Development of Strategic Management Model for Effective Procurement Internal Control of Hubei Engineering University, China

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Abstract

This research aimed to 1) Investigate the problems and needs of Hubei Engineering University instructors and managers for effective procurement internal control. 2) Construct a strategic management model for effective procurement internal control of Hubei Engineering University based on the PDCA cycle. 3) Evaluate the effectiveness of the strategic management model for effective procurement internal control of Hubei Engineering University based on the PDCA cycle. This study selected 284 faculty members and 179 administrative staff of Hubei Engineering University using the Yamane (1967)'s formula. The research tools used in this study are questionnaire survey and interview methods, and both the questionnaire and the interview contain 55 questions. A five-point scale is used to evaluate the problems and needs of effective procurement internal control of Hubei Engineering University. Subsequently, this study uses questionnaire survey and interview methods to survey 284 teachers and 179 administrative staff of Hubei Engineering University as samples. The questionnaire was verified by 5 experts, using the PDCA management model, and setting four dimensions of planning, execution, inspection, and action. The collected data and information were analyzed and interpreted using SPSS software and presented in the form of frequency, percentage, mean, and standard deviation.

Research has found that 1) The demand for effective procurement control is high (mean = 3.93). The PDCA "execution" and "action" stages are considered the most critical, with high expectations (mean = 4.28). The focus is on improving communication, transparency and stakeholder participation. 2) A strategic model for improving procurement internal control based on PDCA is proposed, emphasizing communication, training and stakeholder participation. The study emphasizes combining procurement with strategic goals to ensure the participation of relevant departments. Although the current control measures are positive, there is still room for improvement, especially in communication and transparency. In order to effectively optimize the internal control of procurement at Hubei Engineering University, this paper suggests that it is necessary to further clarify the responsibilities of the procurement entity, establish an internal control system guided by budget performance goals, strengthen procurement process management, optimize procurement decision-making mechanisms, clarify job responsibilities, strengthen internal audit supervision, and give play to the role of

government procurement policies, such as supporting scientific and technological innovation and green development.

Keywords: Strategic Management Model, PDCA Cycle, Effective Procurement, Internal Control

Introduction

In the study of government procurement, foreign scholars have defined the concept of government procurement from different perspectives. Russel (1929, pp. 23), for the first time, put forward the concept of government procurement, which refers to the economic behavior of purchasing agencies to obtain the required materials at low cost, short time and high efficiency through bidding and other means in accordance with the relevant laws and regulations. James R (1971, pp. 75-80) argued that Most of the infrastructure construction and scientific research funds of universities come from government support, therefore, diversified government procurement management methods should be adopted to improve the utilization rate of government procurement funds. Peter (1997, pp. 120) believes that to complete the procurement, the main body of the procurement must complete the preparation of a good procurement plan for the use of the department and the user's service object requirements, strict examination of the qualifications of potential suppliers and other necessary links. Arai (2013, p. 9) argues that government procurement should strictly require the professional competence of the procurement staff in their positions, and process management of the procurement staff to improve the quality of procurement and ensure the fair use of funds. Prabir (2015, pp. 1-25) argues that electronic Informa ionization of government procurement facilitates efficient communication between purchasers and bidders and makes it easier to achieve the objectives of the procurement. Sharifah (2016, pp. 24-27) optimized the government procurement workflow with examples to be able to improve procurement efficiency.

In China, the establishment of internal control systems began in the 1990s, initially guided by policy and regulation. The 1999 Accounting Law mandated the establishment of internal accounting supervision systems (Article 27), laying the foundation for internal control frameworks. The Internal Control Standards for Administrative Institutions (Trial) issued in 2014 introduced more specific requirements for administrative bodies. Since the Government Procurement Law of the People's Republic of China came into effect in 2003, China has developed a comprehensive legal framework that has greatly enhanced expenditure management, standardized budget preparation, and strengthened integrity within government and institutional procurement. Despite rapid growth in procurement volume and diversification of procurement types, challenges remain—particularly inefficiencies, limited professional expertise, and risk of non-compliance (Chen et al., 2022; Li & Xu, 2024). As a special type of public organization, universities face unique procurement challenges characterized by long cycles, complex demand structures, and specialized requirements. The expansion of

government investment in higher education has further amplified procurement complexity, exposing issues such as insufficient professional capacity, intricate processes, and integrity risks (Wu & Zhao, 2020). Therefore, it is vital to examine internal control systems for university procurement to enhance efficiency, accountability, and risk management. Hubei Engineering University has established a procurement and bidding work leading group led by the president, which is responsible for the implementation of government procurement policies and decision-making on major procurement matters. In recent years, the school has faced problems such as insufficient scientific procurement budget preparation, insufficient procurement personnel, and heavy workload, which have affected the efficiency of procurement management.

The study's significance lies in developing a replicable and data-supported model that enhances accountability, transparency, and efficiency in higher education procurement. The theoretical contribution is twofold: first, it enriches the discourse on strategic internal control frameworks by applying PDCA theory to government procurement management; second, it provides an empirical foundation for improving governance and sustainability in public institutions. The effective implementation of this model at Hubei Engineering University is expected to strengthen internal oversight, mitigate integrity risks, and contribute to the high-quality and sustainable development of university governance.

Research objectives

1. To investigate the problems and needs of instructors and administrators towards effective procurement internal control of Hubei Engineering University, China.

2. To construct strategic management model based on PDCA Cycle for effective procurement internal control of Hubei Engineering University, China.

3. To evaluate the effectiveness of strategic management model based on PDCA Cycle for effective procurement internal control of Hubei Engineering University, China.

Literature review

1. The Concept and Related Theories of Strategic Management Model

Strategic management involves formulating, implementing, and evaluating cross-functional decisions to achieve organizational objectives. Classical models such as Porter's Five Forces and the Resource-Based View (RBV) emphasize competitive advantage through market position and internal capabilities, respectively. Mintzberg's emergent strategy model highlights adaptability in complex environments. Strategic planning, execution, and control are core processes in strategic management models. These models help guide organizations in aligning resources with goals amidst dynamic external factors. (Hill, C. W. L., Schilling, M. A., & Jones, G. R., 2020).

2. The Concepts and Related Theories of Procurement

Procurement refers to acquiring goods and services essential to an organization's operations.

Key theories include the Transaction Cost Economics (TCE), which evaluates cost efficiency in procurement decisions, and the Principal-Agent Theory, which explores information asymmetry and trust between buyers and suppliers. Strategic procurement focuses on value creation, cost reduction, and supplier relationships. E-procurement and sustainable sourcing are modern developments in this field. (Lysons, K., & Farrington, B., 2020)

3. The Concept and Related Theories of Internal Control

Internal control is a system of processes designed to ensure financial accuracy, operational efficiency, and regulatory compliance. COSO's Internal Control–Integrated Framework is widely accepted, consisting of five components: control environment, risk assessment, control activities, information and communication, and monitoring. Agency Theory also supports internal controls by reducing risks arising from conflicting interests between management and stakeholders. (COSO., 2013)

4. S.W.O.T. Analysis of Effective Procurement Internal Control

SWOT analysis helps assess internal controls in procurement by identifying Strengths (e.g., transparency), Weaknesses (e.g., poor supplier evaluation), Opportunities (e.g., digital tools), and Threats (e.g., corruption risks). It provides a strategic overview to enhance internal procurement systems. A well-applied SWOT informs policy refinement and risk mitigation strategies within procurement functions. (Gurel, E., & Tat, M., 2017)

5. The Concept of Public Universities

Public universities are state-funded institutions that aim to provide accessible, affordable higher education. They often align with national education policies and serve as drivers of research and social development. Key governance theories include New Public Management (NPM), which advocates efficiency and accountability in public institutions. Public universities must balance academic autonomy with governmental oversight. (Mok, K. H., 2005)

6. Brief Introduction to Hubei Engineering University

Hubei Engineering University, formerly known as Xiaogan University, is a multi-disciplinary public university located in Xiaogan City, Hubei Province. It originated in 1943 and was officially named its current title in 2011. The university offers 66 undergraduate programs across 10 academic disciplines and has developed several nationally and provincially recognized specialties. It emphasizes undergraduate education while expanding into postgraduate and adult education. With strong research platforms and international collaborations, the university supports innovation and global academic exchange. (Hubei Engineering University., 2023).

Research framework

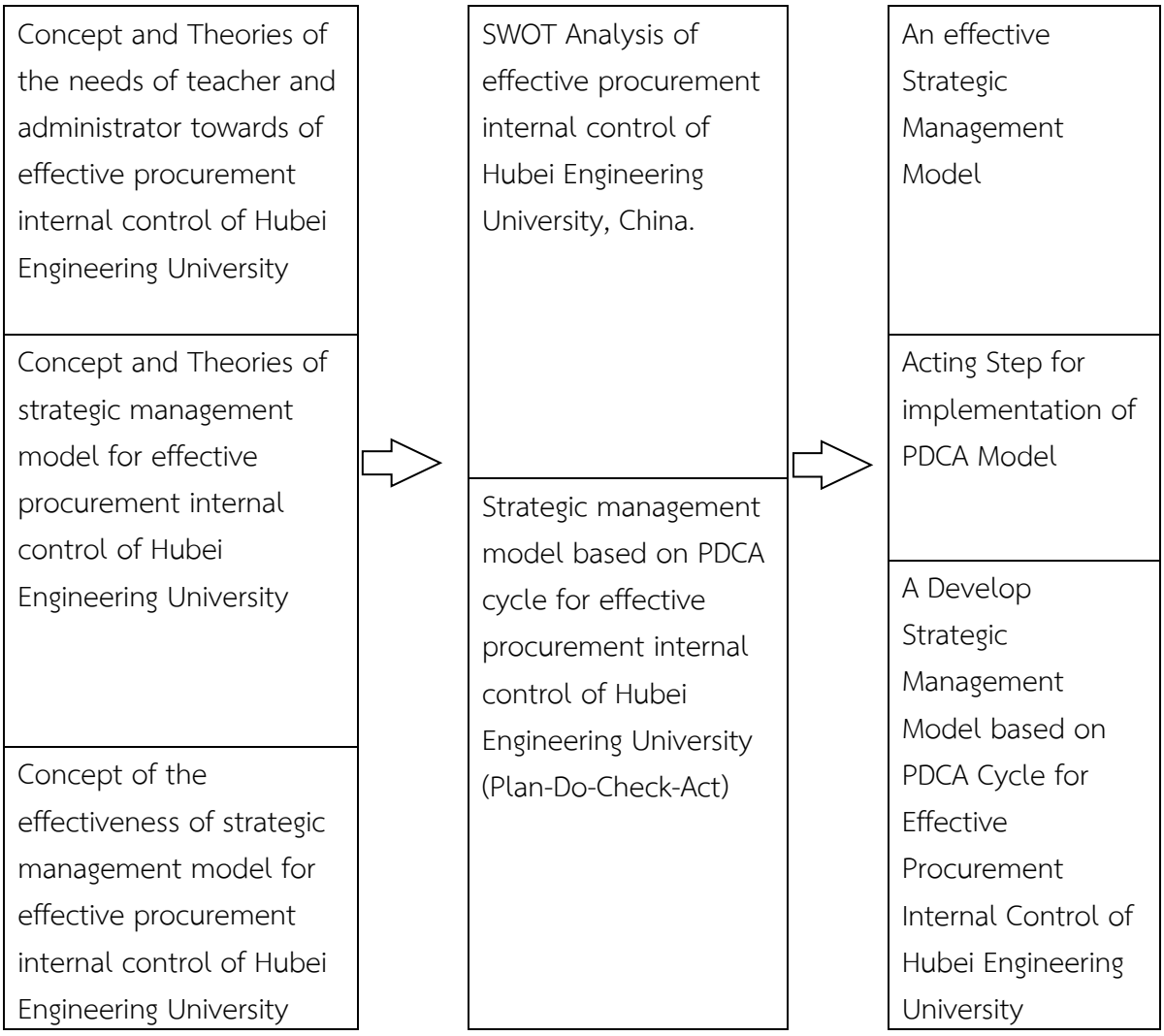

Figure 1 Research framework

Research methodology

Population and Samples

This study focuses on Hubei Engineering University as a case study. The target population includes individuals involved in procurement and internal control: senior university leaders, procurement managers, finance and audit department heads, and other relevant administrative personnel. The total population is 1,300 people, divided into two main groups: 976 faculty staff and 324 administrative staff.

In Phase 1, both groups were surveyed to assess needs related to procurement internal control. In Phase 2, a focus group meeting was held with key stakeholders, including procurement and finance managers, academic experts, and government procurement review professionals, to gather expert input on establishing a strategic model.

In Phase 3, a similar group was reconvened to evaluate the proposed PDCA-based management model. The expert insights helped refine the model to enhance internal control efficiency in public university procurement.

Research Sample

This study used Yamane's formula (1967) to determine appropriate sample sizes with a 95% confidence level and a margin of error (e) of 0.05. Two groups were studied at Hubei Engineering University: 284 faculty members from a population of 976 and 179 administrative staff from a population of 324. These sample sizes ensure statistically valid generalization of results. Questionnaires were distributed via mail, interviews, and face-to-face methods to collect opinions on procurement internal control. A total of 1,300 questionnaires were distributed (976 to teachers and 324 to administrators), aiming to collect at least 463 valid responses. In Phase 2, focus group meetings were conducted with university department staff and government procurement review experts to discuss procurement strategy and internal control. In Phase 3, experts evaluated and modified the proposed PDCA-based internal control model via group meetings, drawing on their practical experience and policy knowledge to enhance school procurement systems.

Research instruments.

In Phase 1, 284 teachers and 179 administrative staff at Hubei Engineering University were selected via Yamane's formula (1967). A bilingual (Chinese-English) questionnaire using a 5-point Likert scale covered general information, current procurement practices, and expectations. Content was validated using the Index of Congruence (IOC), with scores between 0.80 and 1.00 from five experts. A pilot test with 33 professionals yielded high reliability: Cronbach's Alpha values of 0.995 and 0.998 (Cronbach, 1951). In Phase 2, a focus group discussed developing an internal procurement control model. Experts' feedback was recorded, and questionnaire reliability remained high (α = 0.993). IOC scores for discussion points ranged from 0.80–1.00. In Phase 3, the model was evaluated again through expert discussions. The final reliability (α = 0.80) confirmed acceptable consistency. KMO and Bartlett's tests indicated strong structural validity (KMO > 0.97, $p < 0.05$), supporting factor analysis suitability.

Data Collection

Data collection began with classified sampling, using a PDCA-based questionnaire reviewed by tutors and approved by Hubei Engineering University. Distribution occurred onsite and via mail over two months starting April 2024. Respondents were informed of the survey's purpose, and response tracking was documented.

The questionnaire was designed based on the PDCA Cycle:

Plan: Assessed procurement needs, strategic planning, and internal control.

Do: Focused on implementation, supplier management, and contract execution.

Check: Covered audits, supplier performance, and risk control.

Act: Addressed improvement, complaint handling, and model building.

Group meetings with university officials and procurement experts refined the questionnaire's framework. For model evaluation, the Delphi method was applied with 20 experts providing iterative feedback on PDCA dimensions until consensus was reached.

Data Analysis

This study employed SPSS for data analysis, beginning with data cleaning to remove missing values and outliers. Likert-scale responses were scored and aggregated to reflect participant attitudes. Descriptive statistics (mean, SD), t-tests, and ANOVA were used for quantitative analysis, along with frequency analysis for response patterns. Reliability was assessed via Cronbach's Alpha. According to Wongwanich (2005), score interpretation ranged from “minimum” to “highest” levels of needs. Phase two involved qualitative analysis through group meetings to develop a procurement internal control model. Meetings followed structured agendas, including discussion, question development, and synthesis of key points for model formulation. In phase three, model evaluation was conducted via focus group discussions, case studies, and participant feedback. Effectiveness and areas for improvement were assessed, leading to the development of an improvement plan and continuous tracking to refine the model.

Statistics Used for Research

This research utilizes various statistical tools including Percentage, Mean, Standard Deviation (S.D.), T-tests (Independent and Paired), and ANOVA to analyze data. Post hoc tests like LSD and Games-Howell are used for multiple comparisons. The Delphi Method gathers expert opinions through iterative surveys for consensus. Reliability and Validity ensure consistency and generalizability of results. IOC (Item-Objective Congruence) assesses the alignment of objectives in system design. PNI (Perceived Needs Index) measures how individuals perceive their needs using survey data. These methods ensure accurate, consistent, and meaningful research findings.

Research result

The research results are organized into four sections: 1) General Information, 2) Current Situation and Expectations of Procurement Internal Control at Hubei Engineering University, 3) Strategic Management Model Based on PDCA Cycle, and 4) Strategic Evaluation and Control.

1. General Information

The survey involved 463 faculty and staff, with a fairly balanced gender distribution. The majority are aged 31-35, with most holding a bachelor's or master's degree. The most common professional title is Assistant Professor.

2. Current Situation and Expectations of Procurement Internal Control

The need for effective procurement control is high (mean = 3.93). The PDCA "Do" and "Act" phases are considered most critical, with high expectations (mean = 4.28). The focus is on improving communication, transparency, and stakeholder involvement.

3. Strategic Management Model (PDCA Cycle):

A strategic model based on PDCA is proposed to improve procurement internal controls, emphasizing communication, training, and stakeholder involvement.

4. Strategic Evaluation and Control

The study stresses aligning procurement with strategic goals and ensuring relevant departments' involvement. While current controls are seen positively, there's room for improvement, particularly in communication and transparency.

Key Findings: No significant gender differences in procurement control needs or expectations. Differences were observed in procurement needs based on age, education level, and professional title, with younger staff and those with lower qualifications having higher needs. The university's procurement system is well-structured, but there are challenges, such as mismatched budgets and pricing issues.

SWOT and PESTEL Analysis

Strengths: A well-organized system, effective e-procurement, and good regulatory compliance.

Weaknesses: Budget issues, inaccurate planning, and supplier problems.

Opportunities: Hubei's strong economic, technological, and educational growth presents opportunities for improving procurement practices.

Threats: Procurement delays, monopolistic suppliers, and overpriced goods pose risks.

Strategic Vision: Hubei Engineering University aims to become a leading applied university, with a sustainable and efficient procurement system supporting educational and research goals. The strategic focus includes talent cultivation, internationalization, and improving governance, all aligned with a broader national development plan.

Procurement Vision and Mission: The procurement system supports the university's goals by ensuring efficiency, transparency, and alignment with national laws. The focus is on improving procurement processes, compliance, and supporting innovation and sustainable development.

Through questionnaire surveys, focus meetings, face-to-face interviews, etc., the needs and expectations of effective procurement internal control in Hubei Engineering University were statistically analyzed using SPSS software, and the variable factors with higher scores were identified as follows:

Table1 The important variables related to the effective procurement internal control management model based on PDCA Cycle

PDCA	Variable	$\bar{x}$	S.D.
PLAN	When determining the procurement requirements, the university will fully solicit the opinions and suggestions of relevant departments and stakeholders to ensure the comprehensiveness and rationality of the procurement requirements.	4.31	0.79
	The university takes into account financial budget and resource allocation constraints when developing procurement strategies and plans.	4.99	0.93

PDCA	Variable	$\bar{x}$	S.D.
	The university has set up a procurement and bidding work leading group, has a relatively perfect procurement decision-making mechanism.	4.02	0.91
	The university has established a communication and coordination mechanism between departments or positions such as budget preparation, government procurement and asset management to strengthen the management of government procurement budgets and plans.	4.30	0.77
DO	When allocating procurement resources and budget, the university will fully consider the actual needs of various departments and make reasonable allocation according to strategic objectives and development plans.	4.30	0.76
	When implementing the procurement plan, the university will fully follow the relevant procurement processes and procedures to ensure that the procurement activities are legal, compliant, open and transparent.	3.97	0.89
	In the selection and evaluation of suppliers, the supplier's service level and after-sales support capability will be fully considered to ensure the guarantee of follow-up services.	4.30	0.79
	The university openly and transparently releases procurement information, including bidding announcements, procurement results, etc., for the supervision and participation of suppliers and the public.	4.31	0.79
	The audit department participates in the whole process of government procurement, so that the bidding and procurement work in the university runs under supervision.	4.31	0.80
CHECK	The university Regularly check the implementation of procurement, timely find and solve the problems and risks in the procurement process, to ensure the smooth progress of procurement activities.	4.30	0.79
	In terms of improving the efficiency and quality of procurement execution, it will actively learn from the successful experience and practices of other universities to enhance the level and effect of procurement execution.	4.30	0.77
	Based on the results of the inspection phase, the university will actively take measures to improve the procurement process to improve the efficiency and quality of procurement.	4.30	0.79
	When the procurement improvement measures are developed, the relevant departments and stakeholders are fully communicated and consulted to ensure the effectiveness and feasibility of the improvement measures.	4.31	0.75
	When adjusting and optimizing the procurement process, it will actively adopt information means and technical support	4.30	0.77

PDCA	Variable	$\bar{x}$	S.D.
ACT	to improve the level of automation and digital management capabilities.		
	In the process of adjusting and optimizing the procurement process, we believe that universities should strengthen the training and awareness raising of relevant personnel.	5.33	0.77
	The university has formulated policies and procedures for procurement risk management and defined responsible departments and management responsibilities.	4.30	0.76
	In the process of adjusting and optimizing the procurement process, we believe that universities should strengthen the training and awareness raising of relevant personnel.	4.31	0.77
	The staff of the procurement department actively participate in the government procurement training organized by the superior competent department to improve the policy level and implementation ability.	4.32	0.76
	Effective procurement of internal controls play a significant role in promoting the university's teaching, research and social services.	4.30	0.79
	Developing effective procurement internal control management model is very important for improving university governance ability.	4.34	0.76

According to the supervision and inspection of the internal control of government procurement in Hubei Engineering University, combined with focus meeting, face-to-face interview, Delphi method, etc., the main risk points and preventive measures of the internal control of procurement are obtained as follows:

Table 2 The main risk points and prevention and control measures of effective procurement internal control in Hubei Engineering University

Internal control matters	Key risk point	Prevention and control measure
Preparation of procurement budget	The budget preparation is not scientific and reasonable, and the budget is too high or too low	Establish a communication and coordination mechanism among departments of budget preparation, government procurement and asset management, and fully consider the actual needs of each department when allocating procurement budgets, and allocate budgets reasonably according to strategic objectives and development plans
Formulation of purchasing requirements	The procurement demand is not	Fully consult relevant departments and stakeholders when formulating

Internal control matters	Key risk point	Prevention and control measure
	scientific and reasonable, and the technical parameters are tendentious or exclusive	procurement requirements; On the basis of market research, determine the technical parameters and quality standards of products to ensure that the quality of purchased goods or services meets the requirements
Review expert assignment	The appointment of Review expert was not entirely open and fair	Before bid evaluation, put forward disciplinary requirements to the evaluation experts dispatched by the project management unit; Try to establish a review expert database and randomly select review experts
Determination of bid evaluation methods	Bid evaluation methods are not scientific and rigorous enough or there is a negative list of illegal government procurement	Adopt a variety of evaluation indicators and methods in supplier evaluation; Hold regular meetings of the procurement and bidding leading group, and conduct collective discussions on bid evaluation methods
Supervision of the bid evaluation process	The bid evaluation process was not strictly supervised, and the evaluation experts did not follow the principles of objectivity, fairness and seeking truth from facts	The audit department participates in the whole process of government procurement, so that the bidding and procurement work in the university runs under supervision; The audit department and the procurement department shall review the bid evaluation results and correct the errors in the evaluation in a timely manner
Signing of purchase contract	The technical parameters and service standards of the goods or services in the procurement contract are inconsistent with the procurement documents, or violate the relevant laws and regulations	Set up internal control posts reasonably, clarify the authorization, approval and signing authority of procurement contracts, and properly keep and use the special seal for contracts; Conduct regular evaluation and feedback on contract execution to continuously improve the efficiency and quality of contract execution

Table 3 The Index of item-objective Congruence (IOC) of the five units in terms of strategic management model based on PDCA Cycle for effective procurement internal control of Hubei Engineering University

Topics/Contents	IOC
Unit 1 Management System and Department Setup for Procurement Internal Control	
Passage 1: Management System for Procurement Internal Control	0.66
Passage 2: Department Setup for Procurement Internal Control	0.66
Unit 2 The Main Risk Point, Prevention and Control Measures of effective Procurement Internal Control	
Passage 1: The Main Risk Point of effective Procurement Internal Control	0.66
Passage 2: The Prevention and Control Measures of effective Procurement Internal Control	1.0
Unit 3 The effective procurement internal control system compilation of Hubei Engineering University	
Passage 1: The effective procurement internal control system at school level	1.0
Passage 2: The effective procurement internal control system at department level	1.0
Unit 4 Procurement procedures and relevant regulations of Hubei Engineering University	
Passage 1: Procurement and bidding procedures	1.0
Passage 2: Bidding platform operating rules	1.0
Passage 3:Government procurement main procurement methods and legal time limits	0.66
Unit 5 Procurement frequently asked questions guideline of Hubei Institute of Engineering	
Passage 1: Government procurement policy explanation	1.0
Passage 2: Frequently asked questions on government procurement	0.66
Passage 3: Compilation of typical cases of government procurement	0.66

Table 3 shows the IOC scores of the 5 units assessed in terms of content correctness and suitability by the three specialists. All of the 5 units possessed IOC scores ranging from 0.66 to 1.0. It can be assumed that these strategic management model, can be used as a tool to develop the level of effective procurement internal control of Hubei Engineering University.

Hubei University of Engineering Procurement Internal Control Management Model

1) Procurement quota standard and procurement management platform

Table 4 Procurement quota standard and procurement management platform

procurement quota standard	procurement method	procurement platform
The budget is less than 20,000 yuan	Middle level departments carry out procurement	Procurement offline or online
The budget is 20,000 to 100,000 yuan	Middle-level departments apply for procurement through the "bidding network"	Procurement online
The budget is more than 100,000 yuan	The procurement shall be organized uniformly by the school	Entrusting a bidding agency for centralized procurement

2) Hubei Engineering University centralized procurement internal control execution flow chart

Hubei Engineering University attaches great importance to the construction of internal control of economic activities. In accordance with the "Financial System of Higher Education Institutions", "Accounting System of Higher Education Institutions", "Regulations on Internal Audit Work in the Education System", "Internal Control Standards for Administrative and Public Institutions (Trial Implementation)", "Accounting Law of the People's Republic of China", "Guiding Opinions on Further Strengthening the Construction of Internal Control in Higher Education Institutions" and other laws and regulations, combined with the "Procurement and Tendering Management Measures of Hubei Engineering University", a procurement and bidding work leading group meeting was held, and the opinions of the heads of the Assets Department, Finance Department, Audit Department, Academic Affairs Office, Science and Technology Department, and Teaching College were fully listened to. The Hubei Engineering University centralized procurement internal control execution flow chart was formulated, and a management model for effective procurement internal control of Hubei Engineering University was constructed. This management model takes the perspective of the entire life cycle of procurement internal control, and formulates management measures for procurement internal control from the entire process of procurement budget, procurement plan, procurement documents, procurement announcement, procurement execution, procurement results, procurement contract, acceptance and payment. It effectively prevents financial risks and corruption risks, improves the standardization, openness, transparency and procurement efficiency of the school's procurement work, and lays a foundation for improving the school's internal governance capabilities and level and promoting the high-quality development of the school's cause. The following is Hubei Engineering University centralized procurement internal control execution flow chart in Figure 2.

Figure 2 Hubei Engineering University centralized procurement internal control execution flow chart

Research discussion

Current Effective Procurement Internal Controls at Hubei Engineering University

The university has a structured internal control system for government procurement, with clear roles across departments like Asset, Procurement, Audit, and Finance Offices, ensuring separation of duties.

Challenges include lack of a rigorous procurement budget, inadequate procurement planning, and issues with standardization, supplier selection, and contract execution.

Improvements needed: strengthen internal controls, provide more training, enhance review processes, and ensure fair evaluations.

Reform of Chinese Government Procurement System

Procurement Types and Scope: Expanded to include services, healthcare, and emerging industries like cloud computing.

Regulatory Changes: Amendments to improve efficiency, support SMEs, and emphasize environmental sustainability.

Procurement Evaluation: Introduction of "most quality assessment" and life cycle cost focus, alongside mandatory e-procurement.

Recommendations for Hubei Engineering University

Strengthen purchaser responsibilities and align internal controls with performance objectives.

Refine decision-making, improve procurement standards, and clarify roles and responsibilities.

Emphasize audit, oversight, scientific innovation, green development, and SME support to align with evolving procurement reforms.

Research Conclusion

The study on procurement internal control at Hubei Engineering University reveals notable problems such as mismatches between procurement demand and budget, improper budget preparation, and pricing discrepancies, particularly from low-cost suppliers, along with issues in technical parameters, expert appointments, and evaluation fairness. There are high expectations for improving procurement internal control through a strong control model, enhanced training, transparency, stakeholder communication, audit participation, supplier evaluation, and regular performance checks. The university has established a leadership group and management office to oversee procurement activities, while the Audit Department ensures compliance through internal audits and risk assessments. The internal control system is structured around key elements including a clear control environment, proactive risk management, systematic control activities, effective information and communication, and ongoing supervision. Furthermore, the construction of the internal control system integrates budget management, audit supervision, contract management, and risk prevention with well-

defined departmental rules, expert selection criteria, and procurement process flow charts to enhance efficiency, transparency, and risk mitigation.

New knowledge

This research contributes new knowledge in the area of strategic procurement management in higher education institutions. The study revealed a high demand for effective internal control of procurement at Hubei Engineering University, particularly in the "execution" and "action" phases of the PDCA cycle. Key needs include enhanced communication, increased transparency, and broader stakeholder participation. Based on these findings, a strategic management model was developed, aligning procurement practices with institutional strategic goals. The model emphasizes training, clear role definition, improved decision-making mechanisms, internal audit strengthening, and the integration of government procurement policies promoting innovation and sustainability. This approach aims to enhance the efficiency and accountability of procurement processes through systematic planning, implementation, monitoring, and continuous improvement.

Suggestions

Suggestion for applying research result

1) Strengthen research on the opening of government procurement to the external market. Including the Government Procurement Agreement (GPA); Comprehensive Progress and the Trans-Pacific Partnership (CPTPP); Regional Comprehensive Economic Partnership Free Trade Agreement (RCEP). Universities should give full play to their own advantages, research and explore the promotion and application of patents and government procurement in the construction of the "Belt and Road", BRICS, and Shanghai Cooperation Organization countries.

2) Strengthen research on government procurement to support the conversion of scientific and technological achievements. Government procurement in colleges and universities should strengthen research, actively provide strong support for the transformation of scientific and technological achievements and provide policy support for patent industrialization.

3) Strengthen research on government initial purchase and compulsory procurement. Research to break down the first (set) equipment bidding invisible barriers, research to establish a mechanism of exemption and fault tolerance, university government procurement should strengthen policy research, actively play a leading role in supporting.

Suggestion for future research

The research object of this research is Hubei Engineering University. The population and samples are from the instructors and administrators of Hubei Engineering University, which has certain limitations for the study of effective procurement internal control of universities in Hubei Province. It is suggested that the follow-up research can expand the population and samples to provincial universities in Hubei province, conduct a comparative study on the

internal control of government procurement in Hubei universities, and develop a management model of effective internal control of procurement in Hubei public universities.

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