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Coordination mechanisms for construction supply chain management in the Internet environment

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Abstract

The construction industry in general is characterized with high fragmentation, low productivity, cost and time overruns, and conflicts compared with other manufacturing industries. Supply chain management as an innovative management mode provides a new solution for resolving these problems from systems perspective. Coordination is the core issue to improve construction performance in construction supply chain (CSC). In this paper, the concepts of CSC and CSC management are defined. Furthermore, the inter-organization problems that effect CSC coordination are identified. Considering the Internet fosters the integration of construction processes and provides an efficient platform for CSC coordination, this paper presents two types of Internet-enabled coordination mechanisms: market mechanism, such as auction and contracting, and coordination flow, including information hub and electronic marketplace, for improving construction performance and to accelerate the innovations in the construction industry.

Keywords: Supply chain coordination; Construction supply chain; Internet; Construction industry

1. Introduction

Recent years have seen a growing globalization of markets and the concentration of companies on their core competencies resulting in increasing supply chain coordination in supply chain management (SCM). No industry is left untouched. The construction industry in general is characterized with high fragmentation, low productivity, cost and time overruns, and conflicts and disputes compared with other manufacturing industries. These characteristics also are major causes of performance-related problems facing the industry [1].

These problems in general are supply chain management problems. This urgently requires coordinating construction supply chain (CSC) to improve construction performance in construction supply chain management (CSCM). The barriers that obstruct coordination and integration of CSC are identified as follows [2]:

- Attitude-related issues: such as narrow minded "win-lose" attitudes and short-term focus, arrogant attitudes, exclusion of the subcontractors and suppliers from the early involvement phases, lack of praise for good performance, and lack of understanding of the subcontractors and suppliers problems.
- Quality of information-related issues: such as poor information quality from general contractor and less transparency coupled with inadequate information exchanges and limited communications.

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- Financial/cost-related issues: These are related to competitive tendering based on price (with inadequate focus on life-cycle costs and ultimate value), which has developed adversarial relationships among clients, general contractors, subcontractors and suppliers that result in serious problems with regards to payments.
- Programming/time-related issues: such as false expectations on part of the general contractor, unrealistic program times, and unrealistic and uncertain lead time of materials and equipments.

The Internet fosters the integration of construction business processes across the CSC by facilitating the information flows necessary for coordinating construction business activities [3]. In the traditional CSC, for reasons of information asymmetry and uncertain factors intervened by people, the construction processes frequently cannot be controlled well, easily resulting in inefficient management and poor project performance. However, the rise of the Internet has thoroughly changed the traditional market's business rules and has brought a revolution in transaction practices. The use of Internet-based technology initiatives makes the exchange of information simple, fast, accessible, and accurate, and brings a new, pivotal opportunity and force to development of the construction industry [4]. The omnipresent Internet provides a rich environment as well as an effective tool for CSC coordination.

This paper presents the concepts of CSC and CSCM and analyzes the inter-organization problems in CSC business activities. An Internet-based framework for CSC coordination is described, which emphasizes on two Internet-enabled coordination mechanisms, i.e. market mechanism and coordination flow. Another purpose of this paper is to suggest a research agenda in CSCM for improving construction performance.

2. CSC and CSCM

2.1. CSC

Construction is a multi-organization process, which involves client/owner, designer, contractor, supplier, consultant, etc. It also is a multi-stage process, which includes conceptual, design, construction, maintenance, replacement, and decommission. From this perspective, CSC can be defined as flowing:

CSC consists of all the construction business processes, from the demands by the client, conceptual, design and construction to maintenance, replacement and eventual decommission of building, and organizations, which are involved in the construction process, such as client/owner, designer, general contractor (GC), subcontractor, supplier, consultant, etc. CSC is not a chain of construction businesses with business-to-business relationships but a network of multiple organizations and relationships, which includes the flow of information the flow of materials, services or products, and the flow funds between client, designer, contractor and supplier, as shown in Fig. 1.

2.2. CSCM

SCM is a concept that originated and flourished in the manufacturing industry. It was developed from innovation such as just-in time (JIT), as a part of the Toyota Production System, and the field of quality control and total quality management (TQM). Now, it has become a buzzword in the field of operation management. Although a number of scholars have provided contributions to understanding of SCM, there is a lack of agreement among educators, consultants and practitioners on the precise definition of SCM. SCM in general can be defined as an integrative philosophy to manage the total flows of the entire business process. Systemic, client-oriented, win-win and cooperative manage-

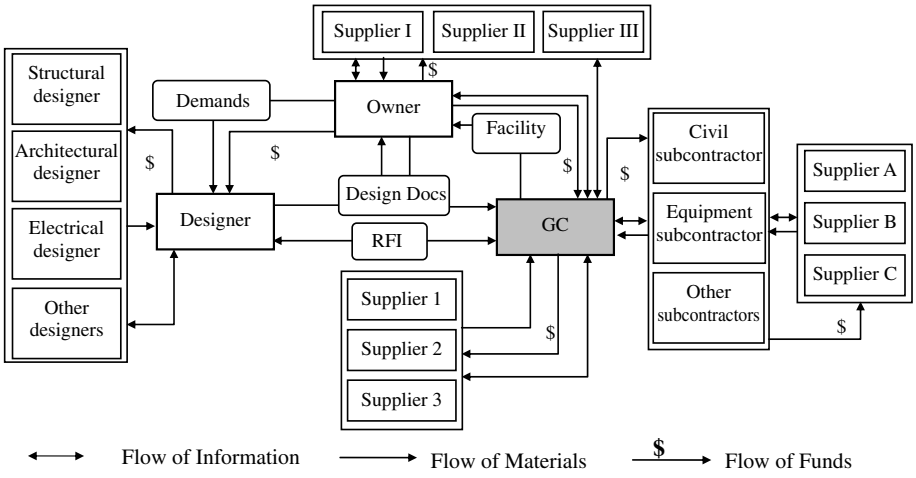

Fig. 1. General structure of construction supply chain.