Analysis on the Application of XML Data of Cost Consultation Project

Zhang Fengrong

Ruihe Anhui Project Management Group Co., Ltd., Shijiazhuang, Hebei, China, 417672006@qq.com

Abstract: *With the development of the construction industry, new technologies and processes continue to emerge. The extensive application of Internet big data has led to the rapid development of informatization in the cost of construction. In order to meet the needs of the owners, the cost consultation has continued to include more enriched services, and the requirements for quality have increased, which requires some valuable reference data. Hence, the data accumulation of cost consultation projects has become an important task. In recent years, people began to extract data from the past to guide future investment plans, so data extraction and applications have become popular.*

Keywords: *XML data, cost data, whole-process consultation*

1. Introduction

The Opinions on Promoting the Sustainable and Healthy Development of the Construction Industry (Guobanfa [2017] No.19) by the General Office of the State Council proposes to "accelerate the integrated application of building information modeling (BIM) technology in the whole process of planning, survey, design, construction, and operation and maintenance, and realize the data sharing and information management of the entire life cycle of construction projects, to provide a basis for project optimization and scientific decision-making, and promote the quality and efficiency of the construction industry."

On May 28, 2019, the 2019 China International Big Data Industry Expo "Digital Cost Leading the Future-Digital Economy Forum of Construction Engineering" was successfully held at the International Ecological Conference Center in Guiyang. At the conference, Chairman Yang Likun stated that "digital cost, as the product of the deep integration of information technology and construction cost industry, is of great significance to promoting the optimization and upgrading of traditional cost business with technological innovation, improving the whole-process engineering consultation services, and promoting the high-quality development of engineering construction."

From June 4 to 5, 2019, the second Shanghai-Sichuan Engineering Consulting Summit Forum was held in Shanghai with the theme of "Cornerstones and Origins-Exploration of the Professional Development of Cost Consultation". In his speech, Deputy Director Wang Wei pointed out that significant changes have taken place in the current external and internal environment of the construction industry, "in terms of informatization innovation, based on "precise use of data" and "information exchange and sharing" as the breakthrough point, accelerate the digital transformation of construction cost. In terms of legalization, further improve relevant systems through pilot projects, to promote the integration of cost and whole-process consultation, and provide institutional guarantees for the reform of construction cost management."

On August 1, 2019, the China Cost Engineering Association held the working meeting of the Information Committee in Beijing. At the meeting, the research team of the "Research on the Development of Informatization in the Construction Cost Industry" reported the preparation idea and work outline. The Education and Training Department of the Association introduced the "China Cost Engineering Association Informationization Work Plan", and proposed that the Association will strengthen the linkage with local cost associations, professional committees of the Association and outstanding enterprises, and actively explore and practice the mechanism of information co-construction, sharing, and co-management in construction material cost information services and construction cost industry.

It can be seen from the themes of the above conferences that information sharing and digital cost

have become hot topics. With the application of Internet big data, cost informatization has become inevitable. Big data in the cost industry is constantly being formed and enriched, which lays the foundation for the digital upgrade of engineering cost. The data accumulated by cost consultation enterprises for many years urgently needs to be sorted and summarized to guide future investment.

2. Current state of the industry

In communication with consultation companies in the industry, it is found that they have accumulated a lot of data, but they have no energy to sort them out. Due to the various construction projects and the types of functions, materials and equipment types covered are diversified. Besides, the project locations, cost content and labor costs in each region are different, so professional personnel are required to organize and sort out, which takes up a lot of energy. However, most companies have their own tasks every day; once the entrusting party assigns a project, the time limit would be relatively tight, which cause the data to be not sorted in time. And the longer the time limit, the more difficult it will be to sort it out.

In addition, many companies have not found the appropriate tools to organize these data. The most common one nowadays is to organize index data in excel spreadsheets. Although excel spreadsheets are powerful, the original data still needs to be filled in manually. After filling in, the classification and summary can be realized, and we often use software versions to export the excel spreadsheets to be filtered, summarized, processed and sorted. The process is cumbersome and time-consuming.

Since 2017, the National "13th Five-Year Plan for the Development of the Construction Industry" and the "Opinions on Promoting the Sustainable and Healthy Development of the Construction Industry" by the General Office of the State Council have made arrangements for the development of the "whole-process engineering consultation". The Ministry of Housing and Urban-Rural Development has carried out whole-process pilot projects in Beijing, Shanghai, Jiangsu, Guangdong and other regions and enterprises. Notice of the Management Committee of Hebei Xiong'an New District on printing and distributing the "Administrative Measures for Tendering and Bidding of Construction Projects in Xiong'an New District (Trial)" (January 1, 2019) to implement whole-process engineering consulting services. Projects that use financial funds should implement whole-process engineering consultation services.

It can be seen from the above documents that the whole-process consultation service has been fully launched, and it requires higher, more comprehensive and more accurate business level of the consultation companies that undertakes the task, and these all require the support of big data. The pre-control of investment in the early stage of the whole-process consultation requires a lot of experience. How to provide professional and accurate investment pre-control services for the owner is significant to the database accumulated in cost business.

3. The process of data extraction

At present, bidding department, cost department, and supervision department (project management department) in many companies have accumulated a lot of data. In addition, many owners also have demands in this area, often asking questions related to economic indicators and consumption indicators. Therefore, our group's database is also in urgent need of sorting out. The development of the whole-process engineering consultation business also requires us to master these historical data, so as to provide owners with more comprehensive and all-round engineering consultation.

After exploring and understanding the needs, and based on previous experience, we have sorted out the index classification levels and standards of the housing construction part, and refined the data to be extracted in department projects, branch projects, and sub-item projects of each specialty, sorted and classified the consumption amount to be extracted, and developed extraction rules to make these large amounts of data be checked on demand and summarized by category to assist professionals in completing calculations.

After various tests, we uniformly adopted the XML format as the important format for conversion. This format is strongly compatible, applicable for reading by most computer software, and it can be quickly converted and sorted according to established rules. The XML file is easy to extract, which will not increase the workload of the cost business staff. For instance, the XML format exported by Glodon's pricing software is collected. The next step is to study the XML format in other software. The

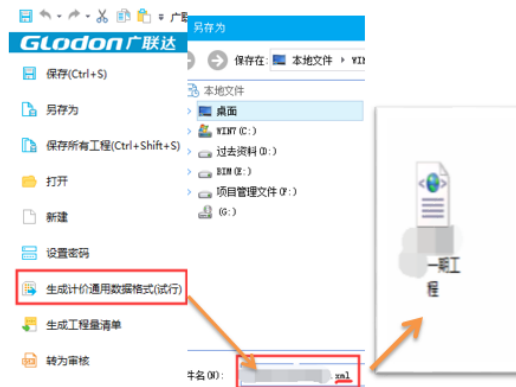extraction steps are shown in Figure 1.

Figure 1. The extraction steps

4. Application of data in XML format

After the one-click conversion by business personnel, upload the data in XML format, the system will sort out the data according to the established rules, so as to quickly extract the required economic indicators and consumption indicators according to the input filter conditions, and achieve horizontal comparison and vertical comparison of same type. In this way, the classification of economic indicators and consumption indicators has been achieved, and a scientific, objective and complete large database has been formed.

Firstly, when reviewing results, the group company can find comparative data from the database based on the project overview, and perform horizontal or vertical comparisons, which has played a great role in preventing deviations in the quality of control.

Secondly, it played a relatively accurate reference role in the preparation of investment estimates and budget estimates, especially in terms of investment estimates. The same types of projects are sorted out clearly, and after slight adjustments in details, a relatively accurate investment estimate can be quickly issued, which improved efficiency.

Thirdly, it enables an intuitive understanding of the trend of economic indicators of the same type of projects in different periods, and can measure the increase or decrease of the project at any time, and understand the trend of the engineering cost. When providing services for the owners, the big data can be used to promptly remind the owners when the investment flow is large, stable, and small, so that the owner's investment will neither be short of funds nor idle, and the investment allocation will be economical.

Finally, currently many developers hope to speed up the construction period and realize the return of funds as soon as possible, before the drawings are fully used as construction drawings, so they require a simulation list. If there is such a database, the economic indicators and consumption indicators of various types of business can be quickly extracted, a complete and complete simulation list of the list items can be timely provided for the owner according to the actual characteristics of the project, and a relatively reasonable bidding control price can be issued according to the simulation list, so that the efficiency and accuracy of preparation can be enhanced.

5. Examples of specific applications

After the database is built, users can check and use it according to needs. The screening is divided into multiple detailed levels. By virtue of the classification of project type, structure type, single-item project, department project and branch project, and more detailed classification like branch projects including earthwork engineering, steel engineering and concrete engineering, the interface is simple and clear with a variety of information integrated. The screenings are shown in Figure 2.
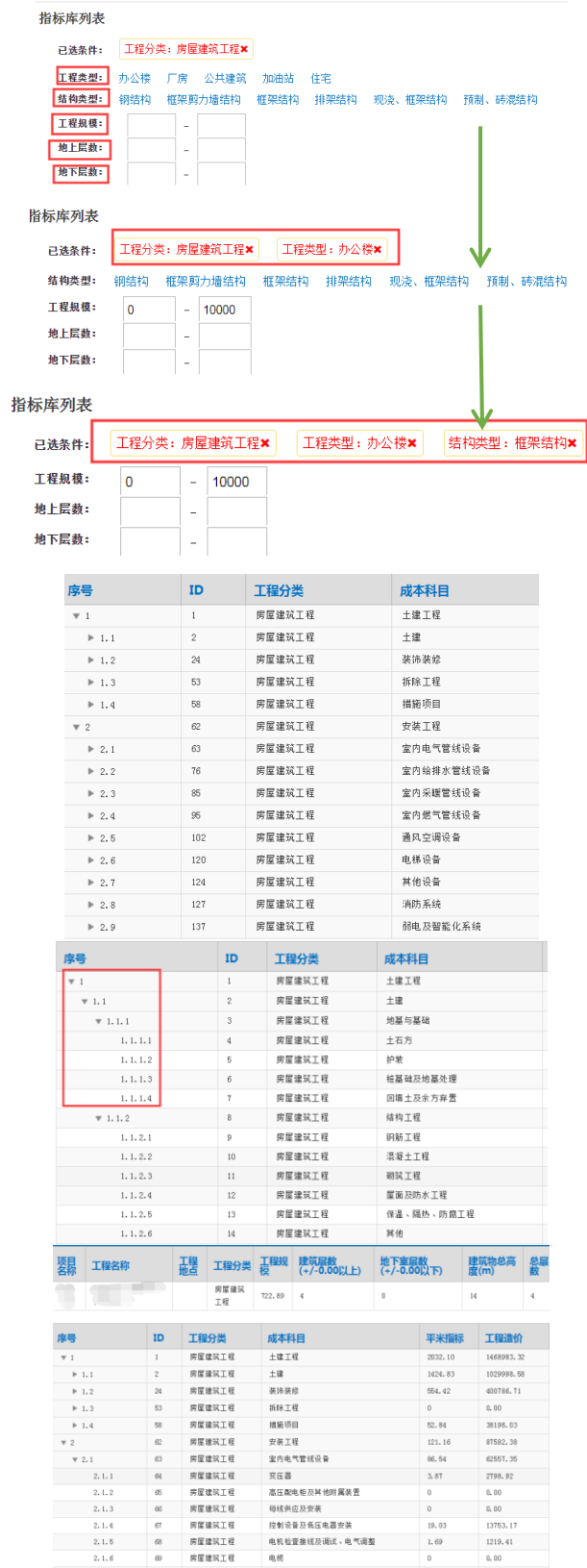
Figure 2.The screenings

6. Conclusion

With the development of informatization in the construction industry, investment control is one of the important links in the construction industry, and control methods and tools have also developed

rapidly, achieving modernization and automation. Many years of accumulated data in the engineering cost industry have been revitalized, and many institutions have begun to sort out these data, so this database will continue to enrich, and the research on the cost data will continue to deepen. Therefore, XML data analysis has emerged to adapt to the development. It is true that the database is not very complete at present, and is being improved. In the future, indicators in municipal greening, highways, hydraulic engineering and hydropower projects, railway projects etc. will also be gradually classified and summarized, which will play an irreplaceable role in guiding future investment.

References

[1] Song Rui (Editor in chief), Wei Hongguang, Li lijiu, Guo Yonglin, Che Minghai (Deputy Editor in Chief). Engineering Consulting Theory and Practice Research Series: Theory and Practice of PMO in Engineering Consulting Enterprises. China Electric Power Press, 2020.

[2] Research Institute of Standards and Norms Ministry of Housing and Urban-Rural Development, Beijing Jianke Software Technology Co., Ltd. (Editor-in-chief units). 'Classification and Calculation Standard of Construction Project Cost Index'(GB/T 51290-2018), jointly issued by the Ministry of Housing and Urban-Rural Development and the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China. China Architecture & Building Press, 2018.

[3] Ministry of Housing and Urban-Rural Development of the People's Republic of China (Editor in Chief Department). Research Institute of Standards and Norms Ministry of Housing and Urban-Rural Development, Sichuan Construction Project Cost Management Station (Editor in Chief units). National standard of the People's Republic of China, 'Code of bills of quantities and valuation for construction works' (GB 50500-2013). China Planning Press, 2013.