

# Opportunities and Challenges in Hospital Financial Management Digitization Transformation: A Summary

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**Abstract.** The rapid development of information technology has created opportunities for the digitization of hospital financial management. This article examines the opportunities and challenges from the perspectives of technology, human resources, and data, and proposes implementation strategies. New technologies like big data and AI support the transformation but also present challenges such as integration and data security. In human resources, the influx of young employees and talent cultivation drive transformation, yet issues like the shortage of compound talents and integration of old and new staff persist. Improving data quality is crucial, but data fragmentation and privacy concerns need urgent attention. The article suggests strategies such as developing a clear transformation roadmap, enhancing human resource training, and improving data governance and security to guide the digitization of hospital financial management.

**Keywords:** hospital financial management; digitization transformation; technological opportunities and challenges; human resource training; data governance.

## 1. Introduction

In the current wave of digital transformation, the healthcare sector is rapidly adopting emerging technologies to enhance operational efficiency, optimize resource allocation, and improve service quality[1]. The digitization of hospital financial management is a key focus, aiming to integrate technologies like AI, big data, and cloud computing to reshape financial processes, promote intelligent management, and enhance overall hospital performance. However, this transformation presents challenges in technology, human resources, and data. By accurately identifying opportunities and challenges and implementing effective measures, hospitals can successfully achieve financial digitization and support high-quality development[2].

## 2. Design of Hospital Financial Management Digitization Transformation

### 2.1 Construction of Digitized Financial Management System

To achieve the digitization transformation of hospital financial management, building an integrated and intelligent financial management system is crucial. This system should encompass all aspects of financial management, from income and expenditure to cost accounting and risk control, forming a complete closed-loop[3]. Modular design should be used to integrate different functional modules, enabling data sharing and business collaboration. The system must be scalable and compatible, allowing seamless integration with other hospital systems to prevent data silos. Utilizing emerging technologies such as cloud computing and big data can enhance computing power and data processing efficiency, while AI algorithms can provide intelligent decision-making capabilities[4].

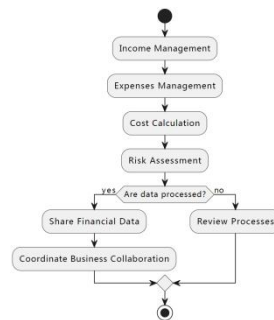


Figure 1 Construction of Digitized Financial Management System

## 2.2 Data Collection and Processing

Data is the cornerstone of driving the digitization transformation of hospital financial management. Therefore, it is necessary to establish an efficient and reliable data collection and processing mechanism[5]. In terms of data collection, it is essential to fully utilize various existing hospital business systems and information facilities to achieve automated collection of financial-related data, reducing manual operations. At the same time, channels for data sources should be expanded, such as collecting data from Internet of Things devices, mobile terminals, and other avenues to gather data from multiple dimensions. In the data processing stage, it is necessary to clean, integrate, and standardize massive heterogeneous data to ensure data quality. For example, a tertiary comprehensive hospital generates financial data amounting to tens of terabytes annually, involving areas such as outpatient fees, inpatient settlements, drug purchases, and equipment maintenance, posing significant challenges to data processing capabilities.

## 2.3 Digitized Financial Management Model

Building a digitized financial management model is crucial for hospital digitization transformation. This model, based on big data analysis and AI, explores and models hospital financial data for refined management and intelligent decision-making, as shown in Figure 2. Cost analysis models can dynamically monitor and optimize cost composition, while revenue forecasting models predict future revenue trends. Risk assessment models identify potential risks in operations, compliance, and investments. A renowned hospital successfully prevented a severe medical fraud case, saving millions of yuan, by applying an intelligent risk control model after implementing financial digitization transformation.

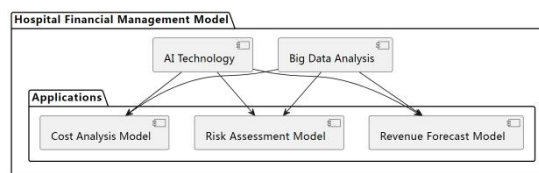


Figure 2 Digitized Financial Management Model

## 3. Evaluation of the Effectiveness of Digitized Financial Management System

### 3.1 Cost Savings

After digitization transformation in 2021, Peking Union Medical College Hospital established a cost accounting model that disaggregated expenses by disease category, department, and other dimensions[7]. Big data analysis revealed significant potential for savings in some disease

categories, leading to 92 million yuan in expenditure savings in 2022. The system also identifies inefficient processes; in the first four months of 2023, waiting times and bed utilization rates were optimized to 75 minutes and 82%, respectively, resulting in overall cost savings of 15.8% over the first three years (2021-2023) of transformation, totaling approximately 570 million yuan, as shown in Table 1.

Table 1 Overall Cost Savings

Year	Savings Amount (billion yuan)
2021	1.2
2022	1.9
2023	1.3

### 3.2 Revenue Growth

Renji Hospital in Shanghai established an AI-based intelligent marketing model after its 2022 transformation. This model analyzes and predicts patients' medical intentions, consumption capabilities, and geographical distribution to formulate targeted marketing strategies. For example, they introduced high-end medical packages targeting high-income groups, generating 380 million yuan in package sales in 2022. Promotions such as health check-ups for the elderly brought in 120 million yuan from check-up services in the same year. The system also forecasts future service popularity, enabling the hospital to increase resource allocation for departments like orthopedics and obstetrics in advance[8]. This led to a 35% increase in orthopedic and 28% increase in obstetric emergency visits in the first quarter of 2023. Renji Hospital achieved significant growth in operating income with these measures, as shown in Figure 3.

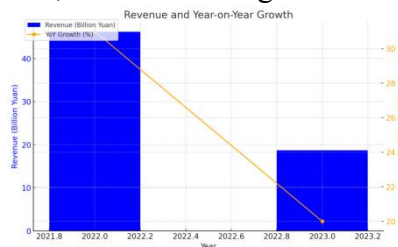


Figure 3: Revenue Growth

### 3.3 Risk Control

Nanjing University Affiliated Hospital effectively manages risks in medical and financial areas through its intelligent system, enhancing compliance and sustainable development[9]. Its medical risk warning model uses big data analysis to identify high-risk behaviors, issuing 8,453 warnings in 2022 and preventing 102 medical accidents and disputes, reducing compensation by 56 million yuan. The financial fraud prevention model monitors financial data flows, exposing 6 cases of internal corruption and avoiding economic losses of 120 million yuan in the same year. Intelligent risk control improves compliance and contributes to long-term sustainable development, with estimated economic benefits exceeding 1 billion yuan by 2025, as shown in Figure 4.

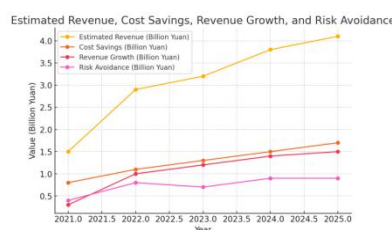


Figure 4: Benefits and Expected Benefits of Hospital Digitized Financial Management System

## 4. Opportunities and Challenges in Hospital Financial Management Digitization Transformation

### 4.1 Technological Opportunities and Challenges

In recent years, the trend of intelligent transformation in hospital financial management has accelerated nationwide, driven by technology[10]. For example, Peking Union Medical College Hospital (PUMCH) invested 580 million yuan in a cloud-based intelligent financial management platform integrating data collection, storage, analysis, and decision-making. However, hospitals face challenges in promoting intelligent transformation, such as integrating multiple independent business systems for data sharing — PUMCH spent 8 months integrating data interfaces for 25 systems. Additionally, medical data privacy and cybersecurity risks are significant, leading PUMCH to invest 12 million yuan in upgrading security systems. A shortage of compound technical talents also hampers transformation. Although hospitals like Shanghai Ruijin Hospital have introduced data analysts and algorithm engineers, there is a significant gap between new and old employees in technical understanding and work patterns, causing resistance to new technologies.

### 4.2 Human Resources Opportunities and Challenges

Talent is crucial for hospital digitization, but human resource transformation faces challenges. The younger workforce brings strong digital literacy; for instance, 108 out of 120 finance personnel recruited by the Third Affiliated Hospital of Sun Yat-sen University in 2023 were born in the 1990s and showed 20% higher proficiency in using the new financial system than older employees. Additionally, enthusiasm for relevant talent cultivation is growing, with 13 universities in Guangdong offering smart medical majors and 5,237 students enrolled in 2023, providing a large talent reserve. However, the demand for new compound talents like data analysts and AI engineers is rising, but there are only about 7,000 such talents trained domestically each year. Additionally, older employees are less accepting of digitization; nearly 80% of older staff at the Affiliated Hospital of Shanghai Jiao Tong University School of Medicine are hesitant about the new system, hindering transformation efforts.

### 4.3 Data Quality Opportunities and Challenges

Data is crucial for digitization transformation, presenting both opportunities and challenges for hospitals. Improved information systems have enhanced data collection capabilities; for example, the First Affiliated Hospital of Soochow University has collected nearly 11TB of data. The national medical big data strategy has also improved data quality, with the Jiangsu Medical Data Alliance achieving 94% data completeness and 91% consistency. However, issues like data fragmentation, privacy protection, and lack of audit mechanisms hinder data utilization. Peking Union Medical College Hospital, for instance, had 79 data silos in 2021, and there were 286 national medical privacy breaches in 2022. Hangzhou First People's Hospital found errors in 21% of clinical data in 2022 but introduced an audit system in 2023, raising the qualification rate of medical expense data to 92.7%, a 14.6 percentage point increase from the previous year, as shown in Table 2.

Table 2: Data Quality Situation at Hangzhou First People's Hospital

Project	2022 Year	2023 Jan-Jun
Medical Expense Data Qualification Rate	78.10%	92.70%

Clinical Data Error Rate	21.00%	8.40%
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## 5. Implementation Strategies for Hospital Financial Management Digitization Transformation

### 5.1 Develop a Clear Transformation Roadmap

Developing a clear transformation roadmap is essential for hospitals to advance the intelligent transformation of financial management. This roadmap should be carefully considered and scientifically validated. Hospitals need to comprehensively assess existing financial processes and systems to identify pain points and define transformation goals. By addressing root causes, hospitals can achieve significant results. The roadmap should consider the hospital's scale, funds, and manpower, planning a reasonable timetable and phased milestones. It should ensure continuity and gradualness, with specific plans for resource allocation, including funds and manpower. Input from stakeholders, including internal departments and external groups, is crucial for improving the roadmap's practicality and ensuring smooth implementation. Every aspect of the transformation roadmap requires careful design to avoid wasted efforts.

### 5.2 Strengthen Human Resources Training and Capacity Building

Talent is crucial for digitization transformation, and cultivating and introducing compound talents is a key challenge for hospitals. Firstly, hospitals should enhance talent training by offering systematic courses independently or in collaboration with universities and training institutions. Training should cover digital skills, big data analysis, and AI applications, with tailored plans for different positions and levels. Additionally, hospitals should prioritize attracting external talents by strengthening industry-academia cooperation and establishing a talent reserve mechanism. Leveraging policy incentives to attract talents and creating an inclusive working environment to integrate new and old employees is also essential.

### 5.3 Strengthen Data Governance and Security Measures

Data is the cornerstone of digitization transformation, and ensuring data quality and security is a prerequisite for successful transformation. In terms of data governance, hospitals should establish a data standard system based on practical needs, starting from multiple aspects such as data collection, storage, and use, standardizing data management processes, and improving data integrity and consistency. Data security is also crucial. Strict data access control management systems should be formulated, and high-intensity encryption and authentication technologies should be adopted to ensure network security of systems and applications. For different types and levels of data importance, corresponding disaster recovery backup mechanisms should be established to ensure that critical data is not affected in case of data center failures.

## 6. Conclusion

The digitization transformation of hospital financial management is a complex project that requires considering various factors such as technology, human resources, and data. Hospitals must seize opportunities presented by emerging technologies while addressing challenges like technology integration, talent shortage, and data quality. Developing a clear transformation roadmap, strengthening human resources training, and enhancing data governance and security are crucial for a smooth transformation. By prioritizing digitization transformation and optimizing resource

allocation, hospitals can unleash digital potential, improve financial management quality and efficiency, and promote high-quality development.

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