# Design and Application of Web-Based Financing Management Information System for Infrastructure Projects in Higher Vocational Colleges

Xiaoning Chen[✉]

Shandong Institute of Commerce and Technology, Jinan 250100, Shandong, China
42204571@qq.com

**Abstract.** At present, the enrollment scale of higher vocational colleges is expanding day by day, the demand for infrastructure construction is strong, and the funding gap is large, so a scientific financing management model is urgently needed to solve the problems of financing difficulty and weak supervision and management mechanism. In this regard, this paper takes the infrastructure projects of higher vocational colleges as the research object, and comprehensively utilizes the Internet technology, database technology and computer software technology to build a financing management information system based on Web, which provides a new operation mode and theoretical basis for the financing management of colleges and universities. The function of the system covers the whole process of infrastructure projects. With the help of the technical advantages of management information system in data information analysis, processing and sharing, the digital and information transformation of financing management mode in higher vocational colleges is realized. The system test results show that the financing management information system, as a powerful tool, can adapt to the infrastructure business scenario and help improve the financing management ability of enterprises and universities.

**Keywords:** higher vocational colleges · financing management · information management system · computer software · Web application

## 1   Introduction

With the promulgation and implementation of a series of national policies and regulations, vocational education will continue to expand the scale of running schools, making the demand for infrastructure construction increase sharply. [1] However, as a non-profit unit, higher vocational colleges often face a huge funding gap in the initial stage of project development, which seriously hinders the development of higher vocational education scale and the improvement of teaching quality. At the same time, in the face of diversified financing channels, higher vocational colleges lack perfect supervision and management mechanism, which can easily lead to problems such as fund waste, misappropriation and

over-investment, and increase financing risks. [2] In view of this, this paper believes that based on the characteristics of financing channels and financing methods of infrastructure projects in higher vocational colleges, combined with the actual project management needs, a financing management information system with online standardized management function is constructed, which provides an information and intelligent management paradigm for infrastructure projects in higher vocational colleges. The whole system is B/S architecture, the front-end interactive interface is designed and developed with VUE framework as the core, and the back-end Web Server is built with Django framework. [3] On the one hand, the development of the system can effectively solve many problems currently faced, on the other hand, it also makes a useful attempt for the realization of smart campus in the future.

## 2    Development Process

First of all, the construction of the server side of the system needs to rely on the "request/response" Web framework application. [4] In this paper, Django 4.0 is selected as the Web framework, and the development environment is deployed in the mode of "LNMP", that is, Linux CentOS 7 is selected as the bottom operating system, Nginx is selected as the Web server, MySQL 8.0 is selected as the database server, and Python 3.8 is selected as the development language. A special Web Server Gateway Interface(WSGI) interface protocol is needed between Django framework and Web server to realize data communication. [5] As far as this system is concerned, the logic running on the Web Server side is Nginx-WSGI-Django, and related settings need to be completed with the help of Pycharm integrated development tools. Secondly, the functions and business logic control in the system will be designed and defined in turn under the Django framework. [6] After all the design is completed, all the files are packaged and published on the server, which can support users to log in remotely. Through the introduction of the above key technical theories, the overall environment of system development, the configuration of related software and tools are determined, and the technical feasibility of the overall project of financing management information system for infrastructure projects in higher vocational colleges is also clarified.

## 3    Functional Implementation

### 3.1    Financing Management

The system will estimate and calculate the amount of financing funds for infrastructure projects according to the actual financial situation of higher vocational colleges. Infrastructure projects have long construction period, many processes and huge financing amount, which can be subdivided into three parts: construction investment, interest during construction period and working capital, among which construction investment can be divided into construction cost, equipment purchase cost and installation cost. [7] Different funds need different estimation algorithms. Taking construction investment as an example, the financing estimation is completed by proportional estimation method, and the calculation formula is shown in Formula 1. Where Q represents the construction

**Table 1.** Calculation results of probability distribution of main index factors

| Risk indicator | High-risk | Medium to high risk | Medium risk | Medium to low risk | Low risk |
|---|---|---|---|---|---|
| W | 0.000 | 0.0013 | 0.0724 | 0.3088 | 0.6175 |
| S | 0.000 | 0.0016 | 0.0729 | 0.2658 | 0.6598 |
| R | 0.000 | 0.0028 | 0.0773 | 0.2977 | 0.6222 |

investment amount of the proposed project, E represents the current equipment purchase cost of the proposed project, P represents the proportion of the equipment purchase cost and installation cost of the built project to the construction cost, f represents the adjustment coefficient, and I represents other expenses of the proposed project. After further estimation, we can choose suitable financing channels, such as BOT mode, PPP mode or ABS mode.

$$Q = E(1 + f_1 P_1 + f_2 P_2) + I \tag{1}$$

Under the financing risk assessment, in view of the particularity of infrastructure projects in higher vocational colleges, WSR system methodology is usually used to construct a financing risk management framework from three dimensions: W, S and R. [8] After the indicators are determined, the risk indicators are set, with three dimensions, W, S and R, as the main indicators, and the sub-indicators included in them. Then, the index is weighted by G1 method, that is, the weight value A of each index factor and the probability distribution value B of each index factor are determined, and the risk combination probability and total risk probability value Pi of the sub-level index factors are calculated by CIM model. [9] The formula for calculating the total probability of financing risk of infrastructure projects is shown in Formula 2, where i stands for risk level. Finally, the test results of the distribution of indicators and factors in the main layers of W, S and R are shown in Table 1, and the test results of the overall financing risk probability of the project are shown in Table 2. According to the test results, it shows that the financing risk of infrastructure projects in higher vocational colleges is in a low-relatively low range, and the project financing model is reasonable and meets the actual needs.

$$P_i = \sum_{j=1}^{n} A_j \times B_{ij} \tag{2}$$

## 3.2 Approval Management

The system will introduce workflow engine to complete the process service control and performance expansion of various functions, and ensure that funds are approved, supervised and controlled in the use of each link. The system chooses Activiti open source workflow engine, and gives the core class ProcessEngine and some Service classes in Activiti to Django for management, so as to realize the call and processing of workflow by Web Server [10].

**Table 2.** Probability distribution of total risk of construction project financing

| Project financing risk level | Probability |
| --- | --- |
| High-risk | $P_i = 0.4315 * 0.000 + 0.2567 * 0.000 + 0.3094 * 0.000 = 0.000$ |
| Medium to high risk | $P_i = 0.4315 * 0.0013 + 0.2567 * 0.0016 + 0.3094 * 0.0028 = 0.0018$ |
| Medium risk | $P_i = 0.4315 * 0.0724 + 0.2567 * 0.0729 + 0.3094 * 0.0773 = 0.0738$ |
| Medium to low risk | $P_i = 0.4315 * 0.3088 + 0.2567 * 0.2658 + 0.3094 * 0.2977 = 0.2935$ |
| Low risk | $P_i = 0.4315 * 0.6175 + 0.2567 * 0.6598 + 0.3094 * 0.6222 = 0.6309$ |
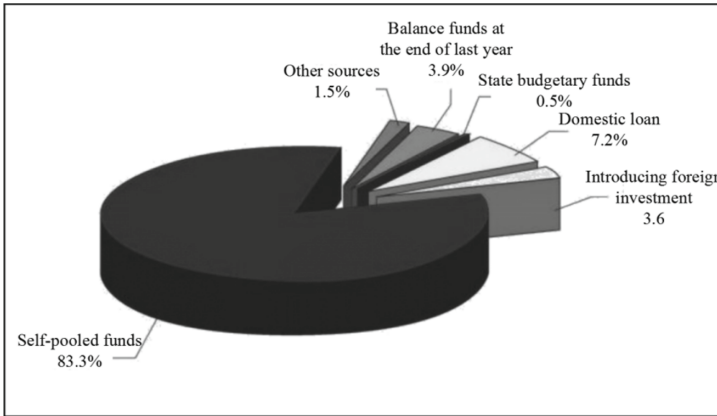


**Fig. 1.** Project financing fund structure

## 3.3 Data Statistics

Under this function module, users can make statistics on the project financing fund structure, and conduct data perspective in the form of charts, which is convenient for users to view and apply intuitively. Figure 1 shows the financing fund structure of an infrastructure project in higher vocational colleges.

## 4 Conclusion

This paper aims at constructing the financing management mode of basic projects in higher vocational colleges, aiming at many shortcomings such as difficult financing and weak management mechanism, and builds a financing management information system based on Web with the help of network information technology and the practical characteristics of database technology and computer software technology. The system focuses on optimizing the overall workflow from three aspects: project financing management,

online approval and data statistical analysis, which effectively improves work efficiency and promotes the digital and information transformation of financing management mode in higher vocational colleges.

## References

1. Zhou Jiansong, Chen Zhengjiang. New Orientation and Mission of Higher Vocational Education under the Background of High-quality Development[J].China Higher Education Research.2022.08.
2. Wang Li. Analysis on the Present Situation of Infrastructure Financing in Private Colleges and Universities and Its Optimization Measures[J].Chinese Enterprise Accounting of Villages and Towns.2022.10.
3. Wu Xiaoshan, Cao Xudong, et al. Development of Management System Software Based on B/S Architecture[J].Computer Measurement and Control.2019.02.
4. Qi Xuedong, Han Lifeng. Design and Application of Web Framework Based on MVC [J]. Microcomputer Applications.2021.03.
5. Wei Limei, Su Bing. Overview of Python Website Development Process under Django Framework [J]. Computer & Telecommunication.2019.12.
6. Qiu Hongli, Zhang Shuya. Research on Web Project Development Based on Django Framework[J].Scientific and Technological Innovation. 2021.09.
7. Yu Mengyi, Chen Zhongwen. Discussion on Financing Characteristics of New Infrastructure Construction Projects in China[J].Jiangsu Science & Technology Information.2020.06.
8. Hu Junpeng, Li Haiping, et al. Research on the Construction of Standard System Based on WSR Methodology[J].China Standardization.2022.02.
9. Yang Guangming, Li Yuzhen. Research on Financing Risk Assessment of Hydropower Projects Based on WSR-CIM Model[J].Journal of Technical Economics & Management.2017.08.
10. Xue Yuan. Research and Implementation of Collaborative Office Application Based on Activiti Workflow Engine[D].University of Electronic Science and Technology of China.2016.09.