ISSN 2616-5902 Vol. 6, Issue 11: 164-169, DOI: 10.25236/AJBM.2024.061124

Research on the Digital Transformation of University Research Fund Management

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Abstract: *With the rapid development of modern information technology, the top-level design of scientific research fund management in universities has been further strengthened, and actively promoting the digital and intelligent transformation of scientific research fund management has become a trend. This study explores the significance of the digital transformation of scientific research fund management in universities, the current situation of the "streamlining administration and delegating power" reform of scientific research fund management, and analyzes the difficulties and shortcomings in the digital transformation of scientific research fund management in universities. This study proposes specific strategic recommendations for achieving the digital transformation path of scientific research fund management in universities, including improving the management system and process of scientific research funds, establishing a process management system framework for scientific research projects, building a digitalized scientific research fund management system, and strengthening the construction of a talent team for scientific research fund management.*

Keywords: *research funding management, digital transformation, integration of business and finance*

1. Introduction

In recent years, the State Council has taken various reform measures to simplify the budget application and process management of scientific research projects, strengthen financial and technical completion acceptance, and give researchers greater autonomy in the use of scientific research funds while being guided by process management results. This puts forward higher requirements for the management level and innovative measures of scientific research funds in universities. With the development of the digital economy and the upgrading of information technology, the digital and intelligent transformation of scientific research fund management provides a possible path for scientifically solving the current problems in university scientific research fund management.

The digital transformation of scientific research fund management refers to the use of advanced scientific research fund management and financial management theories by universities, with the help of digital and artificial intelligence technologies and financial accounting methods [1], combined with the characteristics of the "streamlining administration and delegating power" reform of scientific research fund management in universities, through pre forecasting, in-process supervision and early warning, and post analysis, to achieve the goal of increasing in-depth mining and utilization of financial data [2]. The use of digital information tools in the full lifecycle management of scientific research funds enables highly interconnected and shared internal business systems related to various scientific research management, and connects with external business system resources of universities. We aim to achieve the data sharing function of the scientific research financial service center, such as the development of intelligent robots, the application of tax software, electronic reimbursement, electronic archiving, etc., and strive to gradually realize the automation and intelligence of complex scientific research fund management activities. We aim to ultimately achieve interconnectivity between government departments, upstream and downstream supply chains, and various management departments within universities, thereby enhancing the modern governance capability and level of research funding management in universities, reducing the financial burden on researchers, stimulating scientific innovation and creativity, and promoting the high-quality development of research funding management services in universities.

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2. The significance of the digital transformation in the management of scientific research funds in universities

The digital transformation of scientific research fund management in universities is of great significance in solving the problems of "complicated reimbursement" and "difficult reimbursement" of scientific research funds, promoting the integration of industry and finance, optimizing processes, achieving the combination of decentralization and management, continuously improving the level of scientific research fund management, deepening the reform of the mechanism for allocating and using scientific research funds, and stimulating innovation vitality.

2.1 Grasp the trend of digital economy and seize the opportunity of strategic transformation

The traditional financial management model lacks top-level design, and the management of scientific research funds is single. A large amount of basic and repetitive work still relies on manual operation, with lengthy processes and low efficiency and quality. The management of scientific research funds is relatively isolated from the entire lifecycle of scientific research projects, and the integration of industry and finance is not sufficient. Scientific research projects cannot achieve timely sharing of data throughout the entire process from project initiation, budget application, budget execution, project completion and acceptance to surplus fund management.

2.2 Empowering with digital means to achieve the integration of business and finance

The full process management of scientific research projects requires cross functional and cross departmental data flow. The data-driven digitization approach can design functions such as scientific research project initiation, budget management, management fee extraction, funding entry, budget adjustment, bill issuance, project completion and acceptance, and surplus fund management based on the rules of scientific research project management, covering the entire process of scientific research business management. We have established an information resource sharing platform for various management departments to achieve one-stop online processing of scientific research business.

Financial personnel review, confirm, organize, and analyze financial data related to scientific research projects. Through the financial management "cockpit system", they provide tailored financial statements based on personalized needs, facilitating the retrieval of financial data for scientific research projects, final acceptance, and decision support, promoting financial information sharing, and facilitating the integration of business and finance.

Decision makers in scientific research management can also compare and analyze business and financial data through information sharing when participating in scientific research management decisions, timely discover problems in the operation of scientific research funds for process management warning, analyze and find growth points of scientific research funds, and achieve the maximization of economic benefits for universities.

2.3 Optimization of research funding process to stimulate innovation vitality

Under the promotion of the intelligent transformation of big data, project managers can optimize the structure and process of scientific research funding management by obtaining authorization for relevant scientific research project information and utilizing data sharing from multiple departments. In addition, the use of digital technology can integrate various fragmented resources and leverage the advantages of data integration to break down barriers to scientific research information. It also helps to discover and grasp the needs of innovative entities such as researchers, enterprises, universities, and research institutions more quickly and accurately, effectively interconnect through real-time and accurate information exchange, fully cooperate, and carry out joint project applications to effectively improve project quality. Thus, it can stimulate the innovation vitality of scientific researchers and achieve the overall soft power enhancement of "digital intelligence management full chain integration innovation driven" in university scientific research.

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3. The current situation and problems of scientific research fund management in universities

3.1 Low level of digitalization in financial management

At present, universities generally have applicable scientific research and financial management systems, but there is a lack of unified architecture and organizational implementation among various management systems, and overall planning has not been carried out. The internal systems are independent and decentralized from each other, and there is a lack of unified standards and norms for information and data transmission. Lack of coordination and communication across departments results in insufficient information sharing among various system libraries, making it difficult to achieve effective integration with other information. Secondly, the users of various management systems generally only perform data entry, maintenance, and simple organization, and the systems only use the primary stage of data electronic functions. The system problems in the digital information construction that runs through the entire process of scientific research fund management and the further integration and analysis functions of financial data have not been fully and effectively explored and excavated[3].

3.2 Difficulties in optimizing the management process of research funds

In the management of universities, various universities have carried out comprehensive informationization construction, continuously updating and improving relevant business systems, and basically realizing the informationization management of scientific research funds. In theory, all process businesses of scientific research projects have basically been processed online. We need to establish systems such as automatic issuance of research funding, full electronic tickets, budget adjustments during project execution, paperless reimbursement intelligent appointment, collaborative transfer online approval, and transfer and use of remaining funds. This may seem like process optimization and convenience, but in the actual process of scientific research funding management, many problems are often encountered. For example, filling in the business process system is repetitive and cumbersome, and transferring large amounts of cooperation funds requires scanning a large number of attachments and organizing them for uploading. Researchers are not familiar with relevant financial systems, and the error rate of intelligent reimbursement is high. It is easy to encounter problems such as incomplete documents, incorrect filling, and incomplete approval, which require researchers to repeatedly revise and submit, wasting a lot of time and energy [4].

3.3 Insufficient sharing and integration of business modules and financial modules

The financial system of universities generally interfaces and shares data with more than 10 business departments, including scientific research management, human resources, bidding and procurement, asset management, etc., basically achieving collaborative cooperation and business linkage between the financial department and the school's business departments. However, in the specific implementation process, there are still problems such as the inability to share business and financial data or incomplete basic data. Firstly, due to technical factors, developers did not construct interfaces according to the agreed technical standards during the system integration process; or one party may not have communicated with the other party beforehand during the system upgrade and renovation process, resulting in changes to the system interface standards and the inability to share data. Secondly, due to non-technical factors such as their own business and system renovation costs, business departments are unable to fully integrate their systems. All of these factors result in the inability to achieve effective transmission and sharing of corresponding data with the financial system.

The main job of research related business departments is to manage, track, and guide research projects, while the responsibility of the finance department is to focus on the use of research funds, conduct income and expenditure accounting, and reimbursement management of research funds. The focus of work in the two departments is different, and information communication is not timely, resulting in the lack of integration of information data between scientific research business and financial work, forming an information island. The scientific research project management system cannot share data with the financial management system and intelligently extract relevant scientific research funding completion reports [4].

3.4 There are still many problems in the use of scientific research funds

From the actual management of scientific research funds, it has been found that there are still many

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problems in the use of scientific research funds in universities, such as information asymmetry in the process of claiming scientific research funds, long invoicing and accounting cycles; Accounting services still need further optimization, with issues such as high refund rates, cumbersome approvals, and centralized reimbursement; The issue of not settling the bill upon completion of the project; The internal control supervision mechanism lacks linkage. As a result, the overall efficiency of the use of scientific research funds is not high, which affects the effective operation of university scientific research fund management and is not conducive to mobilizing the innovation enthusiasm of scientific researchers [5].

4. Countermeasures and suggestions for the digital transformation of scientific research fund management in universities

In order to better leverage the advantages of modern digital information resources, make up for the shortcomings in current scientific research fund management, and help optimize the decision-making of scientific research fund management in universities, the following suggestions are proposed for the digital transformation of scientific research fund management in universities.

4.1 Improve the digital management system and process of scientific research funds

This study needs to combine the actual situation of research funding in universities, identify the missing links in the system one by one, optimize and improve the existing system, and strengthen the digital transformation of research funding management. We need to conduct in-depth development of digital empowerment business, utilize big data for management and services, embed internal control systems and management systems of other business departments, and develop standardized processes for various application modules. We need to achieve full process intelligent data processing, such as raw information extraction, data verification and comparison, accounting audit processing, financial statement generation, etc. In order to provide more efficient personalized services for different service recipients, such as providing scientific research funding query and statistics services, performance evaluation reports, project collection and final settlement statistics, budget dynamic monitoring reports, and other financial statements for scientific research projects.

4.2 Establish a process management system framework for scientific research projects

The framework of the scientific research project process management system should include project application management, achievement management, research archive management, scientific research fund management, budget management, message notification, latest policy document push, expert exchange resources, scientific research practical tools, etc., and the various modules should be interrelated. Scientific researchers can be encouraged to record process research data and financial related data of scientific research projects in the scientific research management system, automatically extract and collect the use of scientific research funds in the financial system. At critical nodes, scientific research management personnel can send reminder notifications and financial warnings to scientific researchers, informing them of the progress of project budget execution and potential risk points in the use of funds.

4.3 Building infrastructure and fully leveraging the role of digital platforms

We accelerate the optimization of the data interface of the financial management information system through continuous data governance, achieving cross departmental information sharing and integration. We have significantly improved the level of digitalization in scientific research management by expanding the development of the research funding management module. We continuously strengthen data information security, fully leverage the role of digital platforms, and enhance user experience.

One is the intelligentization of invoice issuance, with automated identification and verification. We rely on the national electronic tax platform to establish a scientific research invoice usage system, actively promote digital invoices, achieve automatic matching of scientific research project partner information and project payment units, intelligent recognition and extraction of invoicing information, online fast and intelligent issuance of scientific research project invoices, and delivery to users for verification and other functions, thereby reducing the duplication of manual registration work and the risk of errors, and improving the efficiency of scientific research fund claim and invoice issuance.

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The second is the intelligentization of scientific research funding reimbursement and the electronicization of process approval. With the popularization of electronic tickets, airplane and train tickets are gradually becoming digitized. In the process of using scientific research funds, intelligent technology can be used to intelligently collect invoices, automatically extract invoice information, fill in intelligent appointment forms, reduce attachment uploads through information sharing, conduct online electronic process approval, and transmit real-time data for intelligent reimbursement. After financial review is correct, accounting vouchers are automatically generated and electronic image files are formed, which are returned to the detailed items of scientific research project expenditure. We strive to shorten processing time as much as possible, effectively reducing the burden on researchers when using research funds.

Thirdly, the integration of intelligent financial services. The construction of smart finance aggregates dispersed financial data and systems to achieve one-stop services. With the help of shared interfaces, the financial data center is interconnected with tax invoices, financial bills, bank electronic receipts, etc., and the data between scientific research management business data and financial management accounting vouchers is traced and verified. We provide appointment reimbursement, information inquiry, information maintenance, travel, intelligent reimbursement, invoicing and other services for teachers and students.

Fourthly, "cockpit" management and real-time decision support. Based on the data from various business systems and financial systems in universities, a comprehensive financial service platform is built. Using data models and intelligent methods, a "one-stop" financial analysis service is established for scientific research project budget management, fund management, etc. It is presented in the form of visual charts for managers and decision-makers, achieving collaborative and interactive decision-making data support for financial management from static to dynamic management, and accurately empowering scientific research and production in university research institutes.

4.4 Strengthen team building and enhance the data literacy and skills of scientific research management personnel

In the process of promoting the digital transformation of scientific research fund management in universities, the key is to deeply integrate the concept of data-driven into the process of scientific research fund management, and to shift from "empiricism" to "dataism". We require university research management personnel to understand the characteristics of information technology and new models of digital management, and become composite talents proficient in business management and digital technology. Colleges and universities should create a good atmosphere of informatization, prepare accounting information system user manuals, regularly offer financial management and digital management training, and improve the informatization quality and thinking of all management personnel. We will integrate the scientific research management system, latest policies, and workflow into the training content, improve the overall digital tool usage ability of scientific research management personnel, and effectively enhance the level of scientific research fund management.

5. Conclusion

In the context of the digital age, universities should actively promote the overall planning of the digital transformation of scientific research fund management, improve the scientific research management system, provide the latest technological support, and actively build an information-based scientific research fund management system. We need to leverage our own scientific and technological advantages, strengthen the information literacy of scientific research management personnel, and provide financial decision-making support for the technological innovation and business development of universities.

Acknowledgments

This work is supported by the Finance Research Project of Jilin University in 2023.

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