

Research on the Construction and Operation Management of Hospital Material Sharing Platform: A Case Study of a Tertiary Hospital

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Abstract

Against the backdrop of the new healthcare reform and high-quality development, public hospitals urgently need to strike a balance between reducing operational costs and improving resource utilization efficiency. Although the traditional Life-Cycle Asset Management (LCAM) system has effectively standardized the vertical circulation of assets, it has failed to address the inefficiency of horizontal allocation and the waste of idle resources. This paper takes a tertiary public hospital as a case study to explore the construction and operation management practices of an idle material sharing platform based on the LCAM system. The study proposes the overall design scheme and core functional modules of the platform, with a particular emphasis on the incentive-compatible mechanism centered on 'economic incentives + credit management'. The practice shows that the platform not only realizes the efficient circulation and value regeneration of idle assets but also establishes an internal market-oriented mechanism through the integration of a points and credit system, thereby fostering a culture of sharing. The research findings have both theoretical and practical value for the promotion of refined hospital management and circular economy models.

Keywords

Hospital Management; Material Sharing Platform; Idle Assets; Operation Mechanism; Circular Economy; Refined Management.

1. Introduction

With the deepening of healthcare system reform, public hospitals are facing multiple challenges in controlling medical costs, improving operational efficiency, and achieving sustainable development. As the material basis of medical services, the management effectiveness of medical equipment and materials directly affects the quality of medical care and the efficiency of resource allocation. In recent years, many hospitals have introduced the Life-Cycle Asset Management (LCAM) system to standardize the management of assets from 'procurement' to 'disposal', effectively alleviating issues such as mismatched accounts, disordered processes, and inefficiencies [1]. However, new contradictions have emerged. Due to disciplinary development, project adjustments, and forecasting errors, a large number of devices and materials remain idle in departments, forming 'resource islands'. This structural imbalance leads to repeated procurement in some departments and long-term depreciation losses in others, causing serious waste. Therefore, hospital asset management has moved from the 'standardization' stage to the 'valorization' stage, necessitating innovative mechanisms for resource reallocation and value maximization. The traditional LCAM system mainly serves vertical, linear management processes such as approval, warehousing, and repair, but lacks functions for cross-departmental horizontal flow and resource sharing [2]. Hence, building an internal material sharing platform based on the LCAM system to establish a resource allocation

mechanism resembling an 'in-hospital market' has become an inevitable choice to solve the idle asset dilemma and promote refined management [3]. The key challenges lie in two aspects: technically, to achieve deep integration with the existing system; and managerially, to establish scientific incentive and constraint mechanisms to overcome the obstacle of insufficient willingness to share [4]. Based on this, this paper takes a tertiary hospital as a case study, systematically elaborates the construction scheme, business processes, and functional modules of the sharing platform, and focuses on the incentive-compatible operational management mechanism. The study not only provides a practical pathway for hospitals to reduce costs and improve efficiency but also offers theoretical insights for constructing a replicable and scalable paradigm of refined management [5].

2. Case Background and Needs Analysis

The implementation of the LCAM system in the hospital laid a foundation for standardized, transparent, and procedural asset management. However, the system mainly focuses on the vertical management of assets throughout their life cycle and has not solved the problem of horizontal allocation and optimization of assets across space. To clearly define the objectives and scope of the new function-the idle material sharing platform-this study conducted a needs analysis from the dimensions of business, function, and users.

2.1. Business Needs Analysis

- 1) Activating existing assets: The hospital urgently needs a mechanism to transform idle, underutilized, or nearly obsolete but still valuable assets (e.g., monitors, hospital beds, office computers) from 'cost centers' (generating storage and depreciation costs) into 'value centers'. The sharing platform should promote the circular use of in-hospital assets, reduce repeated procurement, and achieve maximum utilization.
- 2) Reducing operating costs: Departments can obtain required assets through the platform at a significantly lower cost than purchasing new ones, thereby reducing operating costs and meeting the hospital's full-cost accounting requirements.
- 3) Cultivating a sharing culture: Platform construction is not only a technical innovation but also a transformation of management philosophy. Its goal is to guide departments from 'possession' to 'use', from 'independent isolation' to 'collaborative sharing', gradually forming an open and efficient sharing culture.

2.2. Functional Needs Analysis

- 1) Information release and display: Departments should be able to easily publish idle asset information with images, parameters, status evaluation (original value, residual value), and reasons for idleness.
- 2) Intelligent search and matching: The platform should support multi-condition retrieval (asset name, category, model, asset code) and intelligent recommendation of potential matching assets based on historical demand behavior.
- 3) Process approval and fulfillment: Once a transaction intention is reached, the platform should automatically trigger an online approval process, seamlessly integrated with the existing LCAM system permission framework, and send it to relevant responsible persons and the asset management department for review.

2.3. User Needs Analysis

- 1) Ordinary departmental users (head nurses/asset administrators): Focus on ease of operation, requiring functions such as publishing, searching, applying, and communicating via PC or mobile terminals (e.g., enterprise WeChat) with a user-friendly interface and clear processes.

2) Department heads: As key approval nodes, they require efficient approval and evidence-based decision-making. The platform should provide mobile reminders and complete asset information to ensure rational and compliant approval.

3) Asset management department: As the supervisory and operational party, it requires controllable processes, manageable risks, and global visibility. The platform should provide a backend management interface for verifying authenticity, monitoring transactions, handling disputes, and conducting data analysis (e.g., idle rate, transaction rate, cost savings).

3. Platform Construction Scheme

3.1. Design Philosophy and Principles

Integration principle: The platform is not an isolated new system but an important functional extension module of the existing LCAM system, ensuring full inheritance and seamless connection of asset master data, approval processes, and user systems, avoiding data redundancy and process disconnection.

User-centered principle: The entire design is oriented toward the experience of departmental asset administrators, aiming for simplicity, intuitiveness, and convenience to minimize usage barriers and learning costs.

Security and compliance principle: Ensure all transaction activities leave complete, auditable electronic traces, strictly follow hospital asset management rules and financial regulations, embed necessary approval nodes, and safeguard the compliance and security of state-owned asset circulation.

3.2. Core Functional Module Design

1) Idle resource information management module: One-click publishing allows administrators to select idle assets from the asset list, automatically generate a draft, add descriptions and pictures, and publish. Status management supports editing, removing, and relisting published assets.

2) Intelligent search module: Supports multi-condition searches by asset name, model, category, department, price range, and release time.

3) Online transaction module: Supports both interdepartmental fixed asset transfer and non-fixed asset transactions.

4) Approval and fulfillment module: Visualized workflows automatically triggered after a transaction intention is reached, e.g., department head approval → asset management confirmation → completion of department change in asset accounts, with all approvers able to process tasks on mobile devices.

4. Operational Management Mechanism

4.1. Organizational Structure and Responsibilities

The platform adopts a three-tier 'decision–operation–execution' structure:

- Decision-making level (Management Committee): Composed of the vice president in charge and heads of state-owned assets, finance, biomedical engineering, and logistics departments, responsible for strategic decision-making and arbitration of major issues.
- Operational level (Asset Management Department): Transformed from a 'regulator' into a 'platform operator', responsible for training, promotion, information review, process monitoring, and user feedback collection.
- Execution level (Departments): Department heads serve as the first persons responsible, while asset administrators act as operators to implement asset sharing and allocation.

4.2. Incentive-Compatible Mechanism

This mechanism is the core of the platform's sustainable operation.

Economic incentives (points monetization): Departments transferring assets earn points, which can be exchanged for goods or services or offset against future procurement budgets, functioning as 'internal quasi-currency'.

Non-economic incentives (reputation and assessment): Monthly rankings, performance evaluation linkage, and credit rating systems enhance departmental honor and institutional constraints. Departments with higher credit ratings enjoy priority approvals and point discounts.

Theoretical basis: This mechanism is grounded in incentive compatibility theory, aligning departmental self-interest with the hospital's overall optimal outcomes to form a sustainable equilibrium.

5. Implementation Effect Evaluation

The hospital's material sharing platform was officially launched in February 2025. After a period of promotion and application, the platform has been deeply integrated into the hospital's daily asset management system, becoming a key extension and functional closure of the LCAM system. This section presents the achievements and effectiveness of the platform through system interface screenshots and data analysis.

5.1. Overall Platform Construction Achieved, Full Online Process Realized

The platform successfully constructed a complete online process integrating 'search-publish-transaction'. It features a clear functional layout, with a core navigation bar on the left and intelligent recommendations and popular asset displays on the right. This design integrates functionality with user experience, providing convenient access to sharing services for all staff.

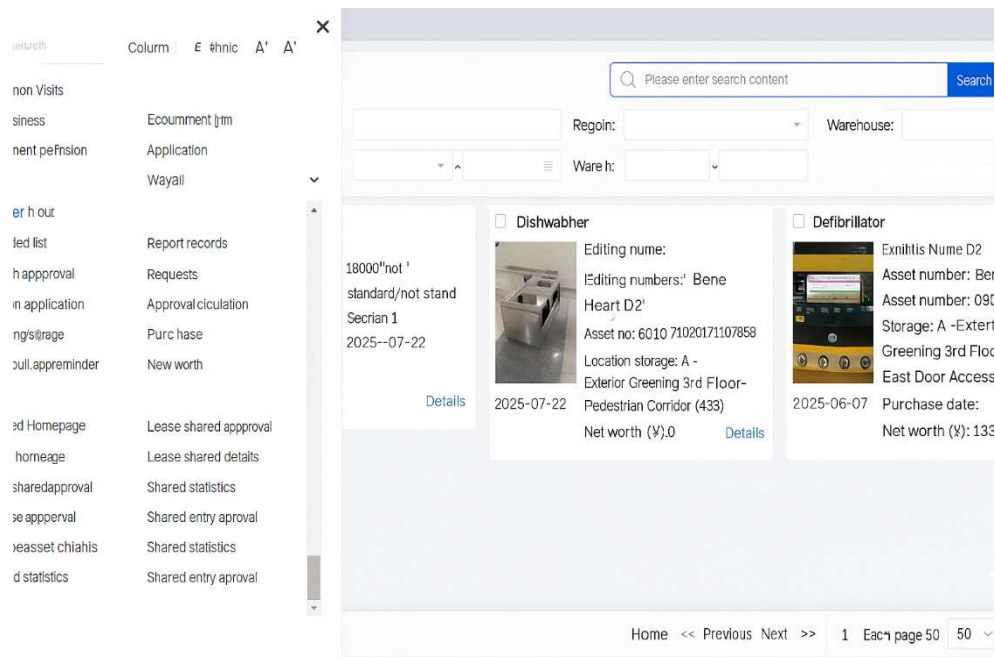


Figure 1. Home Interface of the Material-Sharing Platform.

5.2. Mobile Integration for Convenient Operation

To achieve the goal of 'anytime, anywhere operation', the platform is deeply integrated with the hospital's enterprise WeChat. Users can easily publish, edit, and withdraw idle assets on mobile

devices, greatly enhancing convenience and usability, and addressing the fragmented time constraints of clinical staff.

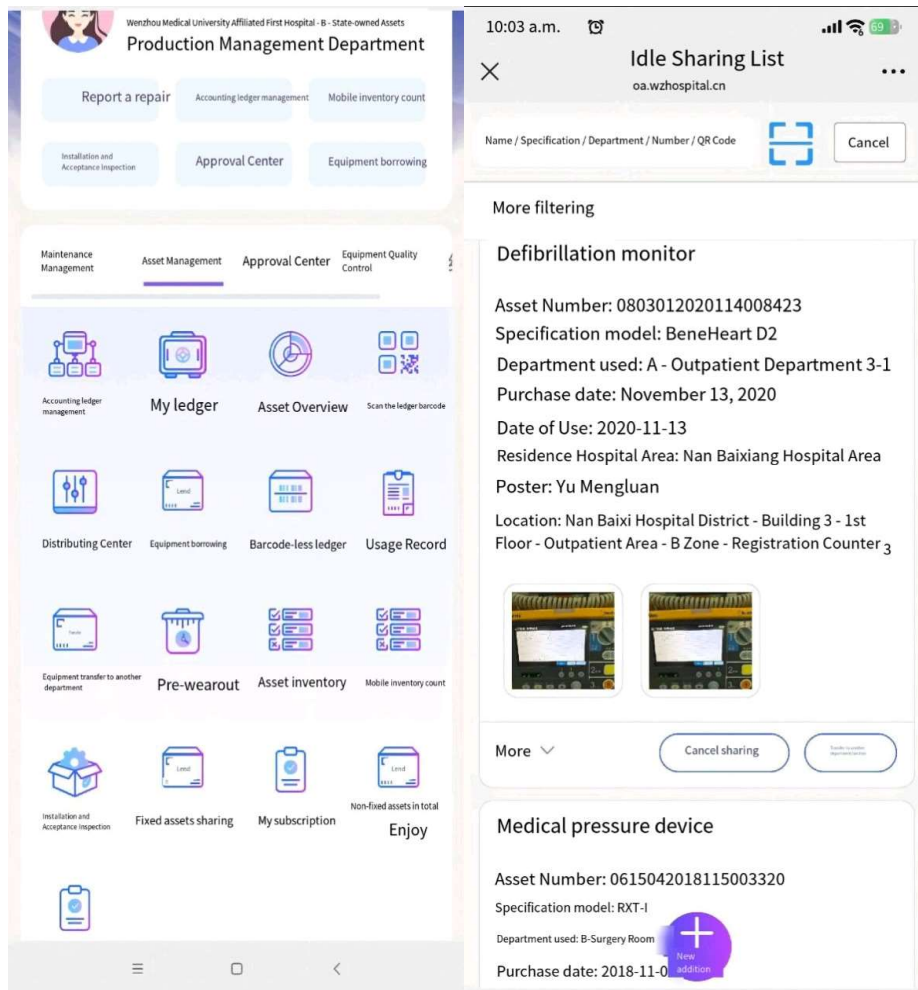


Figure 2. Sharing Interface on the Mobile Platform.

5.3. Innovative Management Tools to Improve Offline Execution Efficiency



Figure 3. Code Management System and Asset Identifier.

The platform innovatively introduced 'asset codes' and an offline management tool called 'Code Manager'. During physical asset handovers, both parties can confirm transactions by scanning

QR codes via WeChat, ensuring the synchronization and accuracy of online information and offline physical flows. This eliminates the risk of discrepancies between online records and offline transfers.

Through these innovations, the hospital material sharing platform has achieved not only technical integration with the existing asset system and construction of a complete online process loop but also managerial improvements through mobility and visualization, significantly enhancing efficiency and user experience. Its implementation marks the successful transformation of hospital asset management from 'standardization' to 'valorization', providing a visualized model for refined management in public hospitals.

6. Conclusion

6.1. Findings

First, the technical pathway of constructing a sharing platform based on the asset system is feasible, achieving efficient circulation of idle assets.

Second, the operation mechanism of 'economic incentives + credit management' effectively enhances platform vitality.

Third, the platform has generated significant comprehensive benefits, including improved asset turnover, reduced procurement costs, and optimized management processes.

Fourth, this practice provides a replicable successful paradigm for hospital asset management.

6.2. Outlook and Recommendations

Future research can be deepened in the following aspects: (1) conducting multi-case comparative studies to verify the universality of the model; (2) introducing intelligent algorithms for precise matching and smart pricing; (3) exploring regional medical resource sharing models to expand resource allocation scope.

It is recommended that hospital managers attach importance to building operational mechanisms, treat the sharing platform as a long-term project, and strengthen data analysis and application to continuously optimize platform functions. This study provides practical reference for achieving refined management in public hospitals and offers new perspectives for theoretical research on medical resource optimization.

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