An Approach to Utilizing Exchanged Documents in Construction Projects Based on Data Warehouse Technology

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Summary

There are many construction projects in China and mass documents are exchanged among the multi-party, including the owner, the contractor and the engineer in the projects. Based on previous studies, an approach to the utilization of the exchanged documents is established by using data warehouse technology and a prototype system called EXPLYZER is developed. The approach and the prototype system are verified through their application in a construction project. It is concluded that the approach can support the decision-making in project management.

1   Introduction

In a construction project, there are many parties of participant, including the owner, the contractor and the engineer etc., and a great deal of information is exchanged among the parties in the form of documents, oral messages, meetings etc. Among the forms of the information, document is not only the carrier of most important management information such as that on schedule, cost, quality control, material etc., but also the evidence of collaborative work for the sharing of information among the multi-party and for the monitoring from relative government agencies. Some regulations have been made by the government agencies for specifying the contents and format of the documents in order to handle the documents efficiently, although they are still based on paper form up to now (BMCC & BMPC 2000). When the project is finished, each party needs to archive the documents for their future use. In addition, for some important projects in China, it is required for the owners to prepare their construction archive and submit it to the relative government agency.

In the previous study, the authors have developed an information management system called EPIMS (Electronic Project Information Management System) and by using the system, the multi-party users can not only submit, check, approve and share the project documents that satisfy the government's regulations on Internet, but also query, present and summarize their contents conveniently (Ma et al. 2002). As a result of using the system, a large number of documents will be accumulated in the database. Besides, in view of the utilization of the accumulated documents, the authors established the model of documents by using object-oriented technology and proposed a data standard of documents based on XML (eXtensible Markup Language) (Ma and Yang 2003). Then the authors introduced the function of extracting documents that conform to the standard according to the conditions that have been specified by the user in EPIMS. This makes it possible to get uniform documents from any construction project in which EPIMS is used.

It is well known that information becomes resources only when it is utilized. Song et al. introduced the concept of building documents to represent the reusable information from construction projects and clarified some basic problems (Song 2002). In addition, data warehouse technology seems to have the potential to be used in information utilization. Soibelman and Kim explored how to prepare data for a data warehouse to carry out data analysis and to discover knowledge (Soibelman and Kim 2002). Chau et al. conducted research

on the application of data warehouse technology in the project management for contractors (Chau et al. 2002).

This research focuses on the utilization of the documents that were accumulated in the process of information exchange among the multi-party in construction projects. Data warehouse is used as a key technology in the research. This paper introduces the rationale and concepts of using the key technology at first, and then presents an approach to utilizing the documents. Besides, a prototype system has been developed and put into trial use to verify the approach. The related result will also be presented in this paper.

2   Approach to Utilizing Exchanged Documents

In China, the paper form of documents is required at present, although electronic version of the paper form is required together with the paper form for some very important projects. However, the electronic form is expected to replace the paper form in the near future. For research purposes, the electronic form of documents is assumed to be available for construction projects in this study.

Further, the electronic documents are assumed to conform to a certain data standard of documents, such as that the authors developed in the previous study (Ma and Yang 2002). Where an information management system is used in the project management, script programs may be developed to generate the standard electronic documents from the transaction database, and EPIMS that the authors developed can generate the standard electronic documents directly.

Three aspects of utilization can be expected to the documents, i.e.

(1) The parties in construction projects can utilize the documents on the current project for making remediation on management. For instance, each party can analyze the documents in order to find if any deviation from the management objectives has occurred and then identify the critical issue of the problem.

(2) The parties in construction projects can utilize the documents on past projects for supporting decision-making. Because the experiences play a very important role in the management of construction projects, the analysis on the documents of past construction projects is beneficial for the managers of each party.

(3) The documents can be used in the operation and maintenance of the constructed facility. For example, when the facility is found to have quality problems or needs to be rebuilt, the exchanged documents become indispensable evidences.

3   Conclusions

This paper explores the utilization of the exchanged documents of the multi-party in construction projects based on extensive literature and field investigation. The characteristics of the documents are analyzed and an approach to utilizing the documents was proposed. Then a prototype system called EXPLYZER was developed by using data warehouse technology to facilitate the utilization of the documents. Then a case study was carried out in a construction project. It is concluded that the approach can support the decision-making in project management.

4   Acknowledgement