved investment budget.
Safety	No major and serious safety accidents occur during the construction.
Quality	The pavilions and supporting facilities of Expo could be accepted for one time to meet handover requirements in operation phase.
Environmental protection	No environmental pollution caused by waste residues, waste water, waste gas and noise discharged during the project construction, reduce the impact on the life of the residents in surrounding communities.
Social development	Care for rural migrant workers for a more harmonious society.

Program Organization and Governance

In the Shanghai Expo Case, a matrix organization structure was adopted by the client as shown in Figure 2. In order to facilitate the front-end decision on site; this organization adopted a form of strong matrix organization. This organizational design was established on the base of program breakdown structure (PBS) of the whole

program. Moreover, all key staff selection, such as heads of Management Divisions and PMTs, was fully assessed on their capabilities before appointment.



Notes: "Mgt." is an abbreviation of the word, "Management".

Figure 2 The organisation of the Shanghai Expo Construction
Source: SECH (2008)

Program Central Control

In the Shanghai Expo Construction case, the central control system consisted two main parts: central control processes and project management information systems. Central control processes involved the monitoring of all the key quantitative performance, including investment, construction progress, and quality as well as safety. Three information systems were utilized to assist investment management, time management and program administration respectively. The Primavera 3.0 software was used to make time plan, collect progress data and analyze progress. Two other pieces of software were further developed by the Chinese. One is office automation (OA) software; the other is a contract and investment integrated management software with a Browser/Sever structure, namely the Construction Contract, Cost, and Coordination Administration System (C3A system). The work interface of the C3A system is shown in Figure 3.

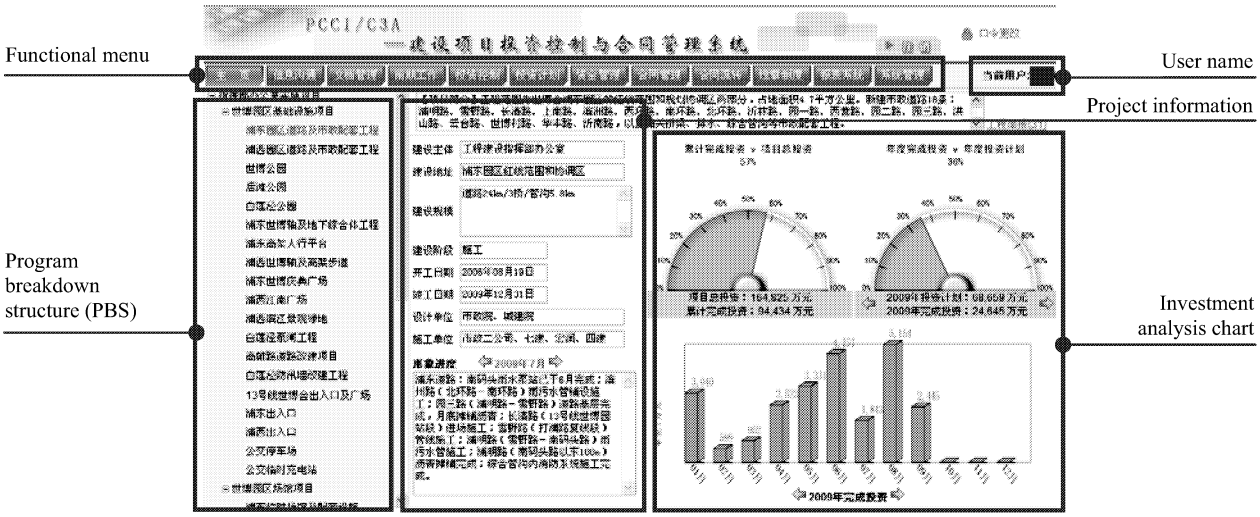


Figure 3 Work interface of the C3A information system
Source: SECH (2007)

Program Leadership

The Confucius philosophy has a great impact on Chinese leadership style for over 2000 years. The leadership of the client can be described as the Oriental leadership concluded by Jiang et al. (2008). The six qualities of Confucius leadership are shown in Figure 4.

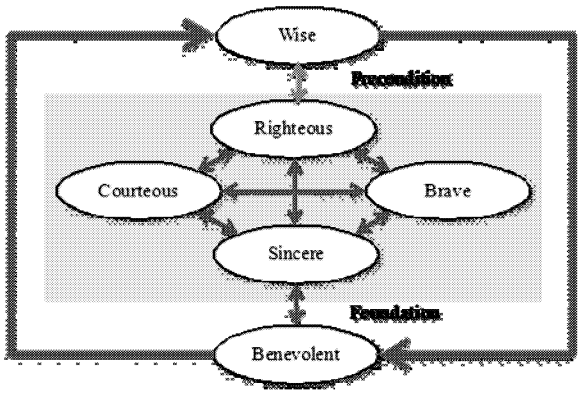


Figure 4 Six qualities of Confucius leadership
Source: Jiang et al. (2008)

Program Stakeholder Management

Key stakeholders of the Shanghai Expo construction were identified as shown in Figure 5. The relationship with major contractors was identified by the client with the highest significance in program stakeholder management; thus the client developed partnership relationships with all the major contractors through establishing incentive contracts.

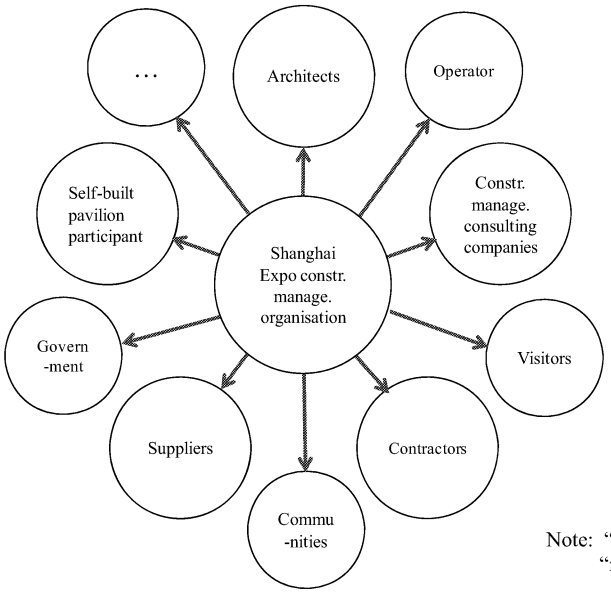


Figure 5 Major stakeholders of the Shanghai Expo construction

CONCLUSIONS

To achieve success in managing megaprojects, program management is emerging as a new approach and deserves more attention in contemporary research on megaproject. This is because program management can provide a more systematic thinking and enlightenment than traditional project management in obtaining overall program performance improvements, such as productivity, safety, quality and investment.

In the light of the Shanghai Expo construction case, this paper has identified five CSFs for program management in megaprojects based on a structured literature review and validated them though conducting a single case study. Although these identified CSFs for program management based on a single case study may not be over-generalized, which need further validation of more cases, it reports much practical wisdom and provides practical guides on program management.

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