

Study on the Innovation of Spatial Planning and Financial Resource Allocation Mechanism of the Intelligent Financial System of Public Hospitals in Refined Construction

Ling Xu^{1,✉}, Han Zhang¹, Xinhao Zhu¹

¹ Nanjing Lishui People's Hospital, Nanjing, Jiangsu, 211200, China

ABSTRACT

With the development of big data, cloud computing and 5G digital technology, smart finance has emerged. The use of modern information technology to create a smart financial management system to transform and upgrade the original financial management system of the hospital has become an indispensable part of the effective operation and management of public hospitals. The article focuses on the current problems in the development of smart finance in public hospitals, plans the smart finance space from the front, middle and back office, and proposes a financial resource allocation mechanism from the perspective of smart finance. In the performance evaluation analysis of smart financial construction, the weights of the professional level of accounting personnel, financial accounting, comprehensive budget management situation, medical revenue management, outpatient satisfaction, and the standardisation of data sets are 0.1067, 0.0857, 0.0670, 0.0630, 0.0512, and 0.0476 in that order. The weights of cultivating human resources, consolidating the hospital's financial foundation work, strengthening comprehensive budget management, promoting data standardisation and enhancing patient satisfaction are important ways to promote the development of smart financial construction in hospitals. The purpose of this paper is to provide reference and reference for the financial revenue management of public hospitals, to help hospitals optimise the management process, to improve the quality of service and to ensure financial security.

Keywords: smart finance, public hospitals, financial management, financial resource allocation

1. Introduction

With the deepening of healthcare reform, the operation management and sustainable development of public hospitals have been severely challenged. Public hospitals should make use of information technology to strengthen the construction of internal control, embed the internal control process and key points into the hospital information system, strengthen the construction of information platform

✉ Corresponding author.

E-mail address: njlsxl@163.com (L. Xu).

Received 05 February 2024; Revised 20 March 2024; Accepted 10 December 2024; Published Online 15 April 2025.

DOI: [10.61091/jcmcc127a-158](https://doi.org/10.61091/jcmcc127a-158)

© 2025 The Author(s). Published by Combinatorial Press. This is an open access article under the CC BY license (<https://creativecommons.org/licenses/by/4.0/>).

and integration, and realise the interoperability and sharing of information systems. In the wave of building smart hospitals, public hospitals need to re-examine the operational pain points, highly integrate financial management and internal control, and build a smart financial system based on the refinement of internal control to further promote the operation of public hospitals [1-3].

In order to establish the 'medical and financial integration' type of service, it is necessary to break the original hospital financial management model and management mode, in a certain sense, to innovate the traditional hospital financial management model [4-5]. Different from the traditional decentralised financial management structure, the hospital intelligent financial information technology as the basis of the business integration function, to achieve the intelligence of the hospital financial work [6-8]. Smart finance itself has the characteristics of storing large amounts of data, human thinking, fast and accurate, human-computer interaction and business scenario processing [9-10]. The fundamental purpose of introducing the smart financial system into public hospitals is to further reduce the operating costs of the entire public hospitals by supporting the public hospitals to improve the corresponding level of healthcare services and the quality of healthcare services, and at the same time, to enhance the efficiency of the public hospitals' healthcare operations and healthcare standards [11-13]. Thus adapting to the needs of social development, further promoting the healthy development of public hospitals, realising the continuous progress and development of public hospital services, and promoting the healthy development of the national economy [14-15].

Olayisade, O. A. et al. examined the relationship between internal control system and financial management in federal hospitals and by analysing the data from the questionnaire, it was found that there is a significant correlation between the two and therefore federal government hospitals can ensure that internal control system is regularly monitored and evaluated in order to improve the productivity of their financial management [16]. Selimoğlu, S. K., et al. discussed the technological development and benefits of the field of healthcare sector accounting, and introduced the application of emerging technologies such as the "Big Smart Cloud Physics Zone" in the field of healthcare sector accounting, including shared insurance claims, data privacy protection, data mining and analysis, and fraud detection, which are important for the success of the healthcare sector [17]. Singh, R. et al. proposed a decentralised healthcare finance system based on blockchain technology with lightweight, efficient and non-interactive zero-knowledge proofs, which contributes significantly to the privacy protection of shared information in healthcare finance systems [18]. Sadki, T. et al. showed that the linkage between activities within an organisation and the consumption of resources is a strong indication of organisational competitiveness, and so the balanced scorecard was introduced into activity performance management in public hospitals to achieve improvements in the overall performance of public hospitals by controlling the chain of flows [19]. David, Y. et al. pointed out that hospitals need to utilise a large amount of resources for procurement and asset management, and operating and managing inventory in the face of iterative demand for medical technology is a very big challenge, and proposed a medical technology management plan that incorporates a cost accounting analysis that evaluates financial capital items to ensure appropriate inventory levels at the lowest life-cycle cost and optimal performance [20]. Ma, M. analysed the current stage of hospital financial intelligence management problems, such as low degree of informatisation, risk early warning system is not perfect, the financial system exists 'information silo' phenomenon, and based on this put forward the development direction of the artificial intelligence financial system, which effectively improves the overall efficiency of the hospital's financial fund management [21]. Filip, F. G. designed a finite-capacity queuing model for optimising the distribution of phase-type services by a fish-school search (FSS) algorithm, which constructs a partitioning model and an associated cost model based on the number of beds in a healthcare facility as well as the budget, which significantly optimises the efficiency of healthcare resource allocation and saves the facility's budget [22].

After summarising the current problems of public hospitals, such as the lack of attention to the construction of a smart financial system, the imperfection of the system and the lack of information

technology talents, the article proposes the specific planning and layout of the smart financial space. The space planning mainly contains the front office, middle office and back office, followed by further research on the financial resource allocation mechanism. Finally, the G public hospital as a research object for the study of smart financial system, through the construction of smart financial performance evaluation system and the application effect of the smart financial system proposed in this paper for verification.

2. Spatial planning of the financial system and optimal allocation of resources

2.1. Lagging characteristics of smart financial development in public hospitals

2.1.1. Lack of attention to building smart financial systems. Intelligent financial system construction helps to improve the quality of medical services, reduce costs, improve efficiency and increase patient satisfaction, although most hospitals already have an electronic financial management system, but most of the hospital management did not recognise the importance of building an intelligent financial system, in the establishment of the financial information system is more blind, that intelligent finance is to buy financial software, the lack of unified Comprehensive planning and perfect top-level design, no foresight, which makes the financial system can only meet the management needs of some single accounting.

2.1.2. Incomplete hospital information system, low degree of integration. First of all, the traditional financial system only has the accounting function, its system function is incomplete, the ability to process data is relatively low, can not provide strong support for the hospital's decision-making. Most of the hospital's financial system can not be perfectly docked with personnel, HIS and other systems, can not achieve data sharing, interoperability, thus forming an information island. The information and data coding of each department is not standardised, resulting in inconsistent calibre of financial data, which can not provide an effective basis for the hospital's budgeting, costing and other related work reference.

2.1.3. Hospitals lack complex financial information technology talents. Composite financial information technology personnel is both proficient in accounting knowledge, but also the value of information attributed to the system, and master information management knowledge, skilled operation of information systems professionals. At present, the overall quality of public hospital financial personnel need to be improved, most of them are only engaged in basic financial accounting work, no professional knowledge of information technology, can not deep understanding of the hospital's business information technology processes and characteristics, can not dig into the depth of the use of intelligent financial systems, it is difficult to give a practical and effective financial information technology and improve the construction of the proposal, the constraints on the hospital's development of intelligent finance. The maintenance of the financial system is usually completed by the information department and software development enterprises, due to the information department personnel do not understand the specific process of financial work, resulting in intelligent financial system can not fully meet the specific requirements of the financial staff, and thus can not give full play to the effectiveness of the intelligent financial system.

2.2. Smart financial space planning

2.2.1. Asset Enhancement Operations Management Centre (front office). In the smart financial organisational framework of public hospitals, the Asset Value-added Operation and Management Centre is at the core of the front office and one of the important outlets for the smart financial system to provide support for business. In the daily operation of business, the centre mainly provides support for six aspects: strategy review, operation participation, system construction, financial process,

business process and business rules. Among them, in the promotion period of project operation, the Centre formulates financial budgets suitable for the promotion period, and clarifies the KPI assessment for the subsequent operation of the project. During the implementation period, we understand the business requirements, sort out business processes, provide financial service support, monitor the implementation of the project in advance, provide regular analyses of the project, and participate in the assessment and evaluation of the project. During the incubation period, assist the management department in establishing a financial budget model that matches the strategy and participate in the design of the project business model.

2.2.2. Money Management Centre (Middle Office). The funds management centre of public hospitals likewise consists of a front office, a middle office and a back office. The front office mainly includes fund inflow, which consists of four parts: sales inflow, bank funds, non-bank funds, and investment income, while fund outflow contains three parts: other outflow, expense payment, and loan settlement. The middle-office part includes financing business, bill management, fund approval, system optimisation, financial business, payment marketing and fund management. The backstage is transaction execution, file management, and accounting and bookkeeping on the basis of the financial sharing centre.

2.2.3. Operational Compliance Management Centre (middle office). The Centre comprises a front office, a middle office and a back office, of which the front office consists mainly of operations, which is also the value output platform of the Operations Compliance Management Centre. The back office, on the other hand, is mainly a financial sharing centre, which is mainly responsible for transaction execution, file management, and accounting and bookkeeping. The middle-office part mainly combines daily business with legal risk, operational risk, strategic compliance and financial risk, adheres to compliance management, and is intelligent throughout the whole process from activity initiation to settlement collection, contract agreement to payment, providing business support for the front-office and basic data for the back-office sharing centre.

2.2.4. Financial Management Centre (middle office). The central function mainly undertakes the accounting function and combines the business system with the finance and tax platform. The specific process is for public hospitals to formulate tax structure, M&A plan and investment plan according to the strategy, after which the business level will implement the strategy, and the back office will collect and account for the data of the business implementation, complete the expense audit, tax declaration, drug procurement settlement and general ledger accounting. Finally, the combination of business and tax data for business analysis, including management report analysis, tax incentives, financial rebates, government subsidies, etc., to provide a basis for decision-making for the subsequent strategic improvement and continuous operation [23].

The financial management centre contains two parts, the tax platform and the business system. The tax platform mainly includes the tax platform, the management reporting system, the invoice system, the settlement platform, the verification system, the tax assessment, the non-procurement contract, the tax file, the health check, the special check, etc. The two complement each other and work together. The two complement each other and work together.

2.2.5. Programme Audit and Asset Security Centre (middle office). Plan Audit and Asset Security Centre As a part of the overall financial intelligence formation of public hospitals in the middle stage, Plan Audit and Asset Security Centre, as shown in Figure 1, these tools provide models and indicators for planning, budgeting, as well as auditing work in public hospitals. Rules, systems, processes, and systems are developed for planning, budgeting, and single counting work, and relevant data are extracted and then analysed and collated by the tools to supervise the entire business process.

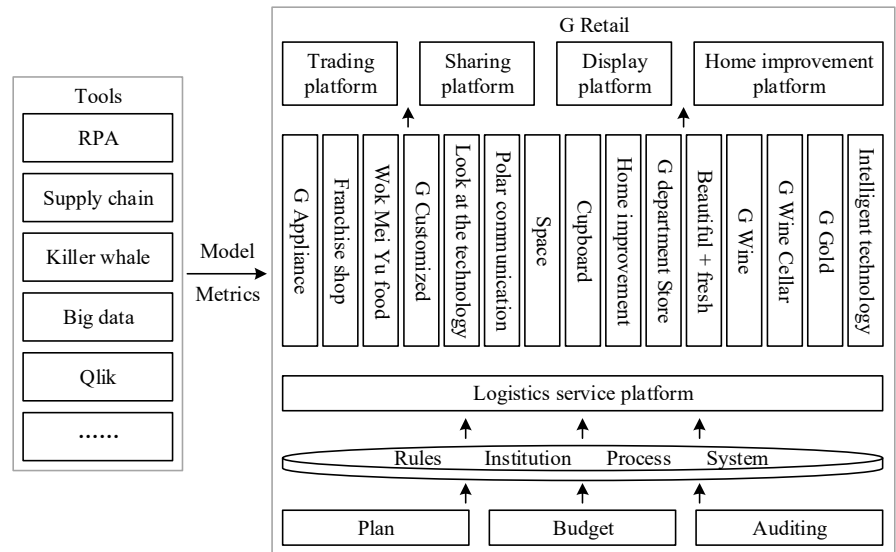


Fig. 1. Plan Audit and Asset Security Center

2.2.6. Finance shared service centre (back office). The financial shared service centre plays a crucial role as the back office of the smart financial system, providing basic data support for the entire system, and the financial shared service centre is shown in Figure 2. Within the centre is the same front, middle and back office structure, similar to that of most corporate shared finance centres, where the front office is the business department. The middle office is a professional line, responsible for controlling all aspects of the interface between business and finance, and the back office is a shared centre. The business content of the financial sharing centre can be broadly divided into three parts according to the type of work: uptake business, monitoring and analysis, and value enhancement, specifically related to the core business of capital sharing, general ledger common word, file sharing, expense sharing, supply chain sharing, tax sharing, as well as for financial data analysis, inspection, feedback [24]. In transaction processing, the financial shared service centre achieves the functions of expense reimbursement, fund payment, list verification, settlement approval, tax declaration, etc., which plays an important role in public hospitals in terms of talent delivery, cost reduction and efficiency, and data analysis. The financial shared service centre enhances the quality of financial accounting, improves the interoperability of financial information, supports the operation of business departments, and also strengthens the sharing function, efficiently handles business according to standardized processes, accurately conducts data analysis, helps operational support and risk control, and plays a role in creating value for the financial sector as well as value enhancement and overall efficient operation of public hospitals.

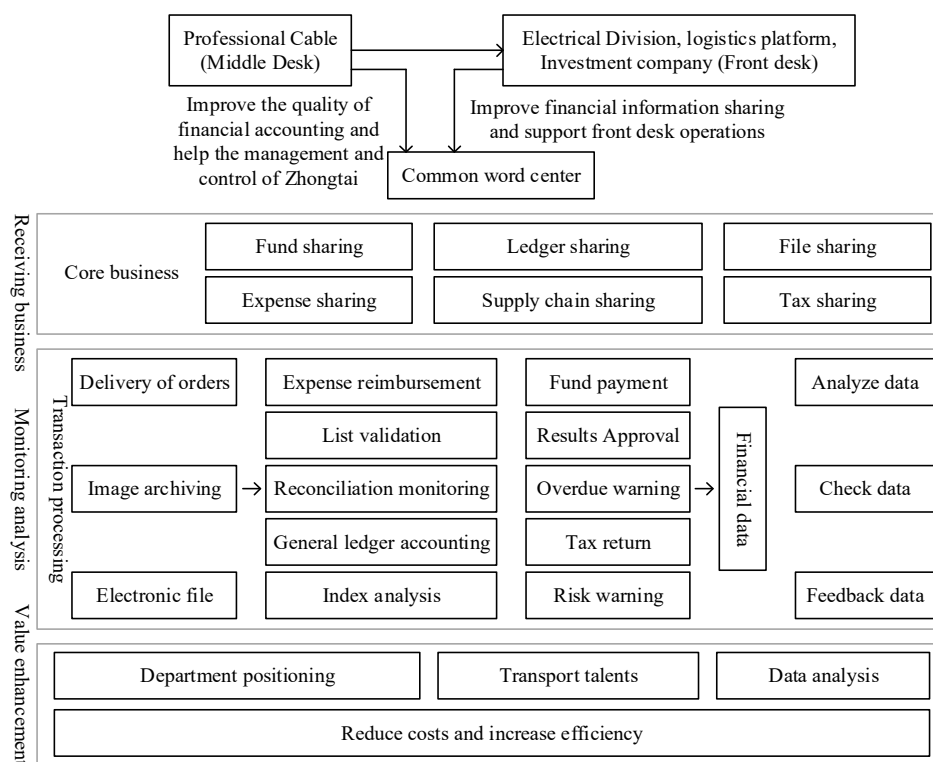


Fig. 2. Financial sharing Service center

2.2.7. **Logistics platform finance (front office).** For the overall financial strategy of public hospitals, the construction of logistics platforms is an essential part of it. Compared with the public hospital logistics platform development speed is slow, the coverage is small. In recent years, public hospitals are committed to building a perfect self-managed logistics system, building a complete logistics information system. The construction of the logistics platform has a greater demand for funds, logistics platform finance as a support for the construction of the logistics platform nutrients, in the wisdom of the financial system also occupies a more important position.

2.3. Proposed mechanism for allocation of financial resources

The financial analyses provide a solid basis for resource planning, making the planning and management of project resources more precise and efficient. It provides decision makers with clear insights into the various resources required for the project, including funding, human resources and other necessary support. Resource planning becomes an evidence-based process, ensuring that resources are maximised and allocated wisely, effectively supporting successful project implementation. The in-depth data and metrics from financial analysis provide the information required for resource planning, helping decision makers to optimise the allocation of resources, reduce resource wastage and ultimately achieve project objectives and outcomes. Such refined resource planning is an integral part of project success and helps maintain the economic viability and sustainability of the project.

Aiming at the common problems that exist in the allocation of funds in public hospitals, the construction of a new type of intelligent financial resource allocation mechanism for public hospitals is considered. The financial resource allocation mechanism is designed as a comprehensive intelligent and automated intelligent information system platform with fund management as the core, financial system as the framework, and information technology as the way to comply with the development trend of the society and promote the process of the new health care reform, and with the objectives of the hospital management, the working needs of the hospital staff as the entry point, and the

enhancement of the quality of medical services as the starting point. Under the financial resource allocation mechanism, each financial data is recorded in real time and in detail through information technology, and the financial data generated by each position is automatically summarised, counted and analysed, providing accurate financial data analysis in hospital operations, helping the hospital to make important decisions and reducing hospital management risks. At the same time, the financial resource allocation mechanism can standardise, refine and standardise the financial management workflow and work standards, reducing the risk of financial work and fund management. In addition. Financial standardisation, refinement and standardisation can also lead to the optimisation of business processes, in the hospital's financial business processes should be set up to the calibre of the financial indicators, combined with the hospital management system and financial management system for a comprehensive and perfect business standards design, to help hospital staff in the business process with the combination of financial data, a better understanding of their own work, to promote the integration of industry and finance, can help the business departments more accurately, can help the business departments more accurately, can help the business departments more accurately. It can also help each business department report budget data more accurately, improve the efficiency of hospital funds, and reduce the risk of funds management. The financial resource allocation mechanism under the smart financial system is shown in Figure 3.

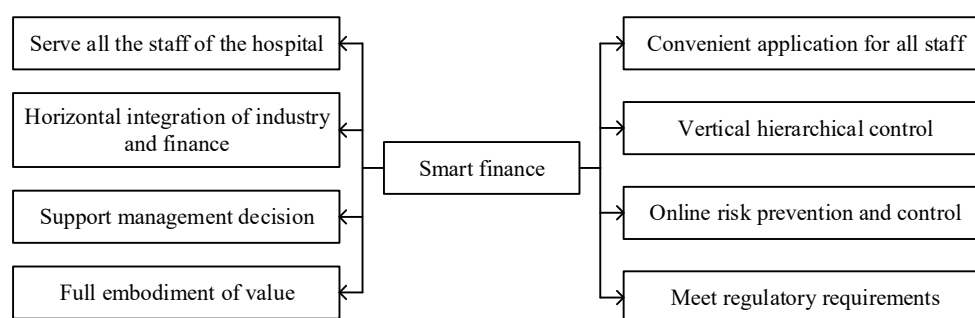


Fig. 3. The financial resource allocation mechanism

Public hospitals in the early stage found that the management of special funds is relatively cumbersome, the review, approval, use and inventory of each special fund rely on manual, special funds budget remaining amount of difficult and cumbersome statistics, human resources consumption, research projects are easy to confuse and so on, the emergence of problems, public hospitals to explore the special funds management module. The special funds are divided into common research special funds, ethical review special funds, drug clinical ethical review special funds, etc., and entered into the statistics by type [25]. The special fund management module can make the research department and the financial department of the management of special funds connected, the information directly retained in the platform to avoid the loss of bills, missed payments, etc., the platform directly retained the ticket number to check the authenticity of the bills to avoid forgery, duplication and so on. At the same time, financial personnel and researchers can directly access the remaining amount of the budget of the special funds on the platform. If the amount is exceeded when entering the project, the platform will first prompt an error and will not allow the entry to be successful, and the amount must be replenished to allow the entry to be successful. If necessary, you can also annual, quarterly, monthly and other time periods of the total amount of each type of special funds to query the special funds project details can also be exported to the system for accounting statistics, greatly meet the requirements of the financial resource allocation mechanism to improve the efficiency of the use of funds to ensure the safety of funds. Budget, settlement, accounting, "three in one" of the wisdom of the refined management of financial resources as shown in Figure 4.

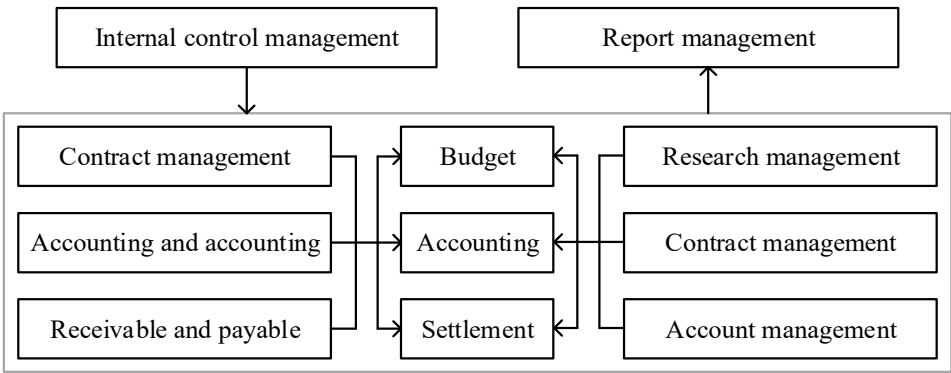


Fig. 4. Intelligent financial capital refinement management

3. Results and discussion

This section takes Hospital G as an empirical study to analyse and discuss aspects such as the effectiveness of the smart financial system for public hospitals established in this paper in practical application.

3.1. Analysis of the level of financial management in hospital G

The business income and expenditure of Hospital G in 2020-2023 is shown in Figure 5. After nearly 10 years of rapid development, the scale of annual business income of Hospital G reaches more than 5 billion, and the annual growth rate reaches more than 10%, but due to the growth of hospital business expenditures and business income is basically synchronous, the annual growth rate of the difference between business income and expenditure is about 5%, which shows that the high-speed development of Hospital G is just the hospital's rapid expansion by virtue of the dividends of the national health care reform policy, and the use of the hospital's scale This shows that the rapid development of Hospital G is only the rapid expansion of the hospital with the dividends of the national medical reform policy, and the rough development by using the hospital scale effect. Along with the promulgation of the medical reform policy of cancelling the drug markup, the growth rate of the hospital's business income obviously lags behind the growth of business expenditure, and even in 2022, the business income and expenditure difference for the first time appeared in the negative, to the extent of 42 million yuan, reflecting that Hospital G's sloppy management mode has lagged behind the hospital's modernisation and management needs.

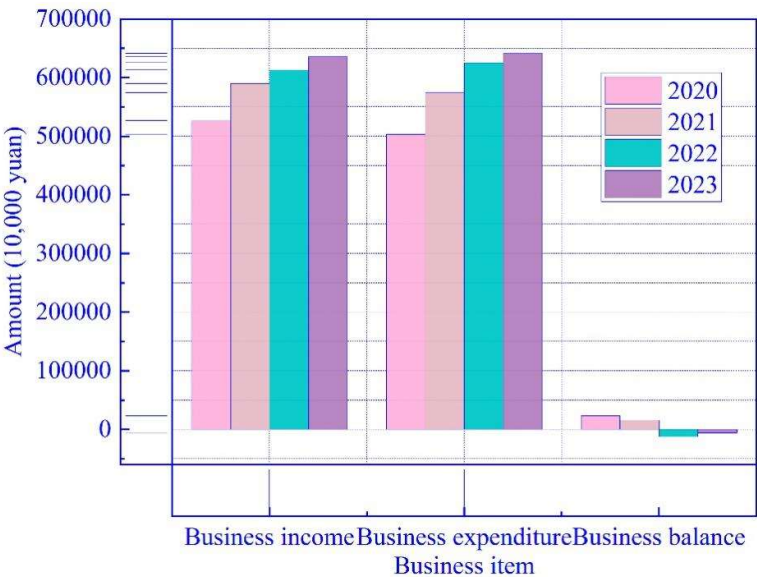


Fig. 5. 2020-2023-G hospital business balance

The expenditure composition of Hospital G in 2020-2023 is shown in Figure 6. The main components of Hospital G's operating expenditure are personnel expenses, health materials, drugs, depreciation and amortisation and other expenses, of which personnel expenses, health materials and drugs are the main sources of expenditure, accounting for nearly 90% of the total ratio of expenditure, which is the focus and difficulty of the hospital's cost control. With the disclosure of the information on the cancellation of the drug mark-up policy, the hospital has carried out a three-year cost control policy, conducted detailed and meticulous statistics and analyses on the composition and growth of the hospital's operational expenditures, and made corresponding countermeasures for the problems in the hospital's expenditures, and compressed the expenditures of the sanitary material fee and the drug fee as much as possible to cope with the impact of the promulgation of the policy of cancellation of the drug mark-up and the sanitary material mark-up on the operation of the hospital.

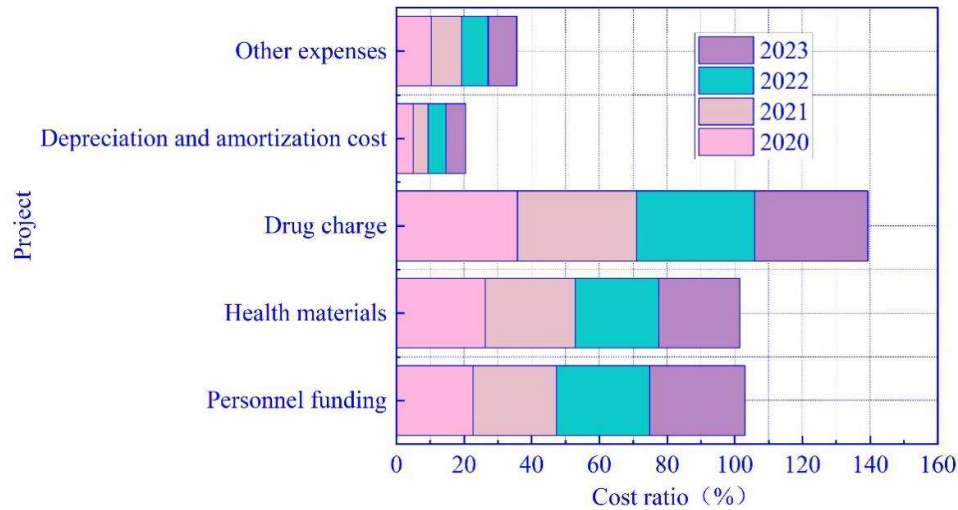


Fig. 6. 2020-2020-2020 G hospital expenditures constitute the situation

3.2. Performance Evaluation System for Intelligent Financial Construction

3.2.1. Construction of Performance Evaluation System for Intelligent Financial Construction. When constructing the hospital smart financial performance evaluation index, this study is oriented to the operation management strategy, the financial module as the top priority of the public hospital operation management information construction, adhere to the 3 basic principles of system interconnection, data sharing, and business synergy, and decompose the important tasks of the operation management (optimize the allocation of resources, strengthen the information support, optimize the management process, improve the quality of decision-making, and strengthen the organization) into 10 sub-targets related to smart The important tasks of operation management (optimize resource allocation, strengthen information support, optimize management process, improve decision-making quality, and strengthen organizational construction) are decomposed into 10 sub-targets closely related to the construction of smart finance. Hospital finance has changed from "accounting" to "management" and from "traditional" to "intelligent". This study constructs 4 first-level and 10 second-level public hospital smart financial performance evaluation indexes to serve the operation and management objectives in four dimensions: financial level, business process level, patient and user level, and learning and growth level, and the public hospital smart financial performance evaluation index system is shown in Table 1.

Table 1. Public hospital intelligent financial performance evaluation index system

Primary indicator	Secondary indicator	Tertiary index
Financial level(A1)	Information resources investment(B1)	The percentage of intelligent financial investment accounts for the information investment of the whole hospital(C1)
		Intelligent financial investment accounts for the percentage of total spending(C2)
		The number of intelligent financial inputs accounts for the percentage of information invested in the full hospital(C3)
		The number of intelligent financial inputs accounts for the total number of people in the total(C4)
	Financial management(B2)	Comprehensive budget management(C5)
		Medical collection management(C6)
		Financial accounting(C7)
		Full cost management(C8)
Business flow level(A2)	Infrastructure construction(B3)	Hardware infrastructure quantity and configuration(C9)
		Network and network security(C10)
		Information security(C11)
		Number of business system construction and the number of contractors(C12)
	Data standardization construction(B4)	Standardization of data sets(C13)
		Data management system(C14)
	Standardization of connectivity(B5)	Type of technical architecture(C15)
		The number of interconnected services(C16)
		The business system core business and the interactive service average(C17)
		Response time(C18)
	Connectivity application(B6)	Business system interaction service frequency(C19)
		Connectivity system(C20)
Patient and user level(A3)	Patient satisfaction(B7)	Outpatient satisfaction(C21)
		Patient satisfaction(C22)
	User satisfaction(B8)	Performance satisfaction(C23)
		Analysis satisfaction(C24)
		Decision satisfaction(C25)
Learning and growth(A4)	Personnel culture(B9)	Information level of accounting personnel(C26)
		Accounting personnel training(C27)
	Cultural construction(B10)	Intellectual and financial propaganda(C28)
		Employee's acceptance and acceptance of intelligent financial work(C29)

3.2.2. Hospital smart financial construction performance evaluation index assignment. In this study, 15 personnel from the finance and medical departments of the hospital were surveyed through a questionnaire. Among them, 8 are financial personnel and 7 are medical personnel. The index weights and comprehensive weights of the public hospital smart financial performance evaluation index system are shown in Table 2. This study of the public hospital smart financial performance evaluation indicators and their weights found that the weights of the financial level and the business process level are significantly higher than the other two first-level indicators. This shows that the financial level and business process level are more important in the evaluation system of smart financial performance of public hospitals. The financial level indicators reflect the smart financial input and financial

management of public hospitals. The business process level indicators reflect the rationality of smart financial business processes in public hospitals under the connectivity strategy. In terms of the overall performance evaluation system, the six indicators of professional level of accounting staff, financial accounting, comprehensive budget management, medical revenue management, outpatient satisfaction, and standardisation of datasets account for the highest proportion of the three-level indicators. Their weights are 0.1067, 0.0857, 0.0670, 0.0630, 0.0512, and 0.0476 in order. In summary, cultivating talents, consolidating the hospital's financial groundwork, strengthening the comprehensive budget management, promoting the standardisation of data, and improving patient satisfaction are important ways to solve the dilemmas of the hospital's intelligent financial construction and reflect the performance of the intelligent finance.

Table 2. The index weight and the comprehensive weight

Primary indicator	Weighting	Secondary indicator	Weighting	Composite weight	Tertiary index	Weighting	Composite weight
A1	0.3562	B1	0.2513	0.0895	C1	0.3261	0.0292
					C2	0.2564	0.0229
					C3	0.2055	0.0184
					C4	0.212	0.0190
		B2	0.7487	0.2667	C5	0.2512	0.0670
					C6	0.2362	0.0630
					C7	0.3215	0.0857
					C8	0.1911	0.0510
A2	0.2835	B3	0.3612	0.1024	C9	0.3561	0.0365
					C10	0.2641	0.0270
					C11	0.2365	0.0242
					C12	0.1433	0.0147
		B4	0.2645	0.0750	C13	0.6351	0.0476
					C14	0.3649	0.0274
		B5	0.1864	0.0528	C15	0.1864	0.0098
					C16	0.4315	0.0228
					C17	0.3612	0.0191
					C18	0.0209	0.0011
		B6	0.1879	0.0533	C19	0.3512	0.0187
					C20	0.6488	0.0346
A3	0.1539	B7	0.6351	0.0977	C21	0.5236	0.0512
					C22	0.4764	0.0465
		B8	0.3649	0.0562	C23	0.4612	0.0259
					C24	0.3261	0.0183
					C25	0.2127	0.0120
A4	0.2064	B9	0.7132	0.1472	C26	0.7251	0.1067
					C27	0.2749	0.0405
		B10	0.2868	0.0592	C28	0.6321	0.0374
					C29	0.3679	0.0218

3.3. Analysis of the effectiveness of the construction of an intelligent financial management system

After going online with the intelligent financial revenue management system, Hospital G is able to unify the management of the hospital's charging entrance, payment channels and merchants through the establishment of a unified payment platform, which realizes the full-process and centralized

supervision of the hospital's payment funds and strengthens the financial internal control of the charging process. Through the establishment of a smart reconciliation management system, it can automate the completion of multi-party reconciliation, and the system can also accurately identify and locate the real long and short payments to help finance efficiently deal with abnormal bills. This study extracts part of the data as a reference for comparison of the reconciliation effect before and after the system goes online, and the effect of hospital reconciliation is shown in Table 3. After the smart reconciliation management system is online, the reconciliation is automated, and in the total of 7 days from March 1 to 7, 2024, the table shows that the payment methods accessing the reconciliation system have reached the level of "partially reconciled", except for the ZG Bank POS card clinic and NY Bank POS card, which have partially offline data that prevents them from being reconciled, and the effect of reconciliation is "partially reconciled", and the remaining payment methods have reached the level of "partially reconciled". The reconciliations for the remaining payment methods were all "reconciled", and the total number of failed reconciliations for the other four payment methods was only 3, 5, 2, and 25. Compared with the results of traditional manual reconciliation, which are generally "unreconciled", the intelligent reconciliation management system has the obvious advantages of automating reconciliation and improving the accuracy of reconciliation. The table also shows that the total number of reconciliations for the ZG Bank POS card clinic and NY Bank POS card payment methods were not reconciled or failed to be reconciled. Through manual analysis of the abnormal data summarized by the system and the formulation of solutions, it is expected that the reconciliation status can be achieved through debugging in the future. In contrast to the traditional manual reconciliation where reconciliation is not level only through manual troubleshooting and locating differences, and where the data volume is huge and the work is difficult to carry out, the intelligent reconciliation management system has the advantages of accurately locating and displaying abnormal bills and automated aggregation of abnormal data, breaking the time-consuming and laborious dilemma of manual reconciliation and locating abnormalities under the traditional reconciliation work mode, and at the same time being able to help hospitals to continuously repair and optimize payment interfaces, to At the same time, it can help hospitals continuously repair and optimize payment interfaces, and continuously assist hospitals in improving the quality of payment data.

Table 3. Hospital audit effect

Payment Formula	Account Mode	Account Effect	Occurrence Number	Total Amount	No Number Of Failures For Flat Or Account Failure	Unplain
ZG Bank Pos Credit Card Clinic	System Audit	Partial Pair	3252	1325164.86	165	Offline Data Leads To Inability To Check Accounts (Existing Solutions, Pending HIS Transformation)
ZG Bank Sweep	System Audit	Tuned	4200	2836452.88	5	Real Length
NY Bank Pos Credit Card	System Audit	Partial Pair	12205	10512432.65	2363	1.The Offline Data Of The Project Is Unable To Account For The Problem (The Existing Solution Is To Be Modified). 2.The Hospitalization Settlement Has Not Been Paid (Identified And Modified).
Wechat	System Audit	Tuned	54632	15633844.62	6	1.The Real Length Of The Tree. 2.The Business Bills Provided By The Business System Are Not Sure.

Internet Wechat (Health Care)	System Audit	Tuned	385	45632.51	1	Real Length
JS Bank Dragon Payment	System Audit	Tuned	8755	652872.65	26	Real Length

A comparison of the timeliness of account processing before and after the on-line of the intelligent financial system is shown in Table 4. The table shows that before the on-line of the intelligent financial system, it took about 35 hours for the financial staff to manually reconcile the accounts, manually locate and deal with abnormal bills within 7 days, and it was difficult for the manual staff to investigate and locate abnormal bills, which resulted in a heavy workload of the financial staff and a low timeliness. After the system goes online, in the same cycle, the total number of automated system reconciliations is 67,875, the number of locating long and short payments is 36, and the discrepancy ratio is 5.36‰, and the time required for financial staff to view the results of the system's automated reconciliations, batch viewing and processing of abnormal bills is about 1.55 hours, which is a significant improvement in the time efficiency of the hospital's account processing compared with that before the intelligent financial system goes online. It effectively reduces the workload of financial staff and shortens the processing time. To sum up, the smart financial system has changed the traditional reconciliation work mode of the hospital, optimized the financial reconciliation workflow, helped the financial staff to handle financial work more accurately and efficiently, deeply excavated the reasons behind the data, analyzed the financial operation status, and assisted the hospital to carry out smarter and finer financial management.

Table 4. The system is online before and after the accounting process

	Before Launch		After Launch	
Period	Seven Days		Seven Days	
The Total Number Of Accounts	About 63500		67875	
Length Number	Unflat		36	
Difference Ratio			5.36‰	
Handling Of Abnormal Accounting Consumption	Financial Personnel Processing Hours (Financial Personnel Daily Manual Checking, Artificial Positioning And Handling Exception Bills For About 5 Hours)	About 34 Hours	Financial Staff Processing Hours (The Daily View Of The System's Automatic Account Results, Batch Viewing And Handling Exception Bills For About 15 Minutes)	About 1.55 Hours

4. Conclusion

With the continuous progress and development of society, the financial management of hospitals is facing the problem of transformation and upgrading, and thanks to the development of the Internet and big data, hospitals are actively promoting the intelligence of financial management. In this context, the article focuses on the innovative application of spatial planning and financial resource allocation of the smart financial system in public hospitals, and takes G public hospital as an example to empirically test the smart financial system constructed in this paper. The article draws the following conclusions:

By applying the smart financial system proposed in this article after G public hospital, the total number of payment methods not reconciled or failed to reconcile in the four payment methods of ZG Bank Sweeping Code Payment, Internet WeChat, Internet WeChat (medical insurance) and JS Bank Dragon Payment are only 3, 5, 2 and 25. The smart financial system of public hospitals effectively

improves the quality of hospital payment data and effectively enables hospitals to repair and optimise payment interfaces.

Funding

Jiangsu Province Social Science and Finance Development Special Project "Research on the Construction of DRGs Cost Management System in Public Hospitals under the Background of Big Data", Fund No.: 23SCB-041, funding source: Jiangsu Social Science Funding 20000 yuan, self raised 20000 yuan.

References

- [1] Lashkari, M., Yazdi-Feyzabadi, V., Mohammadi, M., Saberi, H., & Mehrolohasani, M. H. (2018). Designing a Financial Resource Allocation Model Using Goal Programming Approach: A Case Study of a hospital in Iran. *Evidence Based Health Policy, Management and Economics*, 2(2), 70-79.
- [2] Zhao, B. (2023). Critical Issues and Countermeasures in Smart Hospital Construction and Management under the Context of High-Quality Development. *International Journal of Frontiers in Medicine*, 5(12).
- [3] Shukla, R. G., Agarwal, A., & Shukla, S. (2020). Blockchain-powered smart healthcare system. In *Handbook of research on blockchain technology* (pp. 245-270). Academic Press.
- [4] Zeadally, S., Siddiqui, F., Baig, Z., & Ibrahim, A. (2020). Smart healthcare: Challenges and potential solutions using internet of things (IoT) and big data analytics. *PSU research review*, 4(2), 149-168.
- [5] Khatoon, A. (2020). A blockchain-based smart contract system for healthcare management. *Electronics*, 9(1), 94.
- [6] Atluri, H., & Thummisetti, B. S. P. (2023). Optimizing Revenue Cycle Management in Healthcare: A Comprehensive Analysis of the Charge Navigator System. *International Numeric Journal of Machine Learning and Robots*, 7(7), 1-13.
- [7] Holmes, G. M., Kaufman, B. G., & Pink, G. H. (2017). Predicting financial distress and closure in rural hospitals. *The Journal of Rural Health*, 33(3), 239-249.
- [8] Alloui, H., & Mourdi, Y. (2023). Exploring the full potentials of IoT for better financial growth and stability: A comprehensive survey. *Sensors*, 23(19), 8015.
- [9] Mehta, N., Pandit, A., & Shukla, S. (2019). Transforming healthcare with big data analytics and artificial intelligence: A systematic mapping study. *Journal of biomedical informatics*, 100, 103311.
- [10] Dash, S., Shakyawar, S. K., Sharma, M., & Kaushik, S. (2019). Big data in healthcare: management, analysis and future prospects. *Journal of big data*, 6(1), 1-25.
- [11] Zhu, Y., Zhao, Y., Dou, L., Guo, R., Gu, X., Gao, R., & Wu, Y. (2021). The hospital management practices in Chinese county hospitals and its association with quality of care, efficiency and finance. *BMC Health Services Research*, 21(1), 449.
- [12] Fusheini, A., Eyes, J., & Goudge, J. (2017). The state of public hospital governance and management in a South African hospital: a case study. *Int J Healthc*, 3(2), 68-77.
- [13] Franco Miguel, J. L., Fullana Belda, C., & Rúa Vieites, A. (2019). Analysis of the technical efficiency of the forms of hospital management based on public - private collaboration of the Madrid Health Service, as compared with traditional management. *The International journal of health planning and management*, 34(1), 414-442.
- [14] Happy, A. (2018). The implementation of INA-CBGs system impact on financial performance of public hospital, the Indonesia case: A systematic review. *KnE Life Sciences*, 1-16.

- [15] Dubas-Jakobczyk, K., Kocot, E., Tambor, M., Kostrzewska, O., Szetela, P., & Quentin, W. (2021). Hospital financial performance and quality of care—a scoping review of empirical studies. *European Journal of Public Health*, 31(Supplement_3), ckab165-332.
- [16] Olayisade, O. A., Igbekoyi, O. E., & Mohammed, K. (2023). Internal Control System and Financial Management in Federal Government Hospitals. *International Journal of Research and Innovation in Social Science*, 7(9), 1648-1664.
- [17] Selimoğlu, S. K., Altunel, M., & Yeşilçelebi, G. Evaluation of the Computerized Accounting Information System (CAIS) in Smart Healthcare Systems: Examples of Turkey. In *Industry 5.0 for Smart Healthcare Technologies* (pp. 205-216). CRC Press.
- [18] Singh, R., Dwivedi, A. D., Srivastava, G., Chatterjee, P., & Lin, J. C. W. (2023). A privacy-preserving Internet of Things smart healthcare financial system. *IEEE Internet of Things Journal*, 10(21), 18452-18460.
- [19] Sadki, T., Jalal, C., & Nmili, M. (2023, January). Balanced Scorecard as Intelligent Management Control Tools: Case of the Pharmaceutical Supply Chain of a University Hospital Center. In *International Conference on Digital Technologies and Applications* (pp. 903-913). Cham: Springer Nature Switzerland.
- [20] David, Y., & Jahnke, E. G. (2018). Planning medical technology management in a hospital. *Global Clinical Engineering Journal*, (1), 23-32.
- [21] Ma, M. (2022). Research on the development of hospital intelligent finance based on artificial intelligence. *Computational intelligence and neuroscience*, 2022(1), 6549766.
- [22] Filip, F. G. (2024). Decision-Making in Healthcare Resources Optimal Management: the Case of Inpatient Bed Occupancy and Associated Costs. *Computer Science Journal of Moldova*, 95(2), 155-174.
- [23] Wang Yan. (2024). Analysis of Internal Control Management Problems in Hospital Finance and Accounting. *Proceedings of Business and Economic Studies*(3),133-139.
- [24] Hangming Zhang,Xin Zhong & Xinghui Wei. (2024). Integrative Strategies in Financial Management: Bridging the Gap between Managerial Decision-Making and Accounting Practices. *Probe - Accounting, Auditing and Taxation*(1).
- [25] Jun Zhang & Xiaofang Huang. (2023). Problems in Financial Management of Small and Medium-sized Enterprises. *Academic Journal of Business & Management*(16).