

The Application and Challenges of Information Technology in Fixed Asset Management at Universities

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Abstract: The primary objective of this study is to thoroughly investigate how information technology is utilized in effectively managing fixed assets within 24 universities located in a province. Moreover, the study aims to identify and examine the key challenges these universities encounter in this area. Data for this research was gathered through a comprehensive questionnaire survey distributed to the fixed asset management departments of the universities in a province composing urban and rural parts. Both quantitative and qualitative analysis techniques were employed to analyze the collected data. The analysis of the data revealed that despite some progress made in the implementation of information technology in these universities, a number of pressing issues and challenges remain. Particularly, the most noteworthy challenges include inadequate investment in information technology application, insufficient technical support, and inadequate employee training and awareness. The findings of this study yield valuable recommendations for universities as well as decision-makers, aiming to facilitate improvements in the management of information technology pertaining to fixed assets in order to enhance operational efficiency and optimize resource allocation. Future research endeavors should focus on exploring and developing effective measures to address these challenges, ultimately driving the modernization and sustainable development of fixed asset management practices in universities across a province for inclusivity.

Keywords: Investment; Technical Support; Fixed Asset Management; Universities; Challenges; Decision Makers.

1. Introduction

1.1. Significance of the Study

This research is significant as it aims to identify the extent to which information technology is utilized in fixed asset management across J Province's universities and delineate the challenges involved. The study's findings will contribute to the body of knowledge by offering a systematic understanding of IT adoption challenges in the higher education sector. Furthermore, the findings will benefit decision-makers and policymakers by providing empirical data to enhance the efficiency, transparency, and accountability of fixed asset management systems. It will also serve as a practical reference for similar educational institutions aiming to optimize their fixed asset management through IT solutions.

1.2. Objectives of the Study

To determine the current state of information technology application in the management of fixed assets within J Province's universities.

To investigate the factors influencing the adoption and integration of information technology in fixed asset management in the higher education sector.

To suggest feasible recommendations to overcome the identified challenges and improve the management of fixed assets through the use of information technology.

2. Materials and Method

2.1. Study Design

For the purposes of this research, a quantitative study approach was adopted to thoroughly investigate the application and challenges of information technology in fixed asset management at universities. The study was designed to

collect data from a representative sample of universities located in J Province, with a focus on understanding how IT is being utilized in asset management and the challenges encountered in this area.

2.2. Sample/Population of the Study

The target population for this study consisted of fixed asset management departments at 24 universities located in J Province. The sample size was determined based on the availability of universities in the province and the feasibility of collecting data from them.

2.3. Data Gathering Tools

To gather data for this study, a comprehensive questionnaire survey was developed and distributed to the fixed asset management departments of the selected universities. The questionnaire was designed to capture information on the utilization of information technology in asset management, the challenges encountered, and the integration of IT systems with other business processes.

2.4. Data Gathering Procedures

The questionnaire survey was distributed electronically to the fixed asset management departments of the selected universities. Respondents were requested to complete the survey and provide their perspectives and experiences related to the use of information technology in asset management. The survey was anonymous to ensure confidentiality and encourage honest responses.

2.5. Treatment of Data

Collected data was entered into a spreadsheet and analyzed using statistical software. Descriptive statistics were used to summarize the responses and identify patterns and trends. Chi-square tests and other statistical tests were conducted to determine relationships between variables and identify

significant differences.

2.6. Ethical Considerations

Throughout the study, ethical considerations were paramount. Permission was obtained from the universities to conduct the research, and respondents were assured of the anonymity and confidentiality of their responses. Their participation was voluntary, and they were free to withdraw from the study at any time. The results of the study were presented in a manner that did not identify individual respondents or universities to protect their privacy.

3. Results and Discussion

3.1. Respondent Identity and the Volume of School Assets

Among the 24 respondents, a high proportion of 91.67% were specific business staff from asset management departments, vastly outnumbering other roles. This indicates that the majority of the respondents were frontline personnel directly involved in daily management tasks. Their perspectives and attitudes hold substantial reference value for understanding the current state of fixed asset management in universities.

Most of the surveyed universities possess a substantial number of fixed assets, primarily concentrated in two brackets: above 100,000 units and between 20,001 to 30,000 units. This underscores the large scale of fixed assets in universities and reflects their significant role within these institutions, highlighting the crucial need for sufficient attention towards the management and maintenance of these assets.

3.2. The Status of Information Technology Application in Fixed Asset Management in Universities

The survey was conducted across 24 universities, aiming to comprehend the current application of information technology in fixed asset management. This included the usage of asset management information systems, the implementation of performance management functions on asset management platforms, the activation of standardized classification and coding for fixed assets, the application of network technology for routine asset inventory checks, the execution of online approval and signing processes in asset management, the integration of asset management systems with other related business systems, and the scope of IT coverage in fixed asset management.

The results revealed that half of the surveyed universities (50.0%) used the Jiuchi asset management information system for daily asset management and related tasks such as annual reporting, while the other half (50.0%) utilized various asset management systems for their daily management, though they still used the Jiuchi system for annual reporting. In terms of utilizing IT to realize performance management on asset management platforms, a majority of universities (66.7%) had not implemented this function, with 25.0% in the development phase and only 8.3% successfully implementing performance management. Some 37.5% of universities had not yet adopted the 2022 version of the "Basic Classification and Coding for Fixed Assets," the same proportion were upgrading and testing, and only 25.0% had enabled the new standard. Merely 16.7% of universities had implemented asset inventory checks through mobile devices with direct

data feedback, and the majority still relied on traditional methods such as paper inventory or printing forms from asset management platforms (totalling 75.0%). Most universities had not yet achieved a completely networked online approval and signing process (87.5%), and 25.0% of them had not initiated an online approval procedure.

The best integration was found between asset management systems and financial departments' reimbursement business systems (54.17%), followed by digital campus management platforms (45.83%). Integrations with other systems such as higher-level asset management systems were less common. Information technology coverage was most comprehensive in the management of teaching and research instruments (100%), followed closely by office furniture equipment management (95.83%). However, the refined management coverage of large-scale assets such as land, buildings, and structures was lower at 58.33%, with even lower coverage for the utilization of laboratory instruments and the management of shared large-scale instruments.

The findings indicate that universities have made some progress in the informationization of fixed asset management, but there are still many shortcomings. While half of the universities use a unified asset management information system for daily management and annual reporting, the rest using diverse systems may reflect the adaptability to different needs and budgets.

Although some schools are in the process of developing performance management platforms, the overall majority of universities have not yet achieved this functionality. This shows that the efficiency and modernization of university asset management have room for improvement. At the same time, the majority of universities are also in a period of transition in terms of adopting the latest asset classification standards.

The level of informationization in asset inventory checks varies, with some schools using mobile technology for added flexibility and real-time data, but many still rely on traditional methods, which may affect the accuracy and efficiency of asset management. The varied degree of integration of asset management systems with other business systems could reflect a difference in the level of information technology integration and management strategies across universities. Comprehensive coverage in teaching and research equipment management highlights the importance placed on this core asset by universities, while the lower degree of refined management of assets like real estate suggests potential areas for improvement in the future.

In summary, the informationization of fixed asset management in universities is still in the developmental stage, with significant room for improvement. Universities need to further promote their informationization, strengthen system integration, enhance performance management capabilities, accelerate the implementation of new standards, and explore more efficient asset inventory and online approval and signing methods to improve the overall effectiveness of fixed asset management.

3.3. Analysis of Investment in Information Technology Construction for Fixed Assets in Universities

This research surveyed the use of fixed asset management information system brands, system upgrade timings, investment amounts, and annual maintenance and upgrade costs across 24 universities, collecting relevant data.

The data gathered reveals that the majority of universities have chosen fixed asset management systems from brands such as Beihua (Pronodi), Guozi, Jiuqi, and Sibide. Among these, the Jiuqi brand has the highest proportion of use at 50.0%, followed by Beihua (Pronodi) at 37.5%. Sibide and Guozi brands are less commonly used, with usage rates at only 8.3% and 4.2% respectively. A substantial 41.7% of universities had upgraded their systems within the last year, reflecting a proactive approach toward maintaining their fixed asset management systems. Another 29.2% of universities had last upgraded their systems between 3 to 4 years ago, while the frequency of upgrades at intervals of 5 to 6 years, 7 to 8 years, and over 9 years is at 8.3%, 4.2%, and 12.5% respectively.

Regarding total investment in the systems, universities' funding is concentrated between 10,000 and 900,000 CNY. Specifically, 33.3% of universities have invested within the 10,000 to 300,000 CNY bracket, another 33.3% within the 310,000 to 600,000 CNY bracket, and 29.2% fall within the 610,000 to 900,000 CNY range. High-value investments of 910,000 to 1,200,000 CNY are rare, accounting for only 4.2%. In terms of annual maintenance and upgrade costs for fixed asset management systems, 33.3% of universities do not incur extra expenses, holding the highest frequency. Annual maintenance fees of 0.001 to 10,000 CNY and 20,000 to 30,000 CNY are found in 29.2% and 20.8% of universities, respectively, while higher annual allocations of 100,000 to 150,000 CNY and 40,000 to 60,000 CNY are less common, at 12.5% and 4.2% respectively.

The research results show a high concentration in the choice of fixed asset management system brands among universities, particularly with the Jiuqi brand holding a significant market share, which may indicate broader user recognition and a more established market position. Considering most universities have upgraded their systems recently, it suggests a general acknowledgment of the importance of technological updates for asset management efficiency and security.

The invested funds are mostly focused on the lower financial brackets, reflecting potential budget restrictions or a preference towards cost-effective management system solutions. Limited funding might affect the depth and breadth of system features, yet it also implies a consideration of cost-effectiveness in the universities' investment in management systems.

As for annual maintenance and upgrade expenses, the data shows significant disparities between universities. Some do not have any additional annual maintenance costs, which could be due to included service support in their systems or less workload required for upgrades and maintenance. In contrast, higher maintenance and upgrade costs reflect some universities' emphasis on continuous system improvement and expansion of functionalities.

In summary, this research reveals several aspects of the current state of information technology application in fixed asset management at universities. Universities commonly prioritize system updates and maintenance, but remain cautious in funding investments, and display significant differences in annual maintenance cost burdens. These findings suggest that universities should continuously evaluate their information technology construction needs against their financial status to seek optimal solutions for fixed asset management to ensure efficiency and security. To guarantee long-term sustainability of the systems, it is

recommended that stakeholders focus on cost-effect

3.4. Impact of Financial Investment on Information Technology Construction for Fixed Asset Management in Universities

This research analyzes the impact of investment funds and maintenance and upgrade costs on the construction of fixed asset information management systems in universities.

Several aspects of how investment funds influence the information technology construction for fixed assets are observed:

- The relationship between the volume of fixed assets at the institution and the investment indicates that units with a larger amount of fixed assets (e.g., over 100,000 items) tend to invest more frequently in the 610,000 to 900,000 CNY bracket, suggesting that larger asset volumes may require higher funding to meet management needs.

- The ability of units to implement performance management functions is mostly found to be lacking in those that invest between 10,000 to 300,000 CNY and 610,000 to 900,000 CNY, implying that a certain level of investment may impact the realization of such functions.

- Many units investing in asset management software that enables online approvals and e-signatures fall mainly within the 10,000 to 300,000 CNY and 610,000 to 900,000 CNY brackets, denoting these as common funding levels for IT construction.

- Usage of fixed asset management systems demonstrates that the choice of different systems affects the level of investment, with schools using the Jiuqi system often investing at higher brackets.

- For the normalization of asset inventory processes, the lower investment bracket of 10,000 to 300,000 CNY is the choice of most units, potentially indicating that high investment is not crucial for inventory functionalities.

- Considering the adoption of international standard BG/T 14885-2022, though differences are not pronounced, units with the standard in use are distributed across various investment levels, which might mean that the implementation of the standard does not entirely depend on high investments.

The impact of annual maintenance and upgrade expenses on information technology construction:

- Units with a large number of assets (e.g., over 100,000 items) are evenly distributed across different maintenance cost brackets, depicting variance across institutions of different sizes in terms of average annual maintenance and upgrades.

- For the ability of asset management platforms to achieve performance management, there is a significant divergence ($P < 0.05$), suggesting that annual maintenance and upgrade investments might be crucial to the functionality.

- A large portion of units with an information system enabling automated approval and e-signature processes are clustered in the no extra maintenance cost bracket, likely because these functions may have already been included in the initial system procurement costs.

- Usage trends of information systems show that only units with lower maintenance costs use the Jiuqi asset management system, possibly due to its cost-effectiveness.

- Significant differences ($P < 0.01$) are seen in the normalization of inventory processes; units using mobile inventory devices invest only 40,000 to 60,000 CNY, while other units show greater variance in investment, which reveals that different inventory technologies may have

varying requirements for maintenance spending.

- With respect to implementing international standards for management, significant differences ($P < 0.05$) exist between units that have not implemented or are in the process of upgrading and debugging, with varying expenditures on maintenance and upgrades, potentially indicating a correlation between the standard's adoption and the annual maintenance cost.

According to the research findings, the investment in fixed asset information technology construction is correlated with the asset scale of universities, with those managing larger volumes of assets often requiring more funding for their IT infrastructure. Additionally, annual maintenance and upgrade costs are key factors that impact information technology construction, particularly the functionality.

Investments and maintenance costs have a significant impact on achieving networked approval signatures, performance management, regular asset inventory, and standardized management. Implementing these functions through initial system procurement and continued investment could be an effective strategy for information management of university assets. Zero maintenance and upgrade costs reflect that some system suppliers may offer services included in the purchase price, eliminating extra fees.

Furthermore, higher usage rates of the Jiuqi system in higher investment brackets may suggest that the system offers stronger functionality or is more complex, necessitating more substantial funding to support it.

In conclusion, it is recommended that universities fully consider aspects such as the selection of fixed asset management information systems, performance management capabilities, approval and signature processes, asset inventory methods, and the implementation of standards when planning their IT construction. They should also arrange funds and annual maintenance costs based on asset scale and management needs. Additionally, universities can negotiate with system suppliers to potentially include more services within the initial purchase price, reducing subsequent maintenance costs.

3.5. Challenges in Information Technology Construction for Fixed Asset Management in Universities

According to the research results, key issues faced by university asset management include: incomplete asset management system information (50%), mismatch between physical assets and the management system (29.17%), and unprocessed surplus and deficit of assets (29.17%). A certain proportion of universities also pointed to assets that should be scrapped but have not been (29.17%) and the weak foundation of unit asset management (75%), indicating that asset management processes and systems need further improvement.

The main factors affecting the application of information technology in fixed asset management are the high turnover of asset management personnel across various departments (54.17%), which leads to unstable management. Additionally, asset management personnel often have multiple roles and limited energy (66.67%), while there is inadequate promotion of relevant rules and regulations and a lack of training (58.33%), coupled with a lack of financial investment (41.67%) and insufficient attention from leadership (37.5%).

The difficulties revealed by factors hindering fixed asset management include: inaccurate asset accounts regarding

actual departments, personnel, and storage locations (75%), which makes it challenging to dynamically monitor asset usage during the process (66.67%), and a large workload of asset management along with inaccurate data (50%). Furthermore, there are issues such as insufficiently substantiated asset procurement needs (20.83%) and a mindset of prioritizing procurement over management (41.67%).

The survey highlights urgent areas for improvement and perfection in the application of information technology in fixed asset management, especially the need to focus on asset allocation (considered most urgent, at 58.33%), asset inventory (50%), and asset utilization analysis (also 50%). These involve critical processes related to asset turnover, accuracy auditing, and maximization of benefits. The processes of asset acceptance (45.83%) and asset disposal (41.67%) are also considered essential areas to be addressed, suggesting potential loopholes or technical deficiencies in acceptance and disposal practices.

The most common suggestions for improvement concentrate on strengthening business training (79.17%), increasing financial investment in information technology equipment for asset management (75%), and intensifying the promotion of the importance of asset management (66.67%). This shows that university authorities recognize the lack of personnel training and financial support and understand the significance of raising awareness of asset management.

The research reflects the multifaceted challenges that universities face in the application of information technology in fixed asset management. The imperfections in system information, inconsistencies between asset accounts and physical assets, and problems in asset inventory and scrapping lead to inefficiency and risk in university asset management.

Factors such as the neglect of leadership, tight finances, frequent turnover of asset management personnel, and the burden of multiple responsibilities significantly affect the information technology-based management of assets. These factors not only hinder the application and development of information technology but also slow down the improvement of asset management efficiency.

The factors identified in the survey as hindering asset management, such as discrepancies between accounts and the physical reality, lack of real-name asset management, and difficulties in inventory, further highlight structural problems in university asset management and underscore the potential of information technology to increase transparency, standardization, and efficiency.

The pressing needs for improvements and enhancements in information technology application in the management process underscore several weak areas, such as asset acceptance, allocation, inventory, and benefit analysis, which are key areas where information technology application can significantly improve efficiency and accuracy.

The opinions and suggestions for improving university fixed asset management emphasize the need to raise awareness of the importance of asset management among all faculty and students, enhance legal and regulatory education, expand business training, and increase financial input. Also, strengthening the functional development of asset management information technology software, particularly in monitoring, early warning, and asset inventory, is crucial for solving dynamic supervision challenges and reducing asset loss.

These measures reflect not only the urgent need for universities to solve asset management issues in a systematic manner but also a positive outlook on the role of information construction in advancing management modernization. By implementing a comprehensive approach, universities can effectively improve the professionalism of management staff and the overall efficacy of fixed asset management.

In conclusion, the enhancement of information technology management of fixed assets in universities should progress systematically from top to bottom, involving multiple facets: strengthening the education of asset management awareness, perfecting rules and regulations, stabilizing the asset management personnel team, increasing financial input, and continually improving the application of information technology. To achieve refined, transparent, and efficient asset management, universities need to adjust their strategic planning and policy-making accordingly. Additionally, schools should build a more integrated and coordinated asset information management platform, which means strengthening the connection with organizational structures and personnel data to establish an accurate and reliable asset management system, thereby enhancing management efficiency and reducing related risks. Through this comprehensive set of measures, universities can achieve greater efficiency and better compliance in fixed asset management.

4. Conclusion and Recommendations

4.1. Conclusion

This study finds that despite some progress in the application of information technology in the management of fixed assets at universities, there remain several challenges including insufficient investment in information technology applications, lack of technical support, and inadequate employee training and awareness. These challenges hinder the effective application of information technology in fixed asset management, affecting the efficiency and optimization of resource allocation.

4.2. Recommendations

Firstly, increase the investment in information technology applications, including the updates and maintenance of hardware and software, to ensure the stability and reliability of information technology. Secondly, strengthen technical support by establishing a professional information technology team that provides timely technical services and solutions to tackle technical issues encountered in the management process. Finally, enhance employee training and awareness by regularly conducting information technology training sessions and knowledge sharing activities to improve their abilities in applying information technology and managing more effectively.

Furthermore, future studies should further explore and develop effective measures to address the current challenges. For example, research and implement more advanced information technology application models and management methods to enhance the efficiency and utilization of fixed assets. Attention should also be paid to the security and privacy protection of information technology to ensure the safety and integrity of fixed asset data.

In summary, by increasing investment in information technology applications, strengthening technical support and employee training, and exploring more advanced information

technology application models and management methods, the current challenges can be effectively addressed, pushing university fixed asset management towards modernization and sustainable development.

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