

Optimization Analysis of Comprehensive Budget Management from the Perspective of Digital Restructuring: Taking a Water Company as an Example

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Abstract: This article takes water enterprises as the research object, exploring the organic combination of comprehensive budget management under the trend of digitalization and digital technology in the new era, as well as the process of management system reform. Introduce the current status of its budget management work, comprehensively analyze the architecture and operation mode of the current comprehensive budget management system of water enterprises, and evaluate and analyze the overall situation and shortcomings of its budget management system based on financial data such as budget formulation and execution. From the perspective of digital restructuring and upgrading of comprehensive budget management work, corresponding countermeasures are proposed to make up for the shortcomings and suggestions for the future development of the enterprise's comprehensive budget.

Keywords: Digitization; Comprehensive budget; Achievements; Water company

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1. Introduction

With the trend of large-scale development, diversified business, and broad business scope in contemporary large enterprises, the management work involved in business activities has also become more complex. In this context, the management and operational risks involved have put forward higher requirements for comprehensive budget management. Comprehensive budget management is a planning work aimed at comprehensively planning the overall resources of an enterprise, covering all aspects of resources such as physical resources, human resources, and financial resources. In terms of time dimension, it includes comprehensive coverage of budget execution work, including pre planning, in-process implementation, and post summary. Accelerating the digital transformation and technological transformation of comprehensive budget performance management is a means to deepen the promotion of the digital economy model and change the development path of enterprises. The research on promoting the transformation and upgrading

of the comprehensive budget management model system, realizing the digital operation of the entire budget control process, and compensating for the shortcomings of the existing budget management model is of great significance for enterprises.

2. Case analysis from the perspective of digital restructuring

2.1. Overview of case background

Jiangsu Jiangnan Water Co., Ltd. was established in 2003 and expanded from the development of the Jiangyin Water Plant. Its main business includes water production and sales, water supply and drainage, and sewage treatment. Jiangnan Water has multiple water plants, six wholly-owned subsidiaries, eight joint-stock companies, and three partnership enterprises. As the head office of the group, its budget management work involves a wide range of areas. By reviewing the financial statement data of water enterprises, the main financial indicators are shown in **Table 1**.

Table 1. Financial indicators of water enterprises

| Indicators/Year | 2023 | 2022 | 2021 | 2020 | 2019 |
|------------------------------|---------------|---------------|---------------|---------------|---------------|
| Total Assets | 5.854 billion | 5.716 billion | 5.455 billion | 4.856 billion | 4.333 billion |
| Total liabilities | 2.363 billion | 2.421 billion | 2.377 billion | 1.890 billion | 1.534 billion |
| Asset liability ratio | 40.36% | 42.34% | 43.58% | 38.93% | 35.41% |
| Business income | 1.268 billion | 1.114 billion | 953 million | 992 million | 899 million |
| Operating costs | 900 million | 764 million | 669 million | 704 million | 685 million |
| Net profit | 280 million | 276 million | 241 million | 231 million | 193 million |
| Net profit margin from sales | 22.11% | 24.82% | 25.29% | 23.30% | 21.50% |

Data source: Financial statements of water enterprises for the years 2019–2023

Note: Units are in yuan

As shown in **Table 1**, in the water industry, where the asset-liability ratio is generally higher than 50%, the asset-liability level of water enterprises belongs to a relatively stable category, and the operational risk is relatively small compared to peers. The overall revenue capacity has remained stable, with both operating income and net profit showing a trend of increasing year by year. There is a slight fluctuation in the net profit margin of sales, but overall, it remains at a stable level, and the operating status shows a steady upward trend.

2.2. Digital restructuring process of budget management work

2019 is the initial stage of digital restructuring, which is mainly applied to the collection and input of budget execution information based on digital means, and the dynamic and refined feedback of budget control information based on the access to industrial Internet, online financial channels, assembly lines, and other technologies. From 2021 to 2022, digital restructuring gradually involves budget planning and evaluation, and digital technology is gradually entering the field of financial analysis and control. In this stage of digital restructuring, Jiangnan Water management achieved final communication before finalizing the budget plan based on digital collaborative office control tools such as the Office Automation (OA) system. This further overcame the problem of information silos in traditional budget management work, strengthened communication between departments in the budget planning and evaluation stages, and improved the timeliness of budget decision-making. Under the closed-loop feedback review mechanism of the entire digital process,

problems, and contingency situations in the implementation process of budget plans can be timely fed back to decision-makers based on information analysis and control systems, to optimize the dynamic adjustment and updating iteration of the indicator system, and achieve a flexible digital feedback loop system [1].

Since 2023, the digital transformation of budget management in Jiangnan Water has become more perfect and mature, and the model system of budget management pays more attention to the overall integration and configuration of budget management information through digitization. Jiangnan Water actively introduces digital budget analysis systems such as Automated Budgeting System (ABS), calculates weighted average interest rates and profits based on infrastructure rights and interests under industry standards, intelligently monitors project dynamic costs through digital systems such as the Smartbi, and implements budget implementation projects such as management credit enhancement and capital collection. Under this mode, Jiangnan Water has realized a differentiated management and control mode and performance evaluation system.

The current Jiangnan Water management implements a comprehensive budget management work system based on the core idea of financial control content and budget management. It has established a hierarchical budget management structure system with the board of directors as the highest organizational level, audit, strategy committee, and other departments as intermediate management levels, and business departments executing specific budgets.

2.3. Comprehensive budget management digital restructuring content

The comprehensive budget mainly includes three parts: business, capital, and financial.

2.3.1. Business budget management

The business budget of the water enterprise is shown in **Table 2** below.

Table 2. Budget content of Jiangnan Water business

| Budget items | Responsible department | Budget management content |
|-------------------|---------------------------------------|--|
| Sales budget | Sales department | Sales revenue forecast for major businesses such as tap water and sewage treatment |
| Production budget | Production department | Execution and control of sales business |
| Cost budget | Specific business-related departments | Cost and expense prediction of main business |

The budget management objectives of Jiangnan Water’s business follow the sequential relationship of budget preparation, that is, based on the sales budget, formulate sales volume that fits various time dimensions, determine production budget control, and then establish cost budget management.

To achieve digital transformation, Jiangnan Water has invested in digital hardware equipment, purchased intelligent water meters, artificial intelligent systems for water management, and improved the level of digitalization. A dynamic networked digital budget control system that integrates production and sales is achieved through the use of Internet of Things (IoT) technology. Through real-time supervision and data feedback, budget management can be followed up and regulated in real time.

2.3.2. Capital and fundraising budget management

The main goal of budget management is to improve the efficiency and utility of capital expenditures along with optimizing the fundraising and rational use of funds. At the level of capital budgeting, due to the organizational nature of Jiangnan Water being a monopolistic public service industry and the overall operational direction

being cost sales control, the importance of capital budgeting management is relatively low. Its capital budgeting management activities mainly focus on the capital operation of subsidiaries and branches, as well as investment projects with adjustment and maintenance nature. The recent capital budget plan of Jiangnan Water as an example is shown in **Table 3** below.

Table 3. Jiangnan Water capital and financing budget plan

| Year | Project investment | Asset-backed securities for water supply fee income rights | Comprehensive credit plan |
|------|--------------------|--|---------------------------|
| 2019 | 29,400 | 14,000 | 55,000 |
| 2020 | 27,988 | 20,000 | 85,000 |
| 2021 | 22,400 | 12,700 | 35,000 |
| 2022 | 27,700 | 16,900 | 55,000 |
| 2023 | 29,346 | 16,000 | 60,000 |

Data source: Financial statements of Jiangnan Water Company from 2019 to 2023

Note: Unit in 10,000 yuan

2.3.3. Financial budget management

The financial budget management of Jiangnan Water is led by the finance department, mainly preparing budget plans such as the expected income statement, expected cash flow statement, and expected balance sheet, comprehensively reflecting the results of the overall operation, business, and capital activity budget of the enterprise. Under the digital system, Jiangnan Water has established a shared and automated financial budget management process system. The shared financial system connects business budgets, capital and financing budgets, and financial budgets through digital processes, achieving digital integration and restructuring, strengthening analysis, optimizing, and improving functions. The automated financial process management system automates the accounting of financial indicators such as budget preparation, plan approval, and profit margin, and is processed by digital systems and intelligent financial platforms. Additionally, Jiangnan Water has introduced accounting and operational platforms to enhance financial and capital budget management through digital analysis tools and operational system analysis tools.

2.4. Performance evaluation system for the comprehensive budget of Jiangnan Water

2.4.1. Budget performance evaluation work

Jiangnan Water has developed an evaluation index system to evaluate the budget management work of various departments and types, using differentiated performance evaluation indicators to analyze and consider budget control and execution levels. With the digital restructuring, Jiangnan Water has improved the quantifiability and clarity of evaluation standards, to achieve automated analysis of budget evaluation work and evaluation of opinions and countermeasures. Taking the business budget management evaluation system as an example, Jiangnan Water has established an automated digital process for generating, verifying, and approving business documents, achieving the automation and digital precision of quantitative evaluation work.

2.4.2. Budget performance evaluation indicators

The above table shows the weights and assessment ideas for the overall budget preparation of Jiangnan Water. The main performance evaluation indicators and their weight ratios of Jiangnan Water are displayed, and the full process assessment based on budget management has corresponding weights. The focus of the assessment is on the results and effectiveness of budget management, emphasizing the effectiveness of financial budget

management and the implementation efficiency of business budget projects.

For different budget management entities, such as departmental budgets, Jiangnan Water has set differentiated performance evaluation indicators to adapt to the actual situation of each business. Take **Table 5** sales performance evaluation form as an example.

Table 4. Evaluation of main performance indicators for the overall budget of Jiangnan Water

| Assessment items | Concrete content | Weight | Performance evaluation indicators |
|-----------------------------|----------------------|---------|--|
| Budget plan | Budget preparation | 5% | Rationality of budget preparation |
| | | 5% | |
| | | 3% + 7% | |
| | | 12% | |
| Capital budget management | | 4% | |
| Capital budget management | | 20% | Standardization of budget preparation |
| Business budget management | Financial compliance | | Adequacy and clarity of budget preparation |
| | | 6% | |
| Financial budget management | | 25% | Capital expenditure standardization |

Table 5. Performance evaluation form for sales personnel of Jiangnan Water

| Assessment items | Assessment weight | Performance evaluation objectives |
|----------------------|-------------------|---|
| Business Daily | 30% | Timeliness of time indicators, quantity indicators, and detail of content indicators Segmented score assessment system |
| Customer information | 30% | Timeliness of time indicators, quantity indicators, and detail of content indicators Segmented score assessment system |
| Job performance | 40% | <ol style="list-style-type: none"> 1. Sales achievement rate, Key Performance Indicator (KPI) calculated as a percentage based on sales budget plan 2. Accounts receivable recovery rate, KPI calculated based on budgeted accounts receivable and overdue accounts 3. Business visit volume, based on planned visit volume as the base, calculates KPI as a percentage 4. Attendance rate 5. Daily behavior |
| Assessment items | 10% | |
| | 10% | |
| | 5% | |
| | 5% | |

Table 5 shows the quantitative evaluation standards for specific sales business entities, in which time indicators are taken into consideration in assessment dimensions such as business daily reports and customer information, reflecting the specialized focus on specific businesses. In addition, the performance evaluation of Jiangnan Water has achieved an online digital examination system under the background of digital transformation. Based on personal self-evaluation, peer evaluation, and comprehensive evaluation by department responsible leaders, corresponding weighted evaluation scores are calculated, and the data platform integrates opinions from all parties to achieve the automation and accuracy of performance evaluation.

3. Performance analysis of the digital transformation of the budget management system

3.1. The final settlement results are closer to the budget plan

Since 2019, water management enterprises have been responding to the call for information technology reform

by the water management department, continuously promoting the digital transformation of budget management systems, and improving their budget execution capabilities. The final settlement values of some financial dimensions are closer to the planned budget values.

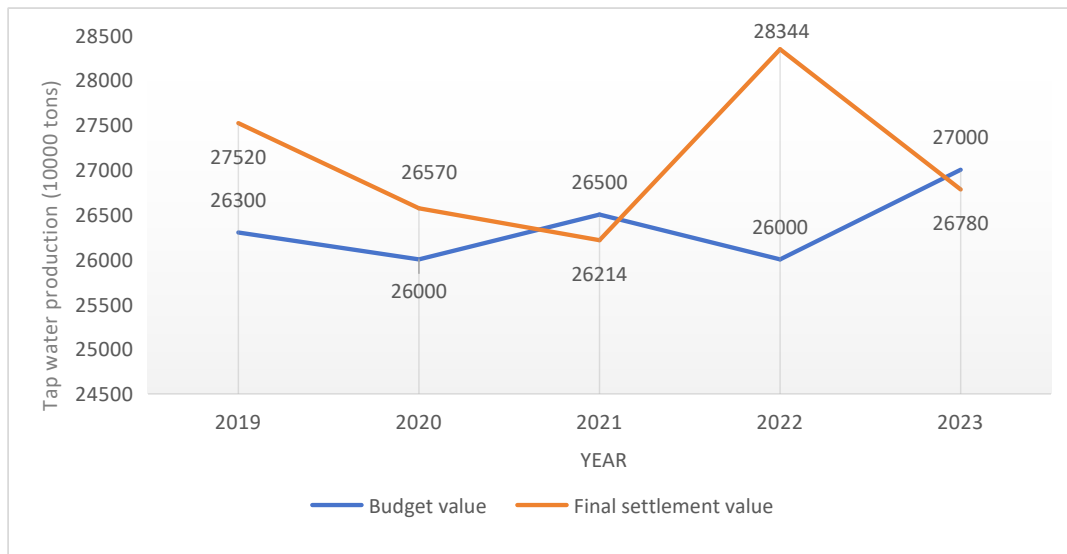


Figure 1. Budget and final account value of tap water production in water management enterprises
Data source: Information on shareholder meetings of water enterprises from 2019 to 2023

As shown in the above figure, in the indicator of tap water production, the actual final settlement value of water supply by water enterprises has shown an overall trend of approaching the budget value since 2018. Except for the abnormal fluctuations in 2021, the budget plan is getting closer to the final settlement execution, demonstrating that the accuracy and effectiveness of their production budget management work have been further improved, and their budget plan is constantly getting closer to reality in the formulation process. At the same time, the budget plan and execution value at the sales level also show a fitting trend with the digital restructuring process, as shown in the following figure ^[2].

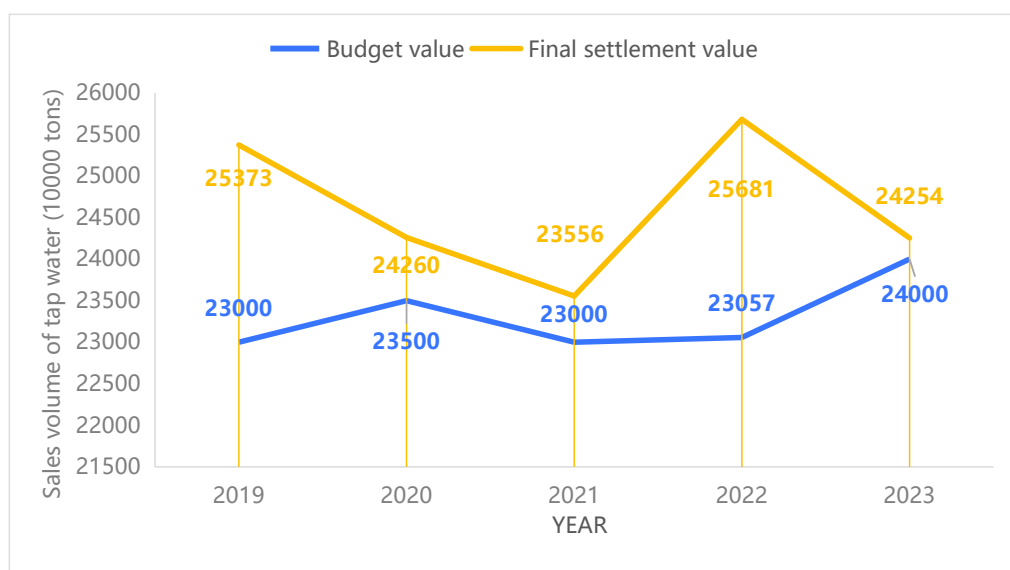


Figure 2. Budget and final settlement value of tap water sales volume for water enterprises
Data source: Information on shareholder meetings of water enterprises from 2019 to 2023

In 2021, there were abnormal fluctuations in the final accounts of production and sales quantities, resulting in unsatisfactory budget execution. The management attributes the differences to comprehensive factors such as structural transformation and green production policies. Overall, the budget execution results of water enterprises are being optimized, the budget plan is more in line with reality, and sales execution is approaching business goals. The supply and sales budget management goal of the water business budget is to control the production and sales variance rate within a reasonable range, usually 5% to 10%. In the past five years, the production and sales gap of tap water in water enterprises has remained below 10%, but there is still room for optimization. Further refinement of budget planning and execution control is needed to achieve the optimal balance point.

In terms of investment budget management, the performance of budget management has improved after digital restructuring. The following figure shows the engineering investment budget and final settlement values of water enterprises.

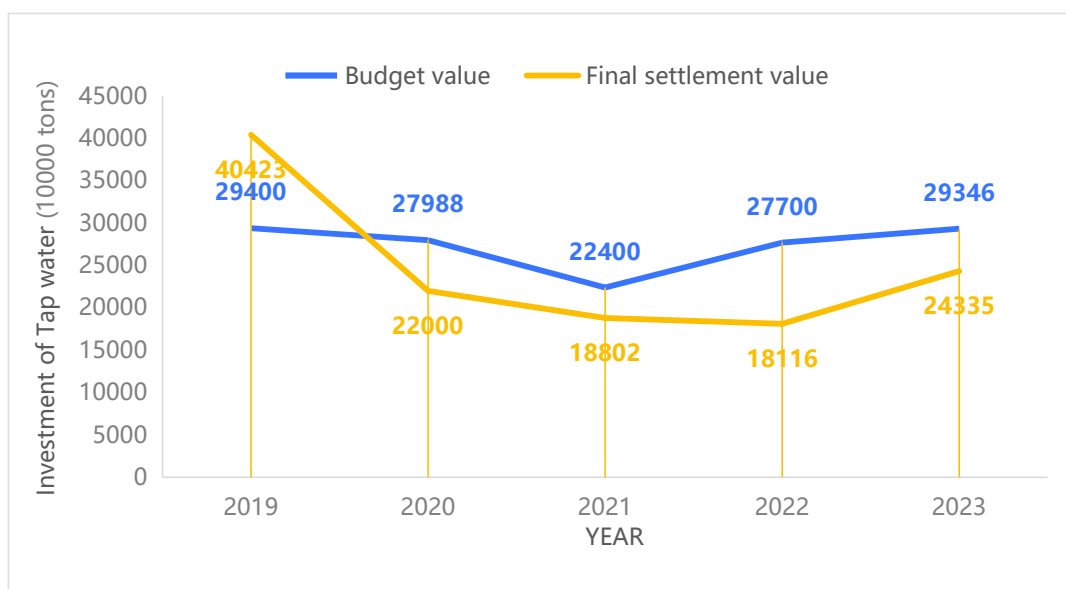


Figure 3. Engineering investment budget and final account value of water enterprise

Data source: Information from the shareholder meeting of water enterprise from 2018 to 2022

Compared to the budget management and execution of main businesses such as tap water, the investment budget management of water enterprises presents greater uncertainty and difficulty in budget control. In terms of financial data, the difference rate between their budget values and final accounts is higher. The overall execution of engineering investment budgets of water enterprises also shows a fitting trend. Except for the abnormal overall budget control in 2021, the budget plans and final accounts execution of other years show a slight similarity, and the overall budget control level of engineering investment has improved.

3.2. The Return on Investment (ROI) and economic value added gradually increase

Since the launch of digital transformation in 2020, the overall investment scale has increased by 50%, resulting in a decrease in the relative return rate. However, this is a normal transformation pain in the process of digital restructuring. The overall investment return rate shows a fluctuating upward trend, indicating that the investment return rate for digital restructuring is steadily improving. With the increase of direct investment in digital budget management, the return on investment has gradually increased, demonstrating the development empowerment of digital restructuring. Economic Value Added (EVA) is an indicator that measures the economic

benefits created for owners, requiring enterprise managers to implement comprehensive cost management, reflecting the overall performance results of the enterprise over a certain period in the dimensions of long-term operation and overall goals.

Table 7. Return on digital investment of water enterprises

| Year | Digital research and development and restructuring investment | Net profit | ROI |
|------|---|------------|--------|
| 2019 | 64.1 | 19,300 | 301.09 |
| 2020 | 76.2 | 23,100 | 303.15 |
| 2021 | 105.9 | 24,100 | 227.57 |
| 2022 | 117.9 | 27,600 | 234.10 |
| 2023 | 120.0 | 28,000 | 233.33 |

Data source: Information on shareholder meetings of water enterprises from 2019 to 2023

Note: Units are in 10,000 yuan

Table 8. Economic value added of water enterprise

| Year | Economic value added (10,000 yuan) |
|------|------------------------------------|
| 2019 | |
| 2020 | -4,308.09 |
| 2021 | 2,528.51 |
| 2022 | 4,568.49 |
| 2023 | 3,735.88 |
| | 6,163.58 |

Data source: Information on shareholder meetings of water enterprises from 2019 to 2023

In 2018, the EVA of the water enterprise was negative, indicating a decrease in capital costs, poor overall operating results, and unsatisfactory budget management performance. Therefore, it is necessary to re-examine and optimize business performance control. With the implementation of the digital restructuring of budget management in 2019, the economic value added to EVA has gradually increased. Except for business fluctuations and abnormal financial data in 2021, the EVA has steadily increased, demonstrating the improvement and enhancement of business performance through digital restructuring.

3.3. The maturity and feasibility of budget execution are gradually increasing

The digital restructuring of budget management in water enterprises has made budget management more mature, decomposable, operable, and thus more implementable. To investigate the current situation of comprehensive budget management in water enterprises and the impact of digital technology on budget management processes, we designed a survey questionnaire targeting practitioners in water enterprises to collect their opinions on the efficiency and optimization results of budget management reform. Finally, we will organize and analyze the questionnaire information to draw relevant conclusions. Most projects score above four points, indicating that most indicators of budget management meet the requirements of a mature, effective, and accurate system. In the budget management process, the budget plan has the highest score, indicating that its system is relatively complete and mature. In contrast, the performance evaluation score is relatively low, indicating that water companies still have shortcomings in their performance evaluation system and need to be

optimized and improved. In terms of the effectiveness of digital restructuring, the digital application of budget management in water enterprises has considerable coverage, improving budget efficiency, reducing control costs, and providing more time for optimizing layout. The digitalization process has had multiple empowering and optimizing effects on budget management.

4. Conclusion

The comprehensive budget management work in the new era has put forward further requirements for the global and dynamic nature of budget control. The advantages of digital technology in optimizing and rebuilding traditional financial management work overlap to a considerable extent with the demands of comprehensive budget management. Based on a digital perspective, examining the organizational structure and implementation process of budget management work is conducive to further exploring existing problems and achieving the optimization and upgrading of budget management through the restructuring and integration of digital technology. The digitization reform is an inevitable process of the development of financial management models in the new era. It realizes the overall digital transformation, optimization, and upgrading of budget planning, budget execution, and budget evaluation and assessment in all time dimensions, providing strong support for the overall development of the group.

Disclosure statement

The author declares no conflict of interest.

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