

# A Simple Analysis of the Quality, Cost, and Safety Management of Basic Construction in Universities

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**Abstract:** With the continuous development of higher education, both national and local governments have increased their investment in the construction of higher education infrastructure. There are various types of buildings that universities need to build, and most of the infrastructure construction in universities is sustainable. This leads universities to not only focus on the engineering construction itself, but also pay attention to the relationship between the engineering and the normal operation of existing campuses in infrastructure construction and management. This article analyzes the current focus of infrastructure management in universities from three aspects: quality, cost, safety, and civilization.

**Keywords:** Basic Construction of Universities; Quality; Cost; Safety.

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## 1. Introduction

In recent years, higher education has been continuously developing, and various universities have seized the opportunities of the times and made efforts to build dormitories, teaching buildings, experimental and training venues, sports venues, etc. to meet the foundation and essential needs of sustainable development. The management of basic construction in universities is mostly carried out by the administrative departments of universities themselves [1,2], which has problems such as insufficient personnel management ability, lax control of engineering quality and risks, and cost overruns [3]. At the same time, the types of construction in universities are also quite diverse, such as classrooms, training workshops, large-span halls, etc. The safety management control points for different types of projects are also different, and university construction requires higher requirements for campus safety and harmony and stability [4]. Therefore, comprehensive control of the quality, cost, safety and civilization of each project is required in management.

## 2. Key Points of Quality Management for University Infrastructure Projects

The quality management of university infrastructure not only refers to the quality management during the construction phase, but also includes the quality management of project design in the early stage and the quality management of final acceptance in the later stage.

To achieve a good final presentation of the project, the first step is to conduct a functional requirement analysis and design drawings. Clear requirements and complete construction drawings are the cornerstone of subsequent construction. Yang[5] pointed out that during the blueprint design stage, school infrastructure management personnel should fully investigate the actual needs of various units, departments, and teachers and students, fully absorb the advanced experience of similar universities, deeply explore the cultural connotation of the school itself, actively organize project demonstration meetings, accurately and completely express construction requirements, and refine task book

requirements. In the actual drawing design stage, the school needs to provide complete information such as pipelines, surrounding buildings, and archives. The design unit can be required to use BIM technology to implement the coordination and unity of building, structure, plumbing, HVAC, electrical and other specialties one by one. The final drawings should be comprehensively reviewed by infrastructure management personnel or hired experts in design, construction, and supervision to minimize any unreasonable aspects of the drawings and avoid errors, collisions, omissions, and hidden design changes. Dai[6] pointed out that quality control in the early stage is the control of project approval and feasibility study report application, and quality control in the design stage is the quality control of preliminary design and construction drawing design. During the project initiation and feasibility study stage, a comprehensive analysis should be conducted on the construction scale, environment, and funding situation of the project to ultimately determine the investment scale and functional positioning. According to the medium - and long-term development plan of the college, a feasibility study report that can maximize benefits should be formed. When designing drawings, it is necessary to fully communicate with the design unit, express one's own demands, and organize industry experts to demonstrate the drawings, improve the quality of the drawings, and reduce unnecessary changes in the future.

In the quality management of the construction process, the construction quality management system, material and equipment management, and construction process control are particularly important. Cai[7] pointed out that for construction quality control, the school management organization should first establish a sound quality management system. Based on the characteristics of different projects, the quality objectives of each project should be decomposed and refined, the responsibilities and powers of each management personnel should be clarified, a project quality assessment system should be established, and the sense of responsibility of management personnel should be strengthened. To organize school management personnel to systematically learn quality acceptance standards, process inspection systems, common engineering defect identification and handling methods, establish a supervision

and inspection process for engineering quality control points, and implement dynamic quality supervision throughout the entire process. Zhang[8] pointed out that the construction quality of university infrastructure projects should not only be fully supervised by the school, but also strengthen the management of project supervision personnel. The management ability of school management personnel varies, so it is necessary to use professional supervision personnel to supplement management, timely discover and correct technical errors during construction, in order to avoid irreparable problems. Zhang[9] pointed out that in order to ensure the quality of the construction phase, it is necessary to establish a pre-, during-, and post control system. Carry out work briefing in advance. Strict inspections should be carried out on materials during the process. For general materials, their certificates of conformity, factory certificates, production dates, etc. should be verified. For infrastructure departments such as installation equipment, intelligent equipment, and decorative materials, sufficient research should be conducted to reasonably determine the brand range. Afterwards, it is necessary to compare the current construction plan and goals, identify quality issues and solve them, and dynamically revise the subsequent work content and management measures. Liu[10] pointed out that in order to improve construction quality, it is necessary to establish a sound construction management mechanism, strengthen the quality supervision function of university infrastructure departments, and control material inspection and concealed project acceptance.

During the completion stage, quality control mainly involves data management and operation and maintenance quality management. Dai[6] pointed out that all parties involved in the completion acceptance must strictly abide by national laws and regulations, mandatory standards, and design documents, and comprehensively inspect the engineering quality and equipment operation. Identify quality issues and rectify them within a limited time until they are qualified. The project also needs to obtain qualified acceptance certificates for fire protection, civil defense, and energy conservation according to the procedures, and timely sort and archive relevant archives. Strengthen quality inspections during the warranty period and implement various maintenance work during the warranty period. He[11] pointed out that during the period from completion to warranty period, universities should attach importance to maintenance management during the warranty period and establish a post use evaluation mechanism. Especially for maintenance and renovation projects, the post maintenance and renovation evaluation mechanism can fill the gap in tracking and auditing after project completion, reflect the advantages and disadvantages of the project from the evaluation results, and promote the development and improvement of the maintenance project management system.

### **3. Key Points of Cost Management for University Infrastructure Projects**

Cost control is essential for university infrastructure projects while ensuring quality. In the context of tight funding from all parties, the construction of infrastructure in universities must increase the coordination of funds, improve the efficiency of fund utilization, and do a good job in cost management. In the process of project management, the focus of cost management is also divided into three stages: pre

project work and budget, dynamic cost control during the construction phase, and completion settlement and final accounting.

In terms of early cost management, it is necessary to enhance cost control awareness and strengthen budget preparation. Yang[12] pointed out that there are various sources of funding for higher education in China, but public institutions mainly rely on financial appropriations. Before carrying out construction, universities should establish sound regulations for budget performance management, scientifically and reasonably formulate goals, supervise the implementation process, and evaluate the completion of budget preparation. The cost control during the initial project approval and design stages can affect about 70% of the total project cost. Therefore, in the construction drawing design stage of the project, it is necessary to fully communicate with the design party according to the development needs of the school, and the total project amount cannot exceed the investment estimate. Liu[13] pointed out that some infrastructure management departments in universities are composed of personnel from other departments, lacking cost management awareness and a clear cost management system. Therefore, in the early stages of construction, a sound cost control system should be established, personnel cost management level should be improved, limited design and standard design should be actively promoted, and design supervision should be implemented. Ye[14] pointed out that cost management cannot be separated from professional personnel. Due to the lack of professional engineering management personnel in some universities, it is impossible to detect the cutting corners of construction units in subsequent cost management work. After establishing a professional cost control team, it is important to focus on establishing a cost management system, reviewing project design quality, and controlling the construction process. Lu[15] pointed out that when universities prepare project lists and control prices for small-scale projects, it is advisable to select a reputable cost consulting company from the school's cost consulting database for preparation work. After completion, the preparation should be reviewed by the school's infrastructure department and audit department respectively. For large-scale projects, it is advisable to choose two cost consulting companies to simultaneously prepare lists and control prices, and then organize professional personnel on campus to review and optimize the two lists, ultimately integrating them into the bidding list and control prices. Yi[16] pointed out that the accuracy of project estimation is not high when making decisions for the establishment of university infrastructure projects, and the degree of cost control responsibility is not sufficient. Therefore, universities need to implement quota design in the early stage, control the estimation, and control the budget. They cannot arbitrarily add construction content or change the design scheme on the approved preliminary design and total estimation, without raising construction standards or expanding investment scale.

In terms of dynamic cost control during the construction phase, Yang[12] pointed out that it is necessary to strictly control change visas, resolutely not change non essential visas, timely apply for unavoidable visas, and update the accounting of project output value. If there is a risk of overspending, non important work should be optimized in a timely manner to reduce costs. Liu[13] pointed out that during the construction process, it is necessary to compare the actual expenses incurred in each stage of the project with the project schedule

budget in real time. For the parts exceeding the budget, relevant personnel should be ordered to analyze the reasons, provide effective rectification measures, and timely achieve relevant cost control goals. Regularly verify the payment of project funds. At the same time, attention should be paid to contract management, and professional personnel should handle contract claims. Zhang[17] pointed out that for universities, the static settlement mode after project completion is difficult to meet the effective supervision of infrastructure projects. However, adopting the tracking dynamic audit mode can actively and dynamically supervise, control, and evaluate the entire process of project implementation, and timely discover and correct problems, effectively control costs, and improve investment efficiency. Lu[15] pointed out that in the construction phase, cost control work needs to be done from multiple aspects such as personnel, technology, contracts, and management. By selecting construction units through open bidding, the determined winning bid price is 12.62% lower than the average bidding control price. Strictly follow the construction drawings during the construction process, and strictly implement the approval procedures in accordance with the university's own changes and visa management methods. Widely listen to opinions and prevent arbitrary changes.

In terms of completion settlement and final cost control, Yang[12] pointed out that it is important to focus on reviewing whether the settlement data is complete, whether there are duplicate calculations, incorrect calculations, and excessive calculations in the engineering quantity, especially to focus on managing the cost control of concealed projects and visa change projects. To review whether the group price complies with national standards, specifications, and contract requirements. After the settlement is completed, timely handle the final accounts and conduct performance evaluations, analyze and summarize the influencing factors of cost control differences between projects, and summarize experience and lessons learned. Liu[13] pointed out that during settlement, attention should be paid to the construction unit increasing the total settlement price. According to the relevant provisions of the contract, the construction unit can control false quotations, reduce subsequent audit expenses, and save audit time. Lu[15] pointed out that in order to avoid the construction unit's settlement price being inflated during settlement, corresponding audit rules should be specified in the bidding and contract. For example, if the audit cost exceeds a certain percentage, the construction unit should bear the audit cost. If the audit cost is too high, the construction unit will report to the Provincial Department of Education for filing. The company will not be used for education system construction within three years. Feng[18] pointed out that in terms of final accounts for completed infrastructure projects, there are problems such as non-standard accounting, non-standard financial statements for completed projects, lack of dedicated fund management, and infrastructure projects being in a long-term state of completed but unfinished final accounts. Therefore, it is necessary to strengthen the financial accounting system for basic construction projects and establish detailed accounts in the general ledger according to the projects. Pay attention to the writing of project final accounts reports. The finance department should participate in the project as early as possible and adjust relevant estimates in a timely manner based on factors such as project usage and decoration quality. After completion, early warning will be given for project

settlement based on factors such as actual investment and construction period.

#### **4. Key Points for Safety and Civilized Management of University Infrastructure Projects**

Universities are places where people gather, and their construction is often not achieved overnight. With the development of the school itself and changes in the needs of teachers and students, many universities have a process of running and building at the same time. In this situation, infrastructure management is not only the safety management within the construction site, but also the management of the safety and harmony between the construction site and surrounding facilities. The management of personnel, systems, and measures is the key to safe and civilized management.

In terms of security management personnel, there is a shortage of dedicated security management personnel in university funds. Yang[19] pointed out that due to limited personnel allocation in infrastructure management departments, production safety management responsibilities in Chinese universities are not clearly defined and are mostly undertaken by the Engineering Construction Management Department. Therefore, in the face of a shortage of safety management personnel and insufficient professional knowledge in universities, it is necessary to clarify the safety management system, clarify the situation of pipeline facilities around construction projects, require construction units to allocate sufficient safety management personnel, and submit relevant safety plans to the supervisor for review. Huang[20] pointed out that personnel safety training and education should be strengthened. Universities are densely populated areas, and many workers have received safety training and education related to engineering, but have not received training and education on safety risks in densely populated areas, nor have they considered the impact of construction operations on the teaching order of the school. So we need to strengthen relevant safety and civilization training.

In terms of safety system, first of all, it is necessary to study laws and regulations, then establish a sound safety management system, and conduct safety and civilized supervision and inspection at any time during operation. Ji[21] pointed out that some university leaders do not attach enough importance to engineering safety production management, believing that project safety is borne by the construction and supervision units, and the infrastructure department only undertakes communication and coordination work, resulting in low safety management level and leading to safety accidents. Therefore, university leaders should have a sense of safety management, improve management systems, and combine departments such as auditing, supervision, and security to form a professional supporting safety production management team. Huang[20] pointed out that the implementation of safety systems is crucial, and it is necessary to clarify the content, frequency, and standards of supervision and inspection. The inspection should cover safety responsibility system, on-site construction management, safety facility configuration, and qualifications of special operation personnel. The frequency of inspections should not be lower than the frequency of supervision meetings. Universities should not only do a good job in safety inspections, but also actively invite industry regulatory departments to supervise the safety work of projects, in order

to timely correct improper behavior of construction units.

In terms of safety and civilization measures, Yang[5] pointed out that infrastructure project construction will have a certain negative impact on campus safety and civilization, so it is necessary to plan and layout relevant safety and civilization measures in advance. In the early stage of construction, it is necessary to reasonably requisition the construction site and roads for enclosure, ensure that the construction flow line is separated from the daily teaching flow line, and ensure normal teaching order. For noisy work, relevant measures should be taken to reduce the impact, and a situation explanation should be issued to teachers and students. Active communication with teachers and students should be carried out to ensure normal class operations and orderly construction of the project. On the basis of routine safety inspections in engineering, the construction unit can also take measures to appoint third-party safety inspection units to carry out regular and irregular safety special inspections to solve safety hazards in various large machinery and special construction projects.

## 5. Summary

This article summarizes the characteristics of the quality, cost, safety and civilization of university infrastructure, and concludes that the key control points for university infrastructure quality management are: construction drawing quality, construction quality system construction, construction material inspection, completion data quality, and operation and maintenance management. The key points of cost control include budget cost control, dynamic construction cost tracking control, completion settlement and final accounting control. The key points of safety and civilization control include: management of safety personnel, construction of safety systems, and control of safety measures.

## References

- [1] Zhang Xiaohui, Jiang Chunchun Research on Optimization of Management of Infrastructure Projects in Universities [J] Journal of Urban Studies, 2023,44 (1): 46-50.
- [2] Xue Yangang The application of project-based management mode in university logistics management [J] Journal of Dalian University of Education, 2015, 31 (04): 64-65.
- [3] Zeng Yaling Research on Cost Control of Phase I Project of Y University's New Campus under EPC Mode [D] Engineering Management, Central South University of Forestry and Technology, 2022.
- [4] Lan Gaoming Research on Safety Production Management of University Infrastructure Projects [D] Guangxi University Architecture and Civil Engineering, 2014.
- [5] Yang Li Key points of management and control for university infrastructure projects under self management mode [J] Architecture and Budget, 2023 (11): 28-30.
- [6] Dai Chaoran Discussion on Quality Control of Infrastructure Projects in Universities - Taking the Infrastructure Project of Binhu Campus of Hefei Normal University as an Example [J] Journal of Hefei Normal University, 2022, 40 (06): 129-132.
- [7] Cai Ya Research on Quality, Cost, and Duration Control of University Infrastructure Projects [J] Fujian Building Materials, 2019 (05): 105-107.
- [8] Zhang Ruiling Research on Construction Management and Control Strategies of University Infrastructure Projects [J] Construction Technology, 2023 (16): 88-90.
- [9] Zhang Zhanheng Exploration of Optimization Measures for Construction Site Management of University Infrastructure Projects [J] Residential and Real Estate, 2021 (21): 171-172.
- [10] Liu Yang The control strategy for engineering quality in the construction of university infrastructure [J] Residential and Real Estate, 2023 (26): 106-108.
- [11] He Guoxiu, He Peifen, Liu Jiaqi The current situation and countermeasures of maintenance and renovation project management in universities [J] Engineering Construction and Design, 2023 (15): 226-228.
- [12] Yang Yi Research on Cost Control of Infrastructure Projects in Universities: From the Perspective of Integrated Budget Performance Management Quality and Market, 2023 (04): 139-141.
- [13] Liu Hongjiang, Xia Xiaotian, Zhang Xianglong Research on Cost Control Issues and Countermeasures of Infrastructure Projects in Some Universities [J] Urban Architecture, 2020,17 (23): 167-168.
- [14] Ye Quanfeng Analysis of Difficulties in Cost Management of Infrastructure Projects in Universities [J] Technology Wind, 2018 (23): 255.
- [15] Lu Huijiang, Liu Ning Research on Cost Control of University Infrastructure Project Construction [J] Engineering Economics, 2021, 31 (7): 18-21.
- [16] Yi Dong Problems and Countermeasures in Cost Management of Infrastructure Projects in Provincial Universities [J] Journal of Hunan University of Science and Technology, 2023,44 (05): 57-60.
- [17] Zhang Lang Research on Optimization of Tracking Audit for Infrastructure Projects in Universities [J] Market Weekly, 2023,36 (12): 123-126.
- [18] Feng Simi An Analysis of Improving the Quality of Financial Accounts for Completed Infrastructure Projects in Universities [J] Finance and Economics, 2023 (18): 129-131.
- [19] Yang Cuiping, Huang Qunqun, Meng Lei Analysis of Construction Safety Management in Higher Education Projects [J] Jiangxi Building Materials, 2020 (7): 176-177.
- [20] Huang Xiaoyi, Cao Jing, Pei Xiongfei Research on Safety Management Measures for Construction Process of Infrastructure Projects in Universities [J] Construction Technology, 2023 (9): 28-30.
- [21] Jijiyang Research on Safety Production Management of University Infrastructure Engineering [J] Brick and tile, 2022 (09): 108-110.