

The application of electronic commerce and information integration in the construction industry

Yaowu Wang ^{a,c,*}, Jing Yang ^{a,c}, Qiping Shen ^{b,c}

^a Department of Construction and Real Estate, School of Management, Harbin Institute of Technology, P.O. Box 1243, No. 13, Fayuan Street, Harbin 150001, China

^b Department of Building and Real Estate, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong, China

^c National Center for Technology, Policy and Management, Science Park, Harbin Institute of Technology, No. 2, Yikuang Street, Harbin 150001, China

Abstract

Many parties involved in the construction industry have convinced the importance of electronic commerce (EC) for improving business processes, cutting cost, and providing comprehensive information. However, currently the application of EC is relatively limited and ineffective. These systems are always non-interoperable which creates problems for the stakeholders in construction projects. This paper aims to analyze the E-commerce application system and develop a system for the parties to collaborate and share information effectively. In this paper, four information flats are summarized based on the literature survey and field investigation, and the information integration model for EC is built up using IFC and XML. It should provide a useful reference for China to promote the development of EC in the construction industry.

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1. Introduction

The construction industry is a complicated process including various participators, so it is important to exchange information in time among the stakeholders for the development of productivity. But currently, information flow in the construction industry is mostly manual, and numerous paper copies of documents and drawings are dominant in practice. The management of these loose documents is often very time consuming and tedious, which reduces the productivity seriously. With the development of the Internet, electronic commerce has become more important. The use of Internet services may lead to

considerable savings in terms of time and money for construction projects. This increased efficiency in terms of project communication may lead to lower building costs. But the uptake of electronic commerce in the construction industry has been relatively limited and ineffective as compared to other engineering sectors such as the automotive or the aerospace industry. One of the reasons for this could be the fragment nature of the construction industry and the one-off nature of the product. Hence, it is an important task for the present research to enhance the electronic commerce application and information integration in the construction industry.

The Organization for Economic Cooperation and Development (OECD) defines electronic commerce that “it supports and manages the electronic information exchange, including organization management, business management, negotiate, contract, laws, finance means and revenue” [1]. From the point of application, electronic commerce uses the Internet to deal with business. From the point of communication, electronic commerce transfers

* Corresponding author. Address: Department of Construction and Real Estate, School of Management, Harbin Institute of Technology, P.O. Box 1243, No. 13, Fayuan Street, Harbin 150001, China. Tel./fax: +86 451 86402181.

E-mail addresses: ywang@hit.edu.cn (Y. Wang), mrlilij@163.com.cn (J. Yang), bsqpshen@polyu.edu.hk (Q. Shen).

service and information by electronic means, and from the point of business processes, electronic commerce is an automatization course for business and workflow [2]. Due to the application of electronic commerce, information integration gets different corporations, data sources and cooperation partners together by the implementation of process flow, logic and configuration [3], then information communication became effective. This paper defines the electronic commerce of the construction industry as the business activities by electronic means in the field of the construction industry.

Researches on the information integration for the construction industry have been carried out from the 1990s. Teicholz and Fischer put forward the concept of construction integration which is based on object oriented model, integrating all participators in the process of design and construction [4]. Anumba pointed out that construction management needs facilities for supplying cooperative environment [5]. The project of COMMIT demonstrated the importance of cooperation in information management for the first time [6]. Those studies only partly solved the basic problems for information communication, but they are hardly applicable to the practice by making the various participants as a whole. This is made possible through the development of electronic commerce and the appearance of a new technique criterion for the information integration in construction industry.

Based on the nature of electronic commerce for the construction industry, this paper discusses the application and information integration for electronic commerce in the construction industry. In Section 2 of this paper, we research on the application of electronic commerce, information exchange flats and the problem of applying electronic commerce in the construction industry. In Section 3, we analyze the application situation of IFC (industry foundation classes) and XML (extensible markup language) in construction industry, explore the cooperation foundation of IFC and XML, and then build up the model of information integration for electronic

commerce. In Section 4, we point out the keys of developing electronic commerce for the construction industry in China.

2. The application of electronic commerce in the construction industry

2.1. The application situation of electronic commerce in the construction industry

All departments in construction have applied Internet tools in various manners, and many corporations have got profits for using electronic commerce. Recently, about 200 service suppliers gathered in the construction market [7], and the total investment capital of these suppliers is about 25 hundred million dollars [8]. According to the service and products, as Table 1 shows, we could classify the application of electronic commerce in the construction industry for three parts.

The application of electronic commerce includes many functions such as project document management, information search and on-line bidding purchase. So it reduces cost and improves information communication among all participants in the construction industry.

2.2. Electronic commerce information exchange flats in the construction industry

The establishment and development of electronic commerce is an enormous systems engineering. It needs the cooperation of all departments, and should be given attention to the profits of all stakeholders. These stakeholders are not only in companies, but also in the exterior environment. For the construction industry, the stakeholders are more complex. Taking international projects as an example, the stakeholders are shown in Fig. 1 [9].

For the complication of the construction industry, in order to ensure the integrality of information, we must analyze all electronic commerce information exchange flats in

Table 1
The classification of electronic commerce application in construction industry

Classification	Function	URL
Project management and cooperation	Share project documents, and on-line document management Main services: upload or download documents, on-line modification, storage document modification notes, pursue document status	www.activeproject.com www.buzzsaw.com www.buildonline.com www.citadon.com www.loadsping.com
Commonality information gateway	Provide commonality information demands for the participants of the construction industry	www.akropolis.net www.4specs.com www.biw.co.uk www.e-idc.com
Project bidding and purchase	Provide construction products and service Main services: electronic bidding, on-line product/service classification, price data exchange, bidding management, on-line purchase	www.buildpoint.com www.bidaec.com www.ebidsystems.com www.eu-supply.com www.purchasepro.com

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