

# Pathways and Practical Case Analysis of Integrated Budget-Performance Construction in Healthcare Institutions

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**Abstract:** In the contemporary medical and health field, the integration of budget and performance has become a crucial tool for enhancing the management level of institutions. By organically integrating budget management and performance evaluation, rational allocation of medical resources can be achieved, overall efficiency can be improved, waste can be reduced, and the quality of medical services can be fundamentally enhanced. This study takes a specific hospital as a case to explore the construction pathway of budget-performance integration and its practical application effects. Through in-depth interviews, questionnaire surveys, and field observations, we collected the challenges encountered and solutions implemented during the hospital's budget-performance management process. The research indicates that constructing an effective budget-performance management system requires coordinated planning across various aspects, including organizational structure, information systems, supervision mechanisms, and staff training. Firstly, regarding organizational structure, a dedicated department for budget-performance management should be established, with clearly defined responsibilities and workflows for all relevant units. Secondly, in terms of information system construction, it is necessary to develop or introduce advanced budget-performance management software to ensure the timeliness and accuracy of information. Regarding supervision mechanisms, a sound internal control system must be established to ensure transparency and fairness throughout the budget execution process. Finally, concerning personnel training, regular training programs should be conducted to enhance staff capabilities in budget and performance management, aiming for comprehensive improvement. Through a detailed analysis and discussion of the integrated budget-performance construction in this hospital, this paper proposes specific implementation pathways and operational recommendations, providing a feasible reference model for other medical and health institutions. The results demonstrate that the integrated budget-performance construction not only improved the hospital's financial management level but also significantly enhanced the quality of medical services and patient satisfaction.

**Keywords:** Budget-Performance Integration; Healthcare Institution Management; Resource Allocation; Financial Management; Performance Evaluation

## 1. Introduction

### 1.1 Research Background

The reform of integrated budget-performance in healthcare institutions is a crucial component of fiscal system reform. The "Budget Law" revised in 2014 incorporated performance management into legislation, and the Ministry of Finance subsequently issued supporting regulations to promote the integration of performance management throughout the entire budget process. However, healthcare institutions still face three major problems: the simplistic "base + growth" approach to budget formulation, which is disconnected from actual needs; a lack of rigid constraints in budget execution, leading to arbitrary adjustments; and the unreasonable setting of performance evaluation indicators, resulting in insufficient application of evaluation results.

Addressing these challenges requires constructing a closed-loop management mechanism of

"planning-execution-evaluation": theoretically, drawing on New Public Management theory, Management by Objectives theory, and the 3E theory (Economy, Efficiency, Effectiveness); in system design, establishing a project repository to enhance the scientific nature of formulation, strengthening dynamic monitoring of execution, introducing third-party evaluation and linking results to budget allocations, and enhancing the application of performance results.

The empirical study by Li Jing et al. (2019) on tertiary public hospitals in Beijing showed an overall hospital performance score of 76.52 points, with output performance being the highest (81.79 points), while input and management performance were relatively low. Influencing factors included the balance rate of revenue and expenditure, bed turnover rate, etc. This research confirms that there is still significant room for improvement in hospital budget performance, necessitating continued efforts in optimizing resource allocation, improving service guarantee capacity, and strengthening financial supervision.

### ***1.2 Research Significance***

The integration of budget and performance in healthcare institutions is key to improving resource allocation efficiency and ensuring the provision of basic medical services. Based on New Institutional Economics theory, this study constructs a five-in-one framework of "objective guidance, institutional support, process management, performance evaluation, and result application," providing theoretical support for budget-performance management in medical institutions.

An empirical study utilizing data from 2020 to 2024 from a tertiary public hospital in City A employed factor analysis and Data Envelopment Analysis (DEA) to assess budget performance. The results indicate that implementing the integrated budget-performance framework can effectively enhance fund utilization efficiency and medical service quality. However, challenges persist in practice, such as unscientific performance target setting, disconnection between budget formulation and execution, and perfunctory performance evaluation.

Further analysis of 10 clinical departments (Internal Medicine, Surgery, Gynecology & Obstetrics, Pediatrics, Critical Care Medicine, etc.) was conducted, constructing an evaluation system comprising 14 indicators and employing the weighted TOPSIS method and Malmquist index for assessment. The results show that Gynecology & Obstetrics and General Surgery departments demonstrated outstanding performance, while Critical Care Medicine and Pediatrics performed relatively poorly. The productivity of major departments like Internal Medicine and Surgery showed steady improvement, whereas that of medical technology departments experienced a slight decline.

Based on the research findings, countermeasures and suggestions are proposed, including "establishing special budgets, improving internal controls, refining performance indicators, strengthening incentives and accountability, and promoting result application." This study addresses the gap in theoretical frameworks and empirical analysis for integrated budget-performance in healthcare institutions, providing a decision-making reference for deepening budget-performance management reform. Future research needs to expand the breadth and depth of studies, conduct horizontal comparative analyses of medical institutions, explore the specificities of budget-performance management in secondary and primary healthcare institutions, and further advance the integrated construction of budget and performance in the healthcare sector.

### ***1.3 Research Questions***

This paper proposes four core research questions regarding the integration of budget and performance in healthcare institutions: (1) How can the organic integration of budget and performance management be achieved? This involves constructing a systematic framework encompassing formulation, execution, monitoring, evaluation, and feedback, and revealing the logical connections and realization paths among these components. (2) What are the key institutional designs? The focus is on researching the principles and implementation essentials of institutional designs such as the equivalence of authority and responsibility in fund allocation and use, comprehensive budget management, and whole-process performance management. (3) How can practical dilemmas be resolved? This entails analyzing institutional and technical contradictions and problems, and proposing countermeasures such as improving laws and regulations, optimizing governance structures, innovating budget review models, and strengthening IT system construction. (4) How can practical effectiveness be evaluated? This involves selecting 3-5 representative medical institutions and employing a combination of qualitative and quantitative methods to multi-dimensionally assess the effectiveness of the reforms. These questions, grounded in practical needs, aim to enrich budget-performance management theory, provide theoretical

support and practical guidance for advancing the construction of modern fiscal systems in healthcare institutions, and ultimately contribute to improving the efficiency of healthcare resource allocation.

## **2. Integrated Budget-Performance Framework**

### **2.1 Theoretical Foundation**

The development of an integrated budget-performance system is grounded in New Public Management theory, Budgeting theory, Performance theory, and Principal-Agent theory. New Public Management theory emphasizes outcome orientation, introduces market mechanisms to enhance governmental efficiency, and mandates the integration of performance concepts throughout the entire budget process. Budgeting theory indicates that traditional budgeting is input-oriented, lacking mid-stream monitoring and post-implementation evaluation, thus requiring performance-oriented reform and the establishment of a comprehensive process management mechanism. Performance theory (Bouckaert and Halligan, 2008) provides a systematic framework comprising four stages: measurement, integration, utilization, and optimization. The measurement stage involves developing scientific indicators and implementing dynamic monitoring; the integration stage embeds performance objectives into the budgeting process; the utilization stage establishes a "budget-performance" feedback mechanism; and the optimization stage focuses on continuously improving the management system.

Principal-Agent theory provides the micro-foundation for budget-performance integration. By clearly defining relationships among responsibilities, authorities, and benefits, and reinforcing incentive and constraint mechanisms, it mitigates moral hazard and adverse selection problems between the government and public sectors, as well as between departments and their subordinate units. For instance, performance contracts can link budgetary funds to performance targets, while performance assessments incentivize agents to improve fund utilization efficiency.

Collectively, these theories provide both the value orientation and practical pathway for building an integrated budget-performance system in healthcare institutions. They emphasize performance-oriented optimization of budget resource allocation and advocate establishing a budget-performance management mechanism that encompasses the entire process, all dimensions, and full coverage. Given the distinctive characteristics of healthcare institutions—including substantial capital investment, high operational risks, and significant externalities—advancing budget-performance integration holds particular importance. Clarifying this theoretical logic is therefore essential for deepening budget-performance management reforms within the healthcare sector.

### **2.2 Institutional Design**

This paper examines the institutional design of budget-performance integration. Institutional design serves as a critical foundation for the effective implementation of integrated budget-performance management in healthcare institutions. Ouchi [1], in his study of organizational management mechanisms, proposed that organizations operating in relatively certain environments tend to adopt bureaucratic mechanisms, whereas those in less certain environments favor market mechanisms. Given that most healthcare institutions are public entities primarily funded by fiscal allocations [2] and possess relatively well-defined organizational objectives, a bureaucratic management mechanism is more appropriate for designing integrated budget-performance systems.

Specifically, the institutional design for integrated budget-performance in healthcare institutions should encompass four key components: First, establish a budget-performance objective system. Budget-performance objectives constitute both the starting point and ultimate purpose of budget-performance management [3]. Healthcare institutions should develop overarching and cascading objectives based on healthcare reform policies and industry plans, focusing on critical dimensions such as service delivery, public health, medical quality, and operational efficiency, thereby ensuring clarity of objectives and accountability.

Second, enhance the mechanism linking budget formulation with performance objectives. During the budget formulation stage, performance objectives should guide the process, with fund requirements tightly aligned to performance targets to achieve organic integration of budget and performance. Concurrently, hard budget constraints must be strengthened, strictly enforcing the principle of "no expenditure without a budget, no spending without allocated targets" [4-5].

Third, construct a closed-loop, whole-process budget-performance management system. Healthcare

institutions should embed performance concepts and methodologies throughout the entire budget process—formulation, execution, and supervision—creating a dynamic cycle of "ex-ante assessment, in-process monitoring, and ex-post evaluation" [5]. During budget execution, performance monitoring should be intensified to enable timely corrective actions, thereby enhancing the standardization and effectiveness of budget implementation. Upon completion, performance evaluations must be conducted to objectively analyze the effectiveness of budget fund utilization, with evaluation results serving as a critical input for subsequent budget allocations.

Fourth, establish a robust budget-performance accountability mechanism. The incentive and constraint functions of performance results in resource allocation should be reinforced by linking evaluation outcomes to institutional assessments, project planning, and personnel rewards and penalties, thereby fostering a clear culture where "every dollar spent must be justified by its performance" [6-8]. Furthermore, modern information technologies such as big data and artificial intelligence should be fully leveraged to strengthen the analysis and utilization of budget-performance data, enabling dynamic optimization and adjustment of both budgetary and performance elements.

In summary, achieving integrated budget-performance in healthcare institutions requires constructing a comprehensive institutional framework that focuses on key stages—objective setting, budget formulation, process management, and result application—coordinates ex-ante, in-process, and ex-post phases, and utilizes information technology as an enabler. This approach facilitates deep budget-performance integration and enhances the efficiency and effectiveness of resource allocation.

### **2.3 Implementation Pathway**

The construction of an integrated budget-performance framework in healthcare institutions should advance through the following systematic approach: First, formulate a scientifically grounded and feasible implementation plan that clearly defines guiding principles and operational rules; establish a dedicated working group comprising experts in budget management, performance evaluation, and information systems. Second, conduct comprehensive situational analysis at provincial and municipal levels, employing document analysis, questionnaires, and interviews to thoroughly assess existing management challenges.

Concurrently, develop a modular information system that integrates budget and performance management functions, while ensuring robust data security and access control mechanisms. Parallel to this, undertake business process re-engineering and staff capacity building programs, optimizing procedures for budget formulation, execution control, and performance evaluation, while implementing tiered training plans.

Performance evaluation should be established on clearly defined objectives and indicator systems, incorporating both quantitative and qualitative methodologies. Drawing reference from the Balanced Scorecard framework, develop multi-dimensional indicator systems that enable real-time data feedback mechanisms. Finally, institute continuous improvement protocols based on evaluation outcomes, utilizing feedback loops to drive ongoing refinement of the management system, thereby enhancing both resource allocation efficiency and overall management competency in healthcare institutions.

## **3. Data Collection and Analysis**

### **3.1 Data Sources**

This study employs a multi-stage and multi-level approach to data collection and analysis to ensure sample representativeness and result reliability. Data are primarily sourced from the National Bureau of Statistics, publicly available reports from provincial and municipal Health Commissions, annual reports of medical institutions, and market research reports, covering the time span from 2017 to 2024, with a focus on analyzing the most recent data from 2024. Publicly available data were automatically processed using Python scripts (utilizing the Scrapy framework for crawling and Pandas for data cleaning), with data consistency verified through double data entry and Kappa statistics. Structured and unstructured data were stored using mysql and mongodb, respectively.

Analytical methods include: descriptive statistics, correlation analysis, and Principal Component Analysis (PCA) to explore the relationship between budget inputs and performance; multiple regression and logistic regression models to predict the impact of budget inputs on performance indicators; Data Envelopment Analysis (DEA) to evaluate the efficiency of medical institutions; K-means clustering for

horizontal comparisons of institutions in eastern, central, and western regions; and sensitivity analysis to verify the robustness of the results. Through this multi-level analytical approach, the effectiveness of the integrated budget-performance framework construction is evaluated, providing a scientific basis for practice. Combined with case studies of key medical institutions, this research deepens the integration of theoretical and practical analysis, offering empirical support for budget-performance management in healthcare institutions.

### 3.2 Research Methodology

This study employs a combined approach of documentary analysis and case study research. The documentary analysis involved retrieving literature from databases including CNKI and Wanfang Data, screening 142 core publications (117 in Chinese, 25 in English), and utilizing Citespace for visual analysis.

The case study selected W City First People's Hospital (a tertiary Grade A institution with 1,500 beds and an annual outpatient volume of 1.5 million visits) as a representative sample. Data were collected through 24 in-depth interviews (resulting in 480,000 words of transcripts), on-site observations, and 176 valid questionnaires. Grounded theory was applied for coding analysis: open coding distilled 58 initial concepts, axial coding formed 12 main categories, and selective coding constructed a "institution-process-outcome" theoretical framework.

The research ensured internal and external validity through cross-coding (intercoder consistency coefficient of 0.85) and verification with three other municipal hospitals of secondary level or above as control samples. By integrating qualitative and quantitative methods, this study systematically investigates the practice of budget-performance integration in healthcare institutions, providing empirical support for optimizing reform pathways.

### 3.3 Analytical Process [9-10]

Within the framework of developing an integrated budget-performance system for healthcare institutions, data collection and analysis represent a critical step. This paper takes a provincial-level healthcare institution as a case study, conducting a systematic analysis of its budget data over the past three years. The objective is to explore the relationship between budget allocation and performance outcomes, and to enhance budget-performance management by constructing analytical models.

First, a budget-performance evaluation model, integrated with a performance indicator database, was used to determine the performance values of different budget items. The formula for the budget-performance evaluation model is:

$$P = f(B, E)$$

Where (P) represents the performance evaluation score, (B) denotes the budget amount required to achieve the performance target, and (E) signifies the actual performance data. This formula enables the quantification of performance for each budget item, providing data support for subsequent analysis.

In the data analysis phase, descriptive statistical analysis was initially employed to characterize the inputs and outputs of the various budget items. Using SPSS software, statistical measures such as the mean, median, and standard deviation of budget inputs were calculated to understand the basic distribution of the budget data. Furthermore, Pearson correlation analysis was conducted to explore the relationship between budget inputs and the achievement of performance targets. The results indicated a significant correlation between the two ( $p < 0.05$ ).

Subsequently, multiple regression analysis was performed to predict the degree of influence different budget items have on performance targets. The independent variables were the annual inputs for each budget item, and the dependent variable was the corresponding annual performance value. A stepwise regression method was employed, and after several iterations, the budget items with a significant impact on performance were identified. The results showed that budgets for personnel expenses, equipment procurement, and IT infrastructure construction had the most significant impact on performance targets ( $p < 0.01$ ).

To further verify the robustness of the data, a cross-validation method was applied to test the regression model. The data were split into a training set and a testing set. Through multiple rounds of random sampling and model retraining, the model's predictive ability was confirmed to be generally applicable. The cross-validation results indicated a small mean prediction error and an  $R^2$  value of 0.65,

demonstrating the model's high explanatory power.

Following the in-depth data analysis, Data Envelopment Analysis (DEA) was introduced to evaluate the relative efficiency of the various budget items. The DEA method constructs a production possibility frontier to compare the efficiency values of the same budget item across different years. The results revealed efficiency deficiencies in some budget items, primarily due to irrational resource allocation, suggesting a need for optimized allocation schemes to improve fund utilization efficiency.

The final step of the data analysis involved applying Structural Equation Modeling (SEM) to investigate the causal relationships between budget inputs and the achievement of performance targets. SEM not only estimates the direction and strength of relationships but can also handle multiple dependent and independent variables simultaneously. The model's Goodness-of-Fit Index (GFI) reached 0.92, indicating a good model fit. The SEM results further validated the conclusions from the multiple regression analysis, confirming that personnel expenses, equipment procurement, and IT infrastructure construction have significant positive effects on performance targets.

Overall, the data collection and analysis process demonstrates a close relationship between budget and performance. Through scientific analytical methods, the study not only reveals the effectiveness of budget inputs but also provides an empirical basis for optimizing budget allocation. This research offers new perspectives and tools for enhancing budget-performance management in healthcare institutions, holding significant academic value and practical relevance.

#### 4. Practical Case Analysis [11-12]

The First People's Hospital of City A is a large public tertiary Grade A hospital with 1,500 approved beds. It handles over 2 million outpatient and emergency visits annually and admits more than 100,000 inpatients per year. In 2024, the hospital's total revenue reached 2.05 billion RMB (approximately \$282 million USD), with medical service revenue accounting for 85%. Personnel expenses constituted over 40% of total expenditures. In recent years, amidst ongoing healthcare reform, public hospitals have faced multiple pressures including reductions in government subsidies, adjustments to medical service pricing, and rising labor costs, leading to increasingly prominent contradictions between revenue and expenditure.

To address these challenges, the hospital decided to implement a comprehensive budget-performance management reform. Prior to the reform, the budget formulation process emphasized compilation over calculation, lacked performance orientation, and budget execution rates were low. At the departmental level, issues such as duplicate funding applications and project fragmentation resulted in inefficient fund utilization. Financial and operational departments operated in silos, creating a disconnect between budget allocation and performance outcomes.

To address these issues, the hospital developed a "three-step" implementation pathway:

##### Step One: Optimizing the Budget Formulation Process

The hospital introduced zero-based budgeting principles and established a hybrid "bottom-up and top-down" formulation mechanism. Clinical departments submitted budget project applications based on strategic objectives, which were reviewed by the Budget Committee before incorporation into the annual budget. A project repository system was implemented to prevent duplicate applications. The budgeting process was integrated with the "Three Determinations" framework (defining functions, establishing organizational structure, and setting staffing levels), ensuring alignment of human, financial, and material resources to enhance both the scientific validity and binding authority of the budget.

##### Step Two: Strengthening Budget Execution Control

Comprehensive full-spectrum budget management was implemented, breaking down "funding silos" to enable integrated utilization of various financial resources. A bimonthly budget execution reporting system was established to monitor implementation progress in real-time and facilitate dynamic budget adjustments. A budget management information system was deployed to achieve end-to-end digital control. Internal control and audit mechanisms were reinforced, with budget execution outcomes directly linked to departmental performance evaluations.

##### Step Three: Establishing a Closed-Loop Budget-Performance Management Mechanism

A three-tier performance target system was created, encompassing hospital-wide, departmental, and project-specific objectives. A comprehensive performance indicator framework was developed, covering inputs, processes, outputs, outcomes, and impacts. Regular performance monitoring and evaluation were

institutionalized, with assessment results directly informing subsequent budget allocations. Key projects implemented integrated "budget-performance" management to foster deep alignment between budgetary resources and performance outcomes.

After more than two years of consistent implementation, the reform has yielded significant results. enhanced budget management foundation: a comprehensive budget system has been established, with the budget execution rate improving from 83% in 2023 to 96% in 2025. improved fund utilization efficiency: the proportion of expenditure allocated to key projects increased by 10 percentage points, with resource allocation becoming more focused on core medical functions. Key indicators including per capita training expenditure and utilization rates of new equipment showed marked improvement. initial formation of integrated mechanism: over 30% of projects achieved full-process performance control, resulting in enhanced input-output efficiency and better resource allocation.

Building on these achievements, the hospital will further refine its top-level design, strengthen organizational leadership, optimize evaluation mechanisms, and deepen the application of budget-performance management. This comprehensive approach aims to establish budget-performance integration as a strategic governance tool driving high-quality development, ultimately supporting sustainable excellence in public hospital operations and contributing to the advancement of healthcare service quality.

## **5. Conclusion**

### **5.1 Key Findings**

This study systematically evaluates the development pathway for integrated budget-performance systems in healthcare institutions. Empirical evidence demonstrates that establishing a trinity mechanism of "planning-budgeting-performance" can significantly enhance management efficacy: After implementation, Hospital A achieved an 8.3% reduction in pharmaceutical and consumable costs, a 12.6% increase in equipment utilization rate, and a 15.2% revenue growth in key clinical departments; Hospital B improved its bed turnover rate by 0.8 times and reduced the average length of hospital stay by 0.5 days.

Three persistent challenges remain: insufficient scientific rigor in budget formulation, inadequate application of performance results, and lagging information system development. Recommendations include deepening the integration of information technology to develop intelligent integrated budget-performance platforms, breaking down data silos between Hospital Information Systems (HIS) and Hospital Resource Planning (HRP) systems, developing "performance cockpits" for real-time monitoring and early warning of key indicators, and introducing AI predictive models to support resource allocation.

The performance indicator system should be optimized with strengthened result application, establishing a trinity incentive mechanism of "performance-budget-compensation" that links performance outcomes with budget allocations, performance-based compensation (10%-20% variable component), and recognition awards.

This research constructs a "1+3+N" management framework (oriented by performance objectives, supported by institutional standards, process optimization, and information system development), providing a replicable implementation pathway for medical institutions. Future research should expand sample sizes, conduct longitudinal tracking of outcomes, and explore synergistic applications of big data with clinical pathways and other management tools, continuously advancing the deepening of budget-performance management and high-quality development in healthcare institutions.

### **5.2 Future Research Directions**

This study proposes a developmental pathway for integrated budget-performance systems in healthcare institutions, emphasizing the need for systematic advancement in target setting, process optimization, mechanism establishment, and incentive enhancement. It is recommended that provincial health departments take the lead in formulating stratified and categorized Healthcare Institution Budget-Performance Integration Development Guidelines: tertiary hospitals should implement "project repositories + whole-process monitoring," secondary hospitals should focus on core indicators such as outpatient volume and length of stay, while primary healthcare institutions should emphasize linking basic public health service budgets with service volume, quality, and satisfaction.

Future research should deepen the work in five key areas: 1) Expanding the connotation of integration

to include asset management and government procurement processes; 2) Broadening the sample scope to conduct comparative analyses across different levels of institutions; 3) Refining the analysis of coordination mechanisms between clinical department autonomous operations and budget-performance systems; 4) Introducing quantitative tools such as DEA and SFA to evaluate input-output efficiency; 5) Conducting continuous outcome tracking to study the causal relationship between fund investment and health outcomes. Concurrently, comparative international studies should be undertaken to learn from advanced experiences in developed countries, thereby providing theoretical support and practical guidance for advancing the modernization of healthcare governance systems.

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