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Research and Implementation of Scientific Research Project Management Platform

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Abstract: With the expansion of scientific research activities and the increasing demand for interdisciplinary collaboration, the traditional scientific research management model is facing challenges in terms of efficiency, synergy and data-driven decision-making. Based on the research and implementation of scientific research project management platform, this paper designs and develops an integrated and intelligent digital management platform for the whole life cycle management of scientific research projects. Firstly, by analyzing the pain points of scientific research project management, the functional architecture design of the platform is put forward, and a closed-loop management system covering scientific research project management, standard management, scientific and technological achievements management, intellectual property management, periodical management and operation and maintenance management is constructed. Through standardized interface and authority classification mechanism, the platform supports multi-role collaborative operation to ensure data security and compliance. The research results of this paper provide a reusable technical solution for the digital transformation of scientific research institutions, and have important practical value in promoting the standardization of scientific research management and the collaborative innovation of industry, University and research.

Keywords: Scientific research project management; Digital platform; Life cycle management; Resource optimization.

1. Introduction

During the "14th Five-Year Plan" period, the scale of China's information industry continued to grow, enterprises fully implemented the information system, implemented the new information strategy, and supported the development of service enterprises. As an important pillar of production and operation of enterprises, scientific research projects play an important role in supporting and leading scientific and technological innovation for the development of enterprises. At present, the management mode of scientific research projects is still dominated by offline management, which produces a large number of information that can not be scientifically and systematically managed, and causes irreparable losses to enterprise management and enterprise development. Some enterprises have established project management systems, but the existing systems have problems such as single module and relatively independent system, which still can not manage the whole process of scientific research projects in a process and modular way, nor can they collect, archive and reuse all kinds of information generated in the process of scientific research project management. Therefore, the construction of digital management system supporting the whole life cycle of scientific research projects has become the fundamental guarantee for enterprises to participate in competition, work efficiently, reduce costs and develop rapidly. The purpose of this paper is to design and develop a digital scientific research project management platform to manage scientific research projects and other related scientific research management processes scientifically and electronically, so as to further improve the management and control level of enterprise scientific research projects and enhance the core competitiveness of enterprises [1].

2. Significance of Digital Management Platform Construction for Scientific Research Projects

2.1. Scientific research project management status

With the rapid development of science and technology and the increasing number of scientific research projects in enterprises, the management of scientific research projects is still dominated by traditional offline manual management and single project management system. The following problems [2] are common in daily management:

1). Traditional management methods are time-consuming, labor-intensive and inefficient. Many enterprises still rely on manual records and paper documents, which not only increases the time cost of information transmission, but also causes the lag of scientific research project management, which makes it difficult to meet the rapidly changing scientific research needs of enterprises.

2). Single scientific research project management system has limitations. Although some enterprises have introduced scientific research project management software, these software systems can only meet the project management, but cannot deal with the financial management, personnel management, file management and other aspects of the work involved in the whole project process, resulting in repeated use of resources and inefficient utilization [3].

3). The phenomenon of information island is serious. Poor communication between departments and project management teams leads to the fact that scientific research project managers are unable to obtain the required project-related information and resources in a timely and convenient manner, and it is also difficult to integrate statistical analysis

to assist decision makers in making decisions [4] .

With the increasing complexity and diversity of scientific research projects, the traditional mode and simple project management system have been unable to meet the management needs. Enterprises need more flexible and efficient scientific research project management system to cope with the huge challenges of the market.

2.2. Significance of construction of digital management platform for scientific research projects

As an important part of enterprise information construction, the construction of scientific research project management system makes enterprise scientific research project and achievement management process, standardization, transparency and visualization. The construction of digital management platform for scientific research projects is an important trend in the modernization of scientific research management, and its significance is reflected in many aspects. The following is a detailed analysis of its core values [5] :

(1) Improve the efficiency of scientific research management. Process automation, through digital tools to achieve the project life cycle management process online, reduce manual reporting and paper material flow, reduce administrative costs. Data precipitation and reuse. Historical project data can be stored in a structured way to avoid repetitive work and accelerate the start of new projects.

(2) Project risk warning. Real-time monitoring and early warning, intelligent early warning of delays, overruns and other risks, to help managers respond quickly.

Break through data barriers. Realize the whole life cycle management of scientific research projects on the platform, eliminate data islands and break through data barriers.

(3) Optimize the allocation of resources and promote the fairness of scientific research. Transparent resource allocation, open project evaluation criteria, funding allocation logic and expert opinions through the platform, reduce human intervention, and enhance the fairness and credibility of scientific research resource allocation.

(4) Strengthen the scientific nature of scientific research decision-making. Data-driven analysis provides objective basis for scientific research planning through big data technology.

3. Design of digital management platform for scientific research projects

3.1. Platform Architecture

In view of each link of scientific research project management, it involves six core modules: scientific research project management, standard management, scientific and technological achievements management, intellectual property management, journal management and operation and maintenance management. These modules are interrelated and form a complete closed-loop management to ensure that every link of scientific research projects from project establishment to achievement transformation can be effectively managed. Through standardized interface and authority classification mechanism, the platform supports multi-role collaborative operation to ensure data security and compliance.

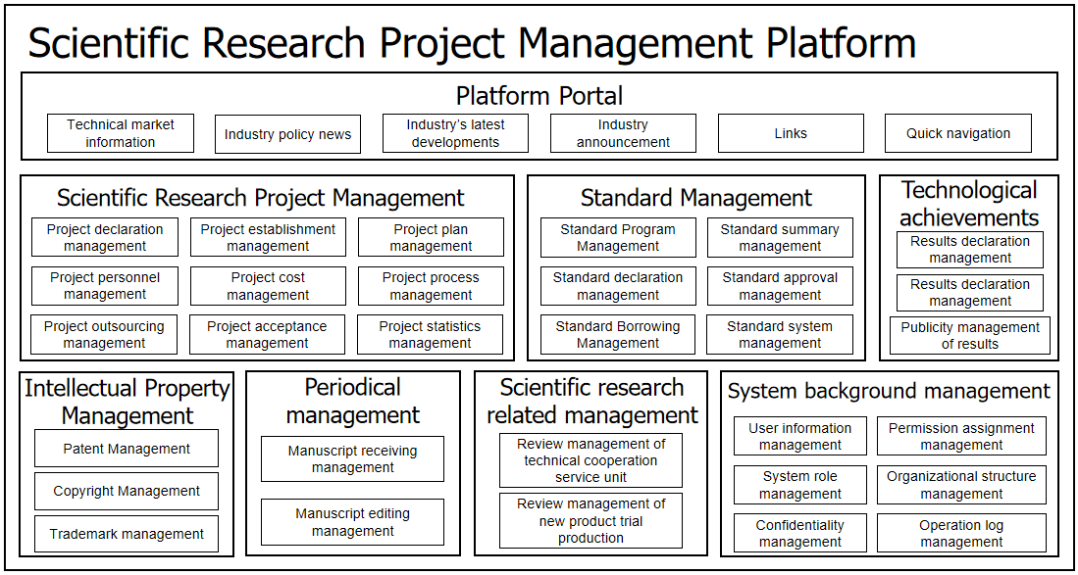

Figure 1. Functional architecture of the platform

3.2. Platform function settings

3.2.1. Platform Portal

The home page of the platform portal contains sections such as technical market information, industry policy news, industry latest developments, industry announcements, friendship links and quick navigation, which facilitate users to quickly and clearly understand the latest situation of industry development and related policy information.

3.2.2. Scientific research project management

The scientific research project management module covers the whole life cycle management of project declaration, project process, final acceptance and award evaluation. Users declare the project in the system, and enter the project module after approval to manage the project process.

(1) Filling in the plan summary: the user shall fill in the plan summary and upload the corresponding plan and project summary on time within the project cycle. The audit team will evaluate the project implementation progress according to the project plan and the actual situation of the project, and form a project schedule as a reference for the assessment work and fund allocation.

(2) Project change application: Project members, participating units and budget are often changed during

project implementation. You can fill in the corresponding change application in this module. After the change application is approved, the subsequent implementation of the project will be based on the changed project situation.

(3) Project Expense Application: Before submitting an expense application, the user needs to submit an annual budget application for the corresponding year, which will be reviewed by the review team and the finance department. The expense application can be made only after the application is approved.

(4) Project completion application: for the project that needs to be concluded, the user needs to make a final summary of the project and upload the conclusion report. After approval, the project enters the accepted project database.

In addition to project process management, outsourcing management of established projects can also be carried out, including outsourcing filing, cooperative unit review, outsourcing contract review and outsourcing contract acceptance. The project can control the cost of suppliers and outsourcing according to actual needs, effectively reduce project risks, and enhance project flexibility and flexibility.

3.2.3. Standard management

The standard management module covers the management of all links in the standard declaration and release process, such as standard declaration and plan, approval management, standard release, standard review, etc., and realizes the standardization, transparency and intellectualization of the whole process by digital means.

(1) Standard application and plan management: including online filling and template support, providing standardized forms such as standard project application template and plan assignment, supporting online filling and attachment uploading, reducing manual duplication; supporting dynamic adjustment of plans, supporting priority ranking of application plans and resource matching, and dynamically adjusting annual or medium- and long-term standard planning according to project database data.

(2) Standard approval management: including multi-level approval process automation, flexible configuration of approval process, support for electronic signature, feedback online circulation, shorten the approval cycle; version control and history tracing, automatically save the revised version of the approval document, record the modifier, time and modification content, to ensure the traceability of the standard formulation process.

(3) Standard release management: including one-click release and multi-terminal synchronization, generating standard official text (PDF/HTML and other formats) through the platform, and automatically synchronizing to the official website, industry database, enterprise intranet and other channels to ensure the timeliness of release.

(4) Standard review management: the closed-loop management of the review process supports the online processing of the whole process of the collection of review opinions, the voting of revision proposals, the abolition or renewal of decisions, and the retention of expert demonstration records.

(5) Whole-process data penetration and statistical analysis: including the standard life cycle board, which visually displays key indicators such as the progress of each stage, resource input, and participating units, and supports multi-dimensional screening and analysis by field, year, and status; resource optimization suggestions, which identify frequently revised fields or long-term idle standards through data analysis, optimize standards, and formulate resource allocation strategies.

3.2.4. Journal paper management

The journal paper management module covers the whole process management of the company's internal and external journal paper submission, registration and review, typesetting and proofreading, manuscript distribution and payment. The user enters different submission application processes in the system according to the category of the manuscript, the manuscript enters the manuscript registration module after passing the primary approval, and the designated journal paper administrator carries out the follow-up operation on the manuscript.

(1) Manuscript editing: After the approved manuscript is registered, the first-level administrator will preliminarily revise the manuscript and distribute the task. After receiving the task, the second-level administrator will edit and revise the manuscript for the second time according to the manuscript standard of the journal, and then submit it to the next level. The third-level auditor is responsible for editing and proofreading the Chinese and English abstracts of the manuscript, and finally submit it to the final examination. After the final review is completed, the manuscript enters the typesetting process. The designated typesetting administrator typesets the manuscript and uploads the drawing according to the format requirements of the manuscript submission journal. After completion, different checkers complete three rounds of verification and enter the journal database to be typeset.

(2) Periodical management: After the manuscript is published, the publisher shall select the appropriate periodical and relevant issue for publication according to the content and type of the manuscript, and contact the financial personnel to complete the payment of the remuneration according to the pre-established remuneration plan.

In addition, the module also makes detailed statistics on the workload of manuscript managers, covering the number of contributions by special authors and the distribution of journals. The summary and analysis of these data enable administrators to grasp the current status of the publication of the journal at a glance. Through the analysis of manuscript processing efficiency, administrators can better arrange their work and improve the overall processing efficiency. The tracking of journal distribution is helpful to analyze the market performance of journals, judge their influence and promotion effect in academia, and provide an important basis for subsequent editing and planning work. With the support of these statistical data, the management and operation of journals can become more scientific and efficient, which is conducive to improving the overall editorial quality and service level.

3.2.5. Management of scientific and technological achievements

The management of scientific and technological achievements covers many aspects, such as intellectual property rights, scientific and technological awards, industry honors, trial production of new products and industry management, and can also provide users with more convenient declaration services. Among them, intellectual property rights are divided into patents, copyrights and trademarks, and users can apply, query and manage these intellectual property rights online in the system to protect their innovative achievements.

At the same time, the system supports users to declare

company science and technology awards and government science and technology awards. By simplifying the declaration process, the platform can help users submit award applications more efficiently and track the progress of declaration in real time, which not only improves the transparency of scientific and technological achievements, but also promotes the virtuous circle of scientific and technological innovation and transformation of achievements.

4. Development and application of scientific research project management platform

This paper selects the implementation process of the scientific research project as an example to introduce.

As shown in Figure 2, the overall implementation process of the project includes two parts: project implementation and project supervision. The implementation is mainly to manage the schedule, scope and cost. According to the characteristics of scientific research projects, the outsourcing procurement part of the project can also be managed. In the process of overall project promotion, detailed early warning functions can be realized. In addition, the project supervision module, based on multi-dimensional project data, can provide senior managers with a detailed overview of the project, which is convenient for leaders to make decisions and better allocate relevant project resources.

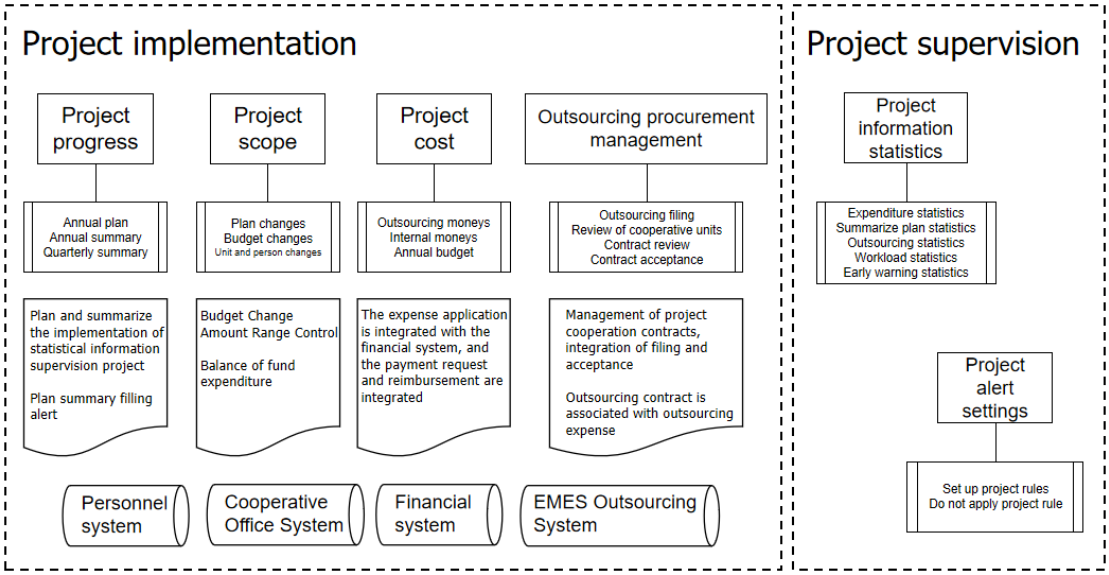

Figure 2. Project implementation process chart

The progress of the project is controlled by two sets of annual and quarterly plans, one long and one short, to summarize and manage the causes of progress changes. The project scope mainly supervises the change of project information scope through the three dimensions of project plan, project budget and project research units or personnel, manages the reasons for change and change documents, and provides important basis and historical records for project change traceability. The project cost mainly manages the project funds through the two dimensions of project budget and project expenditure, and sets the rule system to control the use of funds and the corresponding fund statistics to assist the project manager to understand the use of project funds, so as to enhance the control of project funds and rationally arrange the use plan of funds. Project outsourcing procurement management is mainly to conduct integrated management of the whole process of the procurement unit, procurement process and procurement contract, provide related contract information support for contract expenditure application, and provide accurate and reliable data support for statistical analysis of project outsourcing procurement.

5. Conclusion

The digital management platform of scientific research is not only a tool upgrade, but also a catalyst for the transformation of scientific research paradigm. Through data integration and intelligent analysis, it promotes the transformation of scientific research activities from "experience-driven" to "data-driven", and helps to improve the efficiency of scientific research and optimize the allocation of resources. The platform constructs a standardized and standardized management system, supports interdisciplinary and interdisciplinary collaborative innovation, accelerates the transformation of scientific research achievements, and serves the national innovation strategy and global scientific and technological competition. In the future, with the deep integration of AI, blockchain and other technologies, the platform will achieve more powerful data analysis, prediction and security capabilities, further release its value in scientific research management, become the core engine to promote scientific and technological innovation and industrial upgrading, and inject new impetus into global scientific and technological competition.

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