# Design and Implementation of Road Engineering Cost Management System

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**Keywords:** Engineering cost; Demand analysis; Database; Cost management

**Abstract:** The thesis introduces the research background, project significance and current research and application status of road engineering cost management system, and clarifies the content and main work of the thesis. In the business analysis, the thesis has problems with the system, organization, The original business process is analyzed, and the optimized business process is given. In the function analysis, the paper clarifies the function of the system through use case analysis and use case description, and gives the overall function package diagram and sub-function package diagram of the system. Including sub-package diagrams of engineering information management, cost management, material and equipment management, quota management, report management, and system management; in data analysis, the paper analyzes the data that needs to be processed for each function of the system, and gives the Entity class relationship diagram, the database table structure is established; the paper concludes the research and analysis work done, and looks forward to further work.

## 1. The main content and work of the study

Mainly targeted at the six modules of engineering information management, cost management, material and equipment management, quota management, report management and system management in the construction cost management system, using object-oriented demand analysis technology, from three aspects of business analysis, function analysis, and data analysis Starting from the existing data structure and business processes, improve the data organization structure, business processes, increase intelligent processing and statistical functions, so that the construction engineering cost management system can meet the following requirements:

※ Information entry is convenient, display is unified and standardized, and clear.

※ The query statistics processing is efficient and the response is timely.

※ The user permissions are set reasonably, which improves the management security performance.

※ The interface is simple and the function classification is clear and clear.

Software requirements analysis is a collection of meaningful statements about all aspects of a system to be developed in a clear, concise, consistent, and unambiguous way. Requirements should be comprehensive and complete, which enables designers and engineers The development of software products has achieved customer satisfaction. Software requirements analysis mainly includes three different levels: business analysis, function analysis, and data analysis. Business analysis is a high-level requirement of customers for software product goals.[1]

## 2. Business description

### 2.1 Organizational Function Analysis

As shown in Figure 1, the road engineering organization is composed of the project management department, production and operation department, material procurement department, administration department and finance department. The production and operation department is divided into data office, bidding office, cost office and production plan Office and Contract Management Office.

  DOI: 10.25236/iwmecs.2020.024

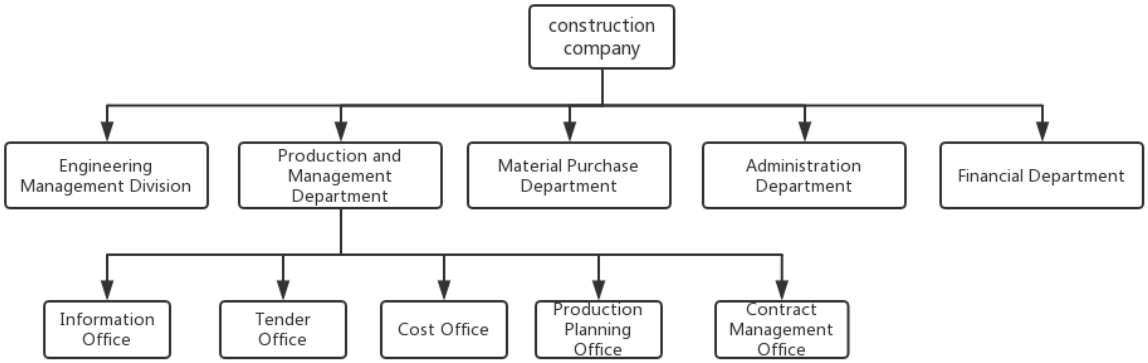


Figure 1 Organizational structure of a road engineering company

## 2.2 Introduction to Construction Engineering Cost Management System

The construction engineering cost management system refers to a computer control system that calculates, analyzes and evaluates the cost of each link of the construction project, so as to provide leadership decision-making, to transfer, store, maintain, and scientifically call engineering information and equipment and material information. Design, budget, engineering, equipment, material procurement and other departments.

The construction cost management can be roughly divided into the following three stages: the project bidding stage, the project construction stage, and the project completion and settlement stage. The main work of each stage is as follows:

1) Project bidding stage. The price quotation before bidding is an important stage of using the construction project cost management system. At this stage, the bidder carefully analyzes the project bidding documents, including the bidding announcement, bidding documents, bidding Q & A, engineering Many items are directly related to the determination and control of the cost of the project, which is the main basis for managing the cost of the project at each stage. J. The construction company makes a quotation based on the construction drawings, bill of quantities, and budget quota. In the bill of quantities, the bidder designs the number of sub-items of the new construction project and the name of the construction measure item according to the method and form specified in the `` Pricing Standards '', and the construction enterprise only needs to perform the corresponding quotation work. It should be designed according to the project quantity list and relevant requirements in the bidding documents, the actual situation of the construction site and the proposed construction plan or construction organization, based on the market price information of the enterprise quota, or with reference to the average social consumption quota issued by the construction administrative department. Based on this, the construction enterprise can Using established according to the construction technology and management level of the enterprise, enterprise quotas and market price information for the enterprise use of independent pricing offer. [2]The design phase of the system, is in fact the overall design of the entire system of cost management.

2) The construction phase of the project. At this stage, the main work is to implement the established cost control targets and control plans, strictly implement the principles and contents of the bill of quantities calculation, and especially pay attention to the increase and decrease of the work of the visa. Before the engineering quantity visa, it should be distinguished between the visa content, whether the project is in the contract, whether the job content includes the visa amount in the bid unit price, and so on.

The list of some sub-items only lists the main project, and the content of the auxiliary project surrounding the main project is mainly based on the project information, which is reflected along with the main project name, which constitutes the basis for the combination and the calculation of the comprehensive unit price. The specific "engineering content" required to complete the main

project and calculate the quotation. However, it is limited to the depth of design and the understanding and understanding of the "quotation specification" by the inventory compiler. The project information description often appears incomplete or inaccurate. Similar problems occurred before and should be clarified with the bidder in time to avoid unnecessary settlement disputes. Otherwise, the two parties will have an objection as to whether the "engineering content" of some of the list items has been included in the theme item's quotation, which will cause unnecessary problems. Settle disputes. When designing a construction cost management system, the system should provide dynamic data modification functions.

## 3. Design of Road Engineering Cost Management System

### 3.1 Overall system design

Based on the above analysis, in the road engineering cost management system, the project department, cost department, finance department, procurement department, design department, construction department, etc. all perform various operations through the browser, and the system selection mode. Although these departments They are independent from each other administratively, but they are logically a whole, and they jointly serve the construction of the project. They share data through the network and are connected to each other, such as the material catalog of the cost department, the material budget price, and the construction contract and material plan. The basis for material procurement and materials out of the warehouse, and the out of warehouse information of the procurement department is one of the basis for the progress department approval and project settlement of the cost department, and the procurement information and out of warehouse information of the material department is the material price difference for the budget department.

The various departments in the construction cost management system communicate through the network. The construction cost management system uses the B / S three-tier architecture for distribution. The first layer is the client, which is the browser used by each department to access the data. The second layer is the middle layer, which is the Web server, and the user handles the specific business logic. The third layer is the database server. The client sends a request to the Tomcat server through the browser. When the database needs to be accessed, the database is accessed through the unified interface component DAO. The structure of this structured program is relatively clear, and it is more readable and reusable than a program implemented with pure JSP.

Considering that the amount of data processed by the cost management system of a single construction project is not very large, and considering the cost reasons, it was decided to use the following software to construct a construction project cost management system.

(1) The database server uses Microsoft's SQLserver2005.

(2) The web server uses Apache-Tomcat 6.0 stable version.

(3) The client browser uses a more stable browser, such as ie5.0 or above, Firefox, etc.

(4) The development technology mainly uses Java Web technology, mainly including JSP, Servlet, etc.

(5) Development tools are MyEclipse, Dreamweaver CS4.

(6) System platform, the operating system used by the system uses the Windows series.

### 3.2 System function module division

According to the demand analysis of road engineering, the road engineering cost system should include 7 subsystems of user management, cost management, engineering information management, materials and equipment management, query statistics, and system auxiliary functions. The overall functional module diagram of the system is shown in the figure:

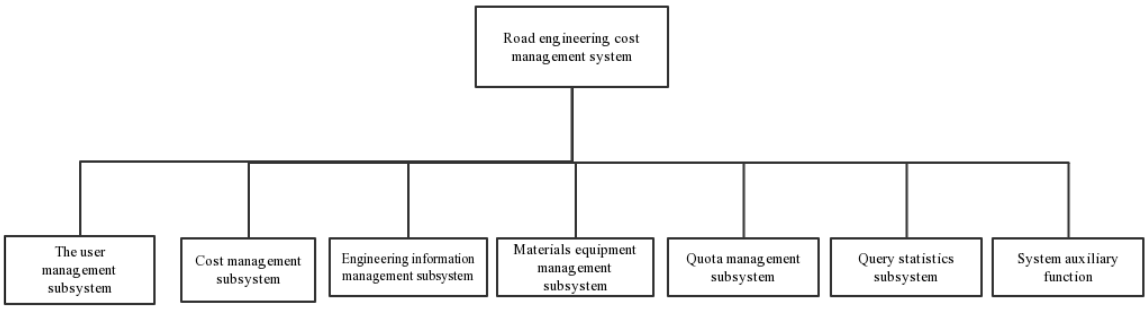


Figure 2 Road Engineering Cost System

### 3.2.1 User Management Subsystem

The user management subsystem is mainly used to manage all personnel information involved in the construction project, including adding users (with new members), modifying user information, setting permissions for different users, and deleting users when the user leaves the project .

### 3.2.2 Cost Management Subsystem

The cost management subsystem mainly manages the funds in the construction of the project, including progress payment approval, construction progress statistics, construction fund plan management, material plan approval, pre-settlement review, cost analysis, etc.

### 3.2.3 Engineering Information Management Subsystem

The engineering information management subsystem mainly manages engineering information, including the addition, modification, deletion, division of projects, and engineering statistics.

### 3.2.4 Material equipment management subsystem

The material and equipment management subsystem is mainly to manage the materials and equipment required for the project, including the preparation of procurement plans, bidding management, procurement contract management, material registration and warehouse registration.

### 3.2.5 Quota Management Subsystem

Quota management is mainly the management of various expenses in construction projects, including manual labor day clicks, material clicks, equipment unit prices, etc., mainly including adding quotas, modifying quotas, deleting quotas, and quota analysis.

## 4. Conclusion

The construction engineering cost management system is not only an information management system, but also reflects a scientific and standardized management system and management system. The application of this system can not only better control the cost and reduce investment, but also make the departments coordinate Sharing data resources, while controlling the progress and quality, ensure that the project cost is properly controlled, and truly achieve the "fast, good and provincial" project construction goal.

## References

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[2] Zhao Xiaofang. Explore the dynamic management and control of construction cost. Health, no.33, pp.233-235,2017.