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Research on Collaborative Mechanisms and Platform Optimization for Engineering Procurement Management in Multi-Campus Universities

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Abstract: With the continuous deepening of China's higher education system reform, universities have adopted a multi-campus model through mergers, reconstructions, and expansions, alleviating the constraints on their development and leading to a significant rise in infrastructure construction project procurement. Consequently, internal control and risk management in the procurement process under the multi-campus management model have garnered widespread attention. The bidding and procurement in the engineering field now face new risks and challenges. By analyzing factors such as the division of procurement management responsibilities and the connection of procedures across campuses, the complexity and variability of construction project procurement, and the characteristics of university construction project procurement, this paper proposes a risk prevention and control system for multi-campus engineering bidding and procurement under the principles of "centralized leadership, tiered management, and professional collaboration.

Keywords: Multi-campus; Engineering field; Bidding and procurement; Prevention and control system

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1. Introduction

In recent years, higher education has entered a stage of high-quality development, and the physical reform of higher education has entered a deep water zone. More and more universities are unable to form a large-scale development and resource integration of education due to the limitations of their educational space. In order to solve this problem, most universities have gradually formed a new pattern of multi-campus education through a series of measures such as mergers, reconstruction, and expansion [1]. The formation of a multi-campus education model has improved the integration of educational resources and strengthened the construction of advantageous disciplines, but it has also brought new challenges. The renovation and expansion

of multiple campuses have brought about a large-scale demand for engineering construction procurement, posing unprecedented challenges to the bidding and procurement management of universities. In particular, the internal control and risk management issues in the engineering procurement process under the multi-campus management model have attracted widespread attention and discussion from all sectors of society. This article provides an in-depth analysis of the difficulties in connecting the responsibilities and procedures of multi-campus procurement management, the complexity and variability of multi-campus engineering project procurement, and the characteristics of university construction project procurement. It also explores possible solutions to help achieve high-quality and sustainable development in the field of engineering procurement in Chinese higher education institutions.

2. Multi-campus bidding and procurement in the field of engineering face difficulties

2.1. Characteristics of procurement for university construction projects

University construction project procurement is characterized by several key features. Public welfare is a prominent attribute, as procurement aims to meet school infrastructure needs, improve the teaching environment, enhance education quality, and promote national education development. University construction projects are mainly funded by national financial appropriations, with the government as the single investment entity, which affects the stability, efficiency, and flexibility of fund allocation. Procurement management is statutory and mandatory, with bidding and procurement activities strictly implemented in accordance with national laws and local policies under regulatory supervision. The construction content is complex and diverse, requiring attention not only to quality and schedule but also to teaching, research, majors, and humanistic factors. In addition, the campus construction environment has special characteristics, as construction activities may affect the teaching and living order of teachers and students, making construction period arrangements, noise control, and safety management particularly important [2].

2.2. Difficulties arising from the division of procurement management responsibilities and the connection of procedures in each campus

The management mode of cross-regional procurement in universities should fully consider the nature of education in different campuses. The “one university with multiple campuses” model typically falls into two categories: one in which the cross regional campuses are congruent with the main campus in all dimensions except geographical location; the other entails the university engaging in cooperative education with local governments or social capital, wherein the cross regional campuses primarily secure financial and material resources allocated by the government. The procurement work of multi-campus universities needs to be completed within the framework of an “integrated” system, which puts higher demands on the procurement work of multi-campus universities [3].

It is necessary to clarify the procurement management responsibilities of each campus and the reasonable connection of procurement procedures between multiple campuses, in order to avoid management vacuum zones or lengthy approval processes. We need to leverage the regional advantages of each campus, seek adaptive development of procurement activities based on actual needs and work characteristics, and achieve flexibility in the formulation of systems and policies. Moreover, it is necessary to have the means to identify risks in the entire process of engineering bidding and procurement for each campus, grasp key information

such as procurement requirements, supplier information, contract data, and acceptance reports, and provide guarantees for centralized analysis and strategic decision-making for the school. These issues are all constraining the momentum of the development of multi-campus universities.

2.3. Complexity and variability of procurement for construction projects

Construction project procurement exhibits several notable characteristics. The complexity of procurement objects is prominent, involving numerous types of materials and services that are intertwined within engineering projects and form a complex structure across time, price, and quality dimensions. The procurement process shows imbalance, with significant fluctuations in demand and supply at different stages, often lacking clear patterns, especially when unexpected situations require a rapid increase in specific materials. Procurement processes are closely related and interdependent, requiring precise coordination, as problems or delays at any stage from project initiation to construction directly affect subsequent stages and overall project progress. Procurement activities also exhibit dynamic evolution, requiring timely strategy adjustments in response to market changes, since project design and procurement plans are interdependent and may need modification during construction. In addition, procurement risks are frequent due to uncertain factors, including supplier delays, transportation disruptions caused by natural or social factors, and seasonal influences such as winter and rainy seasons.

3. Risk prevention and control system for bidding and procurement of multi-campus projects

3.1. Establish a multi-campus procurement management model of "centralized leadership, hierarchical management, and professional collaboration"

The school recruitment center is the brain and center responsible for formulating unified "game rules". The procurement centers of each branch campus are responsible for the implementation process and compliance within their respective campuses. The professional team of the engineering implementation unit is responsible for "what needs to be bought", while the procurement center is responsible for "how to legally buy", forming a balance mechanism that separates requirements from procedures.

3.1.1. Functions of the school procurement center

The school procurement center is the leadership, standardization, and supervision layer, serving as the policy-making center, standard output center, training center, and supervision center for the entire school's procurement work. Responsible for institutional construction and strategic planning, standardization and process unification, training and capacity building, comprehensive supervision of procurement activities and performance evaluation of branch campus procurement centers, development of a unified archive management and information platform optimization for the whole school, and representing the school to liaise and coordinate major and complex procurement projects across campuses with higher-level procurement regulatory departments.

3.1.2. Functions of the campus procurement center

The branch campus procurement center is the executive, compliance, and operational layer, responsible for implementing various policies, procurement process execution, compliance review, and daily management of the school procurement center. Under the authorization of the school procurement center, responsible for

procurement program execution, document compliance review, contract program management, campus supplier management, archive management, and internal coordination and consulting within the campus.

3.1.3. Engineering construction professional team

The professional team of the engineering construction unit is responsible for requirements, technology, and acceptance, as well as the proposer of procurement requirements, the maker of technical standards, the supervisor of contract execution, and the person in charge of project acceptance. Responsible for procurement requirement preparation and demonstration, budget preparation suggestions, substantive content review and execution of contracts, organizing project acceptance, and providing professional opinions as experts by team members.

3.2. Multi-campus procurement approval process

3.2.1. Project initiation stage: Procurement requirements and budget approval

The engineering construction implementation unit and its professional team, as the project leader, initiate procurement project applications, conduct market research, and prepare requirements and budgets. The campus finance department (budget review) and the sub campus procurement center conduct preliminary compliance checks through compliance pre-approval.

3.2.2. Procurement implementation stage: Procurement method and document approval

The branch campus procurement center is responsible for converting approved requirements into legal and compliant procurement documents and executing procurement procedures. The sub campus procurement center formulates procurement methods, prepares and approves procurement documents based on project amount, nature, and school regulations. The director of the sub campus procurement center for major, complex, and special projects reviews and approved by the school's procurement center. The evaluation results shall be approved and confirmed by the branch campus procurement center, and the winning bid and transaction announcement shall be issued. If there are any objections or major projects, the director of the branch campus procurement center shall review and file or approve them with the director of the school's procurement center.

3.2.3. Contract performance stage: Contract signing and execution approval

The key point of collaborative work between the branch campus procurement center and the professional team of the implementing unit reflects the separation and balance between "procedures" and "technology". The contract is drafted and reviewed by the branch campus procurement center, and the professional team of the implementing unit is responsible for ensuring that the technical and service terms are accurately reflected. The approval of contract signing shall be initiated by the person in charge of the implementing unit and approved by the director of the branch campus procurement center. Major contracts must be approved by the school's procurement center or school leaders.

3.2.4. Project closing stage: Project acceptance and payment approval

The professional team of the implementing unit takes the lead, and the procurement center of each campus supervises the procedures. The professional team of the implementing unit is the main responsible party for project acceptance, and the acceptance report is drafted by the head of the professional team. The implementing unit is responsible for approval, and the procurement center of each campus sends a specialist to supervise the

standardization of the acceptance procedure. The payment application shall be submitted by the implementing unit based on the contract and acceptance report. After the campus procurement center confirms that the procurement process has been fully closed, the finance department shall make the payment according to relevant requirements.

3.3. Optimize the school's bidding and procurement information management platform

The construction of a unified procurement management system for multiple campuses aims to achieve standardization, efficiency, transparency, and datatization by managing the entire school's procurement activities through "one platform, one set of standards, and one set of processes" [4]. Laws, regulations, and campus systems are solidified into the system to realize automatic process control and reduce human operational risks. Online circulation replaces offline processing, and automated reminders replace manual urging to improve quality and efficiency. The entire procurement process is traceable, key information is disclosed to authorized personnel, and "transparent procurement" is achieved. Full-process data are aggregated to provide support for procurement decision-making, supplier management, and budget preparation.

4. Conclusion

The development of a multi-campus education model in higher education institutions has promoted the large-scale integration of educational resources and expanded both the capacity and quality of university education. Against this background, higher requirements have been placed on bidding and procurement management for multi-campus engineering projects. To reduce procurement risks and improve management effectiveness, this study constructs a risk prevention and control system for multi-campus engineering bidding and procurement. By establishing a procurement management model featuring centralized leadership, hierarchical management, and professional collaboration, designing a scientifically sound multi-campus procurement approval process, and optimizing an integrated bidding and procurement information management platform, a four-in-one prevention and control system encompassing institutional, procedural, organizational, and technological dimensions is achieved. This framework enhances the standardization, efficiency, and transparency of multi-campus bidding and procurement and provides theoretical support for the high-quality development of procurement management in university multi-campus engineering projects.

Disclosure statement

The authors declare no conflict of interest.

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