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Research on the Assets Sharing Economy of Colleges and Universities under the Background of the Digital Economy — From the Perspective of Transaction Costs

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Abstract: ***Grounded in Williamson's transaction cost economics and situated within the current implementation of integrated budget management platforms, this study systematically investigates the theoretical logic and institutional innovation pathways underlying asset sharing in colleges and universities during the digital economy era. Digital technologies substantially reduce institutional transaction costs in asset sharing by reconfiguring three core dimensions: asset specificity, transaction uncertainty, and transaction frequency. The broad deployment of integrated budget management platforms offers standardized and operationally robust technical infrastructure, which effectively curtails information search and contract enforcement costs. At the same time, the in-depth advancement of digital asset management in colleges and universities, through the organic integration of smart contracts and credit evaluation systems, effectively alleviates the sharing dilemma caused by the specificity nature of colleges and universities assets. This study not only extends the applicability of transaction cost theory to public resource allocation but also offers theoretical and practical insights for enhancing the allocation efficiency and utilization effectiveness of assets in colleges and universities.***

Keywords: Digital economy, Sharing economy, Transaction costs, Asset specificity**.**

1. Introduction

With the rapid expansion of the digital economy and the ongoing push for high-quality development, the management of state-owned assets in colleges and universities has reached a critical phase of transformation. Establishing a modern asset management system aligned with contemporary needs has become essential to enhancing governance efficiency. According to the 2023 Ministry of Education report titled "Asset Status of Higher Education Institutions", the idle rate of fixed assets of Chinese colleges and universities ranges from 15% to 20%, among which the idle rate of some colleges and universities exceeds 30%. In response, requirements such as "revitalizing existing assets" and "improving the efficiency of asset utilization" have been put forward. In recent years, the rise of the sharing economy model has provided new ideas for revitalizing existing assets and improving asset utilization efficiency. The release of policy documents such as the "Notice of The State Council on Printing and Distributing the '14th Five-Year Plan' for the Development of the Digital Economy" and the "Opinions on Accelerating the Digitalization of Education" jointly issued by the Ministry of Education and nine other departments, as well as the implementation and promotion of the "National Education Digitalization Strategy Action". It has further clarified the direction for colleges and universities to innovate and transform their asset management models by relying on digital means.

2. Theoretical Framework

The sharing economy, also known as collaborative consumption, is fundamentally driven by the minimization of transaction costs [4]. The sharing economy requires the basic conditions of three parties: idle assets of colleges and universities, underutilized colleges and universities assets, an integrated budget management platform, and each college and university. The integrated budget management platform is actually a matching program. A central allocation system between the suppliers and demanders of idle assets in colleges and universities involves creating a match at an acceptable transaction cost at a specific time[2]. By significantly reducing transaction costs, this platform enhances the efficiency of supply and demand matching [8].

In his seminal work "The Nature of the Firm" [3], Coase (1937) introduced the concept of "transaction costs", providing a fundamental theoretical foundation for understanding the sharing economy. Building upon Coase's work, Williamson (2002) further developed a systematic framework identifying the key determinants of transaction costs: uncertainty, opportunism and asset specificity, offering a refined theoretical lens for economic analysis [1]. This theoretical framework is of particular pertinence when analysing asset sharing mechanisms in colleges and universities. Under the traditional asset management systems, such costs are especially pronounced: high asset specificity creates "lock-in risks" for transacting parties, while elevated monitoring and enforcement costs undermine the sustainability of sharing mechanisms. On the other hand, the cost of supervision and execution is relatively high, affecting the sustainability of the sharing mechanism. The innovation of information technology and the transformation of management systems in the digital economy era offer the possibility to solve these problems. On the one hand, the use of an integrated budget management platform and the transformation of digital management of college and university assets provide unified and standardized technical support for the sharing of college and university assets, which can reduce the cost of information search and matching. Furthermore, digital governance tools such as smart contracts and credibility assessment systems can standardize

transaction processes, establish long-term governance mechanisms and mitigate the risks associated with asset specificity. These tools can also enhance the efficiency with which asset-sharing contracts are executed in colleges and universities.

Transaction costs are shaped by asset specificity, uncertainty, and transaction frequency in colleges and universities. As major holders and operators of state-owned assets, colleges and universities manage resources such as dedicated teaching and research equipment, specialized laboratory facilities, and athletic venues—all characterized by high specificity and limited applicability. These assets often suffer from low utilization rates and fragmented management. However, when placed in a sharing mechanism, their specificity diminishes, leading to a reduction in associated transaction costs [11]. Uncertainty, manifested in the forms of default risks (such as moral hazard, adverse selection) and usage conflicts, also contributes to transaction costs. The adoption of digital credit evaluation systems can help mitigate these risks, thereby lowering the costs stemming from behavioral and operational uncertainties. Furthermore, transaction frequency plays a critical role: higher usage and transaction rates tend to reduce unit transaction costs through repeated interaction and institutional learning. Together, these factors form the transaction cost structure of asset sharing in colleges and universities setting, directly affecting both the efficiency and long-term viability of resource-sharing mechanisms.

Colleges and universities asset sharing also faces "institutional transaction costs" inherent to administrative and public-sector organizations, including coordination costs within bureaucratic systems and agency-specific governance expenditures. Under traditional management frameworks of colleges and universities, asset allocation typically adheres to a decentralized model, often summarized as "whoever acquires the asset controls its use and management", which frequently results in pronounced information asymmetry across organizational units.

Coase argued that transaction costs prevent many potential transactions from being realized. Similarly, the high transaction costs associated with asset sharing have historically hindered its large-scale adoption among colleges and universities. However, advances in digital technology, particularly the development and implementation of integrated budget management platforms, have provided critical technical support in reducing these costs and facilitating the sharing of assets each college and university. By enhancing operational transparency and standardizing administrative procedures, the integrated budget management platform helps lower institutional barriers, thereby enabling more efficient and widespread sharing of assets across colleges and universities. Meanwhile, the integrated budget management platform serves as a "digital infrastructure" that bridges data gaps and breaks down information silos among colleges and universities nationwide. This transformation has enabled a shift from a fragmented, patchwork model to a cohesive and ecosystem-oriented approach. The application of innovative technologies such as LBS positioning services, big data analytics, and blockchain-based smart contracts can reshape the transaction costs structure in the asset sharing management of colleges and universities, and effectively mitigate sharing constraints caused by asset specificity.

This theoretical framework highlights asset specificity, uncertainty and transaction frequency as the core dimensions of transaction costs influencing sharing mechanisms. Integrated budget management platform significantly lower information search and contracting costs through digital matching mechanisms, while the smart contracts and credit evaluation systems effectively alleviate the lock-in risks and opportunistic behaviors brought about by asset specificity. Beyond restructuring colleges and universities asset management's transactional architecture, digital technology also offers a theoretical foundation for dismantling institutional barriers and establishing sustainable models of shared governance.

3. Pathways for Innovation in Colleges and Universities Asset-Sharing Mechanisms

The sharing economy reduces transaction costs through institutional and organizational innovation. Without the transformation of systems and economic organizational forms, the innovation of Internet technology is difficult to generate the business model of the sharing economy [6]. Especially in colleges and universities where there are "institutional transaction costs" within the administrative system. The key enabler of the sharing economy lies in institutional adaptability rather than technological advancement alone. Ultimately, minimizing transaction costs in the sharing economy is achieved primarily through the optimization and innovation of institutions and organizations [4], not merely through progress in Internet-based information technology [9]. From this institutional-organizational perspective, this article analyzes feasible pathways for innovating asset-sharing mechanisms in colleges and universities.

3.1 Incentive Mechanism Reform

1)An incentive-compatible mechanism that integrates performance evaluation with a credit system should be established

It is essential to increase the weighting and substantive influence of sharing performance in resource allocation through a quantifiable, traceable, and comparable contribution accounting system. We propose incorporating explicit asset-sharing efficiency metrics into evaluations such as the "Double First-Class" initiative assessment and key laboratory reviews. The results should not only determine inclusion in a "Shared Red List", but also directly influence subsequent annual budget allocations, approvals for equipment procurement funds, and investments in major university-level platforms. By directly linking resource distribution to sharing outcomes, this performance-resource mechanism internalizes the positive externalities of sharing, transforms institutional attitudes from reluctance to active and voluntary participation, and reduces institutional coordination costs at their source.

2) Pilot a "Shared Credit" System Using Blockchain Technology

A transparent and tamper-proof credit archive for shared

college and university assets should be established using blockchain technology. Record the key behavioral data such as the reservation fulfillment rate and usage duration of assets, and maintenance of shared equipment and facilities would be recorded to generate a unique shared credit score for each college and university. This score would serve as a credential for obtaining priority access to scarce or high-demand assets [10]. Users with high scores would receive incentives such as "green channel" processing and exemption from security deposits. For malicious breach of contract, damage to equipment, and other losses caused by refusal to compensate, such behaviors will be recorded in the list of untrustworthy entities and subject to phased usage restrictions across platforms and departments. Credit records based on big data will to a certain extent strengthen the credit constraints of various university entities. Meanwhile, establishing a complete credit system can prevent excessively high supervision costs. Otherwise, the decline in transaction costs brought about by information technology may be offset by the increase in transaction fees of types such as supervision and risk costs.

3.2 Property Rights System Reform

A governance system centered on "digital usage rights" should be established for colleges and universities assets.

1) Clarify the boundaries of rights and responsibilities by implementing a hierarchical management framework. The Interim Measures for the Administration of State-owned Assets of Directly Affiliated Institutions of Higher Learning of the Ministry of Education stipulate the separation of ownership and usage rights of state-owned assets in colleges and universities under the principle of "state ownership, tiered supervision, and institutional utilization". This separation allows suppliers to share usage rights of idle resources, thereby establishing a property rights framework conducive to exchange. As the de facto asset holders, colleges and universities should be granted more comprehensive rights pertaining to asset use and income. It is recommended to introduce a "college and university legal person property rights system", enabling colleges and universities to participate in asset-sharing transactions as legally recognized rights-holders. Such a structure would reduce coordination and negotiation costs arising from multilayered agency relationships.

2) Standardized Division and Transfer of Usage Rights via a Digital Asset Management Platform

The application of blockchain and smart contract technologies has resulted in the generation of tradable "digital right of use certificates", thereby promoting the standardisation of the management of the right to use idle assets in colleges and universities, including large-scale instruments and equipment, track and field resources, and so forth. These certificates confer exclusive rights to utilize specific assets within a stipulated period and are automatically issued, reserved and settled through school-level or regional shared platforms. This technology-enabled refinement of property rights transforms previously illiquid usage rights into easily tradable instruments, thereby substantially reducing information search and contract initiation costs in the process of matching supply and demand.

3) Design an Incentive-Compatible Revenue-Sharing Mechanism to Overcome Asset Specificity

Establishing transparent and scientifically grounded internal pricing and profit-distribution rules is critical to addressing challenges related to asset specificity. The distribution of shared income should be apportioned among the school and the departments to which the assets belong, subsequent to the deduction of the relevant operating costs (such as cleaning and maintenance fees, etc.) in a certain proportion (for example, it can be allocated to the asset shared income fund established by the school, the development fund of the affiliated department and the performance reward respectively in a certain proportion). By directly correlating economic returns from asset sharing to the interests of all stakeholders, this market-oriented compensation mechanism effectively incentivises asset-owning units to open their specialised resources. It mitigates hold-up risks caused by fears of opportunistic behavior, thereby reducing lock-in effects and lowering supervision and enforcement costs associated with asset specificity.

3.3 The Establishment of a Flat and Professional Governance System is Essential for Enhancing Digital Capacity

1) The Establishment of a College (University)-Level Asset-Sharing Governance Committee in Order to Clarify the Lines of Authority and Reduce Coordination Costs

The establishment of a college-or-university-level asset sharing management committee is recommended. The committee should be headed by the president, and its membership should comprise the heads of various functional departments, including the State-owned Assets Department, the Finance Department, the Academic Affairs Department, the Research Department and the Information Technology Department. Furthermore, it is suggested that the committee be composed of representatives from the secondary colleges within the university. The committee bears responsibility for the approval the sharing strategy, system, revenue distribution principles and performance evaluation standards. Its primary function is to break down administrative barriers between departments, to coordinate shared resources across the university, and to reduce internal coordination and negotiation costs caused by fragmented management structures.

2) Enhance Digital Literacy and Integrate Sharing into Performance Evaluation Systems

Specialized training should be provided to asset managers and research-oriented faculty, covering digital platform operation, data security, sharing policies, and cost–benefit analysis. At the same time, annual performance evaluations of academic and administrative units should incorporate key indicators such as "large-scale equipment sharing rate" and "sharing-generated revenue". This integrated approach, which combines training, assessment, and incentives, has been shown to be an effective strategy for shifting organisational culture from a focus on "acquiring over sharing" to one that values open collaboration. It also reduces institutional

transaction costs stemming from information asymmetry and weak incentives, thereby encouraging proactive participation in resource sharing.

4. Conclusion

This study applies Williamson's transaction costs theory to analyze the theoretical foundations of college and university asset sharing in the digital economy. Digital technologies significantly reduce institutional transaction costs stemming from administrative systems and the nature of public institutions by enhancing information transparency, standardizing procedures and automating governance. These effects extend the relevance of transaction cost theory to public institutional settings.

A sustainable model for asset sharing in college and university depends not only on technological adoption, but also on complementary institutional innovation and organizational adaptation. A hybrid governance structure that integrates necessary administrative oversight with market-style incentives is critical. Moreover, a cooperative framework combining government policy guidance, college and university-led execution, and market-based support can provide institutional safeguards for a sustainable asset-sharing economy. Collectively, these measures can optimize the conditions for resource sharing within and across colleges and universities.

Colleges and universities are currently undergoing a transition from administration-driven asset sharing to a digital-enabled approach. While this transition is subject to constraints arising from existing path dependence, it also creates opportunities for substantial institutional innovation. From a policy perspective, the sharing of assets is in alignment with the recent initiatives of the government, such as "fiscal tightening", the revitalization of asset inventory, and the enhancement of asset utilization profitability. In order to facilitate this transition, it is recommended that colleges and universities make full use of integrated budget management platforms and digital asset management systems. These tools can help foster resource integration and collaboration across departments, disciplines, and institutions, thereby supporting optimal resource allocation and efficient circulation.

Future research should pursue two promising directions. Firstly, comparative and empirical studies are required to examine differentiated sharing pathways across various types of colleges and universities. Secondly, further investigation should explore how emerging digital technologies, such as the Metaverse and Artificial Intelligence (AI), which have the potential to reshape asset-sharing models and transform transaction cost structures, should be considered. It is evident that research in these areas will offer valuable theoretical and practical insights, which will advance the digital governance of public sector resources.

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