European Journal of Business and Management
ISSN 2222-1905 (Paper) ISSN 2222-2839 (Online)
Vol.17, No.10, 2025

Perspectives on the Optimization Path and Information Transformation of Fixed Asset Management in Chinese Universities

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Abstract

This paper provides an in-depth analysis of the current status, existing problems, and their causes in fixed asset management in universities. It also proposes optimization paths and practical case studies. The study indicates that issues such as inadequate systems, low levels of informatization, inefficient asset utilization, and insufficient professional capabilities of management teams exist in university fixed asset management. These problems are attributed to factors including lack of enforcement of regulations, disconnecting between budgeting and procurement, lagging technology, and absence of performance evaluation mechanisms. To address these challenges, this paper suggests a four-dimensional approach involving system optimization, technological empowerment, performance evaluation, and talent assurance for advancing management reform and capability enhancement. Through typical case studies, it highlights the critical role of coordinated advancement in systems, technology, and human resources in improving asset management effectiveness. In the future, universities should further explore the application of artificial intelligence and big data prediction technologies in asset allocation and performance assessment, driving university fixed asset management towards a smarter new phase, providing solid material support and strong backing for core activities like teaching, education, and scientific research.

Keywords: University fixed assets, Asset management, Informatization, Performance evaluation, System optimization

DOI: 10.7176/EJBM/17-10-04
Publication date: December 30th 2025

1. Introduction

Fixed assets in universities are crucial for teaching and research activities, providing necessary material foundations. With the advancement of educational development strategies such as "Double First-Class" construction and "Double High Plan," university asset scales continue to expand, and management complexity is increasing [1][2]. Traditional decentralized management models can no longer meet the demands of high-quality development in modern universities and cannot effectively address management challenges brought about by expanding asset sizes. Therefore, universities urgently need to enhance asset management efficiency through institutional restructuring and technological innovation to achieve modern governance, ensuring that fixed assets can efficiently serve teaching and research, providing a solid foundation for high-quality university development [3][4].

2. Current Status and Major Problems in University Fixed Asset Management

2.1 Inadequate Systems and Non-standard Processes

Currently, most universities have not established scientific, systematic, and full lifecycle management systems for fixed assets, leading to long-term crude management focusing more on procurement than management [5]. On one hand, asset procurement processes often focus on project fund execution rates, neglecting subsequent use-effectiveness assessments, resulting in frequent instances where purchased assets are either unused or underutilized [6][7]. On the other hand, from asset acceptance, accounting, usage, maintenance, to disposal, each stage lacks unified, standardized operating procedures and accountability tracking mechanisms, with unclear

management responsibilities, poor departmental coordination, and potential issues such as discrepancies between records and reality, asset loss, duplicate purchases, etc. For example, some universities lack technical expertise and approval procedures in the asset disposal process, leading to premature disposal of still-usable equipment or long-term hanging accounts of fully disposed assets, forming "zombie assets." Additionally, some universities do not establish asset inventory systems or perform superficial inventories, unable to promptly discover lost, damaged, or privately transferred assets, further exacerbating the risk of management failure [8].

2.2 Low Levels of Informatization and Severe Data Silos

Despite the gradual introduction of asset management information systems in recent years, overall informatization levels remain low, with system constructions exhibiting a fragmented approach. Financial systems, procurement systems, and asset management systems lack effective integration, with inconsistent data standards and incompatible interfaces, preventing real-time synchronization of asset information and creating multiple "information silos" [9]. For instance, equipment registered by asset management departments may not be timely accounted for in financial systems, or after procurement departments complete bidding and purchasing, asset systems fail to update synchronously, causing discrepancies between records and reality. Moreover, current systems are mostly limited to functions such as asset registration, querying, and statistics, lacking dynamic data collection and analysis capabilities regarding asset usage status, operational efficiency, maintenance records, etc., making it difficult to support full lifecycle management and decision-making optimization [10][11]. More concerning is that some universities still rely on manual ledgers or Excel spreadsheets for asset management, with delayed and error-prone data updates, unable to achieve real-time monitoring and early warnings, significantly constraining management efficiency and precision [12].

2.3 Low Asset Utilization Efficiency and Lack of Sharing Mechanisms

Due to the absence of unified asset allocation platforms and cross-departmental sharing mechanisms, internal asset resource distribution within universities is uneven, with significant duplication of configuration, leading to generally low utilization efficiency [13][14]. Many large-scale instruments and equipment are exclusively used by specific research groups or faculties, running in isolation for extended periods, sometimes resulting in situations where "someone buys, but no one uses or uses poorly." According to internal audit data from some universities, certain research devices priced over 500,000 RMB have annual utilization rates below 30%, far lower than the Ministry of Education's recommended standard of over 80%. Furthermore, asset sharing lacks institutional safeguards and incentive mechanisms, with faculties tending to keep equipment for themselves due to a "possession equals ownership" mentality, resulting in severe fragmentation of resources. Despite attempts by some universities to establish "large instrument sharing platforms," the lack of unified scheduling, charging settlement, performance evaluation, and other supporting mechanisms results in superficial platform operations and suboptimal sharing outcomes [15]. Meanwhile, the absence of asset adjustment mechanisms makes it challenging to achieve secondary circulation of idle assets within the university, ultimately forcing them to be stored for long periods or even scrapped, leading to significant waste of national educational resources [16].

2.4 Insufficient Professional Competence of Management Teams

University asset management teams commonly face issues of being part-time or marginalized, with weak professional capabilities, making it difficult to handle increasingly complex asset management tasks. Most asset managers are concurrently administrative personnel or laboratory technicians [17], lacking systematic training in asset management, financial knowledge, and information technology operation skills. Their understanding of the entire lifecycle of asset management is shallow, often limiting their work to basic tasks such as registering accounts, labeling, and conducting inventories, unable to engage in higher-level management tasks like asset performance evaluation, usage analysis, and optimized allocation. Additionally, asset management positions are generally viewed as "auxiliary" roles within universities [18][19], offering limited career development opportunities, resulting in high turnover rates and low job motivation, further weakening management continuity and professionalism. Some universities have yet to establish entry standards and evaluation mechanisms for asset managers, lacking regular training and capacity-building channels, thus hindering the improvement of the overall quality of the management team, which becomes a key bottleneck in enhancing university asset management levels [20].

3. Analysis of Problem Causes

3.1 Lack of Enforcement of Regulations

While university fixed asset management systems are gradually being established, there is a prevalent issue of

"emphasizing formulation but neglecting implementation," with system designs lacking rigid constraints and enforceable accountability mechanisms, leading to prominent problems of "rules without adherence" and "poor enforcement of rules." On one hand, asset management systems are mostly principle-based guidelines, lacking detailed procedures and quantifiable standards, making it difficult to provide effective guidance for actual operations; on the other hand, unclear boundaries of management responsibilities lead to overlaps or gaps in responsibilities among asset management departments, user units, and financial departments, resulting in mutual blame-shifting when problems arise, making accountability hard to trace [21]. For example, some universities lack clear specifications for responsible parties in the asset disposal process, leading to long-term hanging accounts of disposed assets or premature disposal of still-usable equipment [22]. Moreover, the enforcement of systems lacks supervision and accountability mechanisms, with low costs of violations, further undermining the authority of the systems. Some universities' asset inspection systems are merely formalities, with inspection results not linked to unit performance evaluations or individual rewards and punishments, rendering system enforcement superficial and unable to form long-term constraints.

3.2 *Lack of Demand Justification and Imbalanced Resource Allocation*

University asset configurations generally lack scientific justification and demand research, with budgets disconnected from actual needs, leading to frequent occurrences of "blind procurement" and "redundant purchases" [23]. On one hand, budget preparation is primarily led by financial departments, with low involvement from asset management departments, lacking systematic assessments of existing asset stocks, usage efficiency, and sharing potential, leading to a tendency of "spending for the sake of spending"; on the other hand, some universities engage in "last-minute spending" behaviors to secure fiscal special funds, concentrating equipment purchases before project completion while neglecting subsequent usage and maintenance conditions, resulting in idle or inefficiently used assets [24]. For instance, a "Double First-Class" university once concentrated purchases of 30 high-end microscopes due to the need for project completion, but due to the lack of matching experimental facilities and technical personnel, nearly half of the equipment remained unopened and were prematurely phased out due to technological obsolescence [25]. Furthermore, asset procurement lacks inter-departmental coordination mechanisms, with severe information barriers among faculties, resulting in redundant purchases of similar equipment across different units while units in urgent need of resources cannot allocate due to budget constraints, leading to misallocation and waste of resources.

3.3 Lack of Dynamic Monitoring

Although some universities have introduced asset management information systems, the overall level of technological application remains at the "electronic ledger" stage, lacking deep integration of modern information technologies such as IoT, big data, and RFID, making it difficult to achieve real-time positioning, status monitoring, and intelligent analysis of assets [26]. On one hand, asset labels still mainly rely on traditional QR codes or manual numbering, unable to achieve batch scanning and automatic recognition, with inventory checks dependent on manual verification, leading to low efficiency and high error rates; on the other hand, system functionalities are mostly limited to static information input and queries, lacking the ability to collect and analyze dynamic data such as asset usage frequency, fault rates, and sharing rates, making it difficult to provide data support for decision-making. For example, during an asset inventory check in 2022, a university found that due to the system not recording equipment movement information, assets worth over 20 million RMB were "location unknown," requiring manual rechecking. Additionally, some universities have yet to establish asset warning mechanisms, unable to preemptively identify and intervene in issues such as overdue service life, long-term idleness, and redundant purchases, leaving management in a reactive state of "post-event remediation" [27].

3.4 Lack of Incentive Orientation

Current university asset management generally lacks a scientific performance evaluation index system, unable to quantify and feedback on asset usage benefits, sharing outcomes, maintenance costs, etc., leading to the persistent issue of "emphasizing input over output" [28]. On one hand, asset evaluations still primarily focus on static indicators such as "account integrity rate" and "inventory accuracy rate," neglecting the measurement of benefit-oriented indicators such as "usage efficiency," "research output," and "talent cultivation contributions," making it difficult to reflect the true value of assets [29]; on the other hand, performance evaluation results are not linked to budget allocations, unit evaluations, or individual rewards and punishments, lacking positive incentives and negative constraints, resulting in a lack of intrinsic motivation for user units to enhance asset benefits [30]. For example, some universities have large-scale instruments with annual utilization rates below 20%, but due to the lack of performance accountability, related units can still apply for new equipment budgets. Furthermore, asset sharing lacks institutional incentives, with user units concerned about equipment wear,

increased management costs, and unwillingness to open up sharing, while the university level has yet to establish incentive mechanisms such as "sharing credits" and "usage subsidies," leading to superficial sharing platforms [31]. The absence of performance evaluations keeps asset management focused on primary goals of "ensuring safety and avoiding loss" rather than advancing to higher-level management objectives of "improving efficiency and promoting output" [32].

4. Optimization Paths for University Fixed Asset Management

To address issues such as loose systems, fragmented information, wasteful resource allocation, and inefficient management in university fixed asset management, a comprehensive approach can be adopted from three dimensions to promote management reform and capability enhancement.

4.1 System Optimization: Building Scientific, Standardized, and Enforceable Management Systems

Develop comprehensive management systems covering the entire lifecycle of assets, including "project initiation - procurement - acceptance - accounting - usage - maintenance - adjustment - disposal" processes; clarify responsibilities at each stage, establish an asset responsibility system, implement a lifelong responsibility system of "whoever uses, maintains, and is responsible"; promote asset tagging management (such as RFID, QR codes), achieving "one item, one code, one file" [33]; improve inventory efficiency and accuracy, avoiding asset loss and unclear responsibilities.

Establish university-level "asset sharing platforms" or "public property warehouses" to centrally register, publish, schedule, and allocate idle assets; encourage cross-faculty and interdisciplinary sharing of large-scale instruments and equipment, develop shared usage rules, charging standards, and incentive measures, such as sharing credit systems, linking equipment usage duration with research subsidies to incentivize sharing and improve asset utilization [34]; example: a university saved over 1 million RMB in procurement expenses by reallocating more than 800 items through the "public property warehouse" platform.

Clear criteria for asset retirement should be established, and approval workflows streamlined. Professional technical appraisal and evaluation mechanisms must be introduced to ensure rational disposal decisions—preventing both the failure to retire eligible assets (“should retire but not retired”) and premature disposal (“retired too early”). A standardized system for residual value assessment and disposal documentation should be implemented to guarantee that asset disposal processes are transparent, fair, and fully traceable. Furthermore, environmentally sustainable disposal methods—such as professional recycling and green processing of electronic assets—should be actively promoted [35].

4.2 Technological Empowerment: Building an Intelligent, Visual, and Collaborative Asset Management Platform

The system should achieve seamless data integration with financial, procurement, and budgeting platforms to eliminate information silos and ensure real-time, interoperable data flow across institutional systems. It should support end-to-end digital workflows—including asset requisition, approval, acceptance, registration, reallocation, and retirement—thereby reducing manual interventions and enhancing operational efficiency. Additionally, the platform must offer real-time querying and advanced statistical analytics capabilities covering asset registers, usage logs, maintenance records, and depreciation schedules, providing robust data support for evidence-based decision-making [36].

Technologies such as RFID, QR codes, and NFC should be widely deployed to enable automatic asset identification, rapid inventory checks, and precise location tracking. Sensor networks installed in key areas—such as laboratories and storage facilities—can monitor asset movements in real time, with the system automatically logging entries and exits to maintain accurate asset records and minimize discrepancies between physical and book inventories. This significantly reduces labor costs and human error in audits. Case in point: One university developed a self-service equipment borrowing system using Raspberry Pi and RFID technology, enabling unattended check-in/check-out operations and improving inventory efficiency by 70% [37].

Dedicated mobile applications or WeChat mini-programs should be developed to allow users to perform tasks—such as scanning assets for inventory, submitting repair requests, or querying asset status—anytime and anywhere. Role-based access control should be implemented so that faculty, students, and administrators can interact with the system according to their permissions and needs. Automated notification features should deliver timely alerts on critical events—such as asset expiration dates, maintenance progress, or pending approvals—ensuring prompt responses and breaking down temporal and spatial barriers to management responsiveness.

5. Conclusion

Fixed asset management in Chinese universities is undergoing a strategic shift—from a compliance-oriented model toward a performance-driven paradigm. Informatization and intelligent technologies will undoubtedly shape the future trajectory of this transformation. Universities are advised to adopt a top-down design approach that holistically integrates institutional reform, platform development, and talent cultivation, thereby establishing a "system–technology–talent" triadic synergy mechanism to achieve scientific and highly efficient asset management. Indeed, fixed asset management constitutes a vital component of modern university governance. As higher education institutions expand rapidly, asset portfolios grow in scale and complexity, rendering traditional management models increasingly inadequate. This paper has analyzed current challenges, diagnosed root causes, and proposed a four-pronged optimization strategy centered on institutional refinement, technological empowerment, performance evaluation, and talent development. Drawing on empirical cases, it underscores that coordinated progress across systems, technology, and human resources is pivotal to unlocking higher management efficacy. Moving forward, universities must deepen their exploration of frontier technologies to advance toward intelligent, data-driven asset management,ultimately strengthening institutional capacity to fulfill their educational and scientific mandates.

Acknowledgements

The authors gratefully acknowledge the support from the Project of Education and Teaching Reform from Yancheng Teachers University (2025YCTCJG65) and the start-up grant (204060037) from Yancheng Teachers University.

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