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Design of Smart Financial System for Digital Campus in Higher Education Institutions

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Abstract. Financial management in universities is an important functional area that concerns the interests of teachers and the development of the school. This article designs and implements a smart financial system under the digital campus framework to address the problems of the current financial reimbursement system, such as multiple funding approval processes, information asymmetry, and delayed communication between approvers and reimbursement personnel. Firstly, this article analyzes the characteristics and drawbacks of current financial management, and based on the existing financial management drawbacks, sorts out the overall framework process of financial reimbursement in the entire university. Then, in the online communication stage, the database design in the automatic question and answer based on question matching and the ES engine setting and document paragraph storage format design in the paragraph positioning stage are completed. Finally, a hardware platform is built to complete the design of some links in the system, and the efficiency of this article in the question and answer stage is verified through comparison. The, Prove the feasibility of the overall plan presented in this article.

Keywords: smart finance, database, semantic matching model, BiLSTM

1 Introduction

In recent years, concepts such as smart campus, smart city, and smart country have been proposed both domestically and internationally, prompting universities and vocational colleges to conduct more in-depth research on the planning and construction of smart campuses. Various universities have continuously strengthened the overall infrastructure platform to upgrade towards the direction of smart digital campus construction, striving to achieve information integration and sharing among various majors on the platform. In terms of hardware, with the rapid development of sensor, RFLD, M2M communication, Internet+, Internet of Things, cloud computing and other technologies, colleges and universities attach great importance to promoting the construction of infrastructure that provides greater storage space, faster processing capacity, and more flexibility and intelligence for the convenience and intelligence of life. The development, construction and application of various information systems have achieved fruitful results, giving full play to the advantages of digital technology in the development of college education, and bringing great convenience to teachers' office work, students' study and life on campus [1].

Financial reimbursement is a daily job that every teacher cannot avoid. Due to the strict and serious financial management, the constantly expanding scale of universities, and the complex sources and expenditures of university funds, the workload of university financial personnel continues to increase, with long approval cycles. At the same time, problems such as slow financial reimbursement approval, high refund rates, and inconvenient financial file queries in the expense reimbursement process are becoming increasingly apparent, resulting in some teachers or reimbursement personnel repeatedly modifying and submitting reimbursement procedures, seriously reducing reimbursement efficiency [2].

The construction of a digital campus can effectively compensate for the problems of poor communication channels and high communication costs in the financial reimbursement process, providing a channel for information sharing to a certain extent. However, there are still some practical problems in the current construction of a

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digital campus. The initial construction plan lacked sufficient theoretical basis, insufficient research and feasibility analysis of domestic and foreign information construction, and a lack of close and forward-looking predictions combined with school planning. As a result, some universities have built digital campus platforms that lack relevance and become information islands [3].

In terms of financial management in universities, especially in terms of financial reimbursement, there are the following situations:

1) Financial consultation is not smooth. Reimbursement personnel usually use office software for online consultation when facing reimbursement issues, but due to limited office hours and too many inquiries per day, the consultation is not smooth enough.

2) Unclear understanding of professional terminology, some reimbursement personnel have low reimbursement frequency, are not familiar with the reimbursement process, and often do not fully understand the professional terminology that appears during the reimbursement process.

3) The reimbursement process is cumbersome

The reimbursement items are numerous and complex, so there are often situations where documents are returned due to errors in filling in the appointment form content, lack of reimbursement materials, unprinted electronic invoices, and lack of leadership approval. And when these documents are rejected, they still need to go through the approval and submission process again, which not only increases the workload of reimbursement personnel and financial personnel, but also raises questions about whether the approval personnel have repeated reimbursements.

In response to the above issues, this article is based on the construction of a digital campus and aims to manage financial information in universities. Especially under the reform of the "two-level management" model in various universities, in the face of a large number of horizontal issues in fund management and payment, the following work has been done:

1) Firstly, the characteristics of the existing financial system in universities were analyzed, and how the financial system should match the development of universities in horizontal projects was summarized, providing direction for the overall system design process of this article;

2) We have completed the design of an automatic reimbursement system for horizontal projects, which includes functions such as automatic verification of invoices, automatic downward flow of business approval processes, and automatic response to reimbursement issues. At the same time, we have enriched the dataset and designed the core module of automatic Q&A in terms of automatic response;

3) We have completed the preliminary design of the system, the relevant design steps of the system login interface, and verified the effectiveness of the proposed method, as well as the effectiveness of the dataset and model through experiments.

2 Related Work

Under the domestic audit system, the financial reimbursement system adheres to strict and serious principles, and the overall audit and review process is very cumbersome. In order to improve reimbursement efficiency, relevant personnel have achieved rich research results in related fields.

Xuemei Lv proposed an automatic financial reimbursement review system for large public hospitals to address the issue of poor universality of traditional financial reimbursement systems. In terms of hardware design, FPGA chips are used as the core processor to support the implementation of audit functions and encryption algorithms; In terms of software design, automated mechanisms are used to review the completeness and accuracy of different financial reimbursement application businesses, and encryption algorithms are designed to provide security guarantees. Meanwhile, through actual operation, the feasibility of the system has been proven [4].

Xinsheng Fang from Yanbian University has developed an optimization model for the online appointment reimbursement system of universities based on Petri networks to address the queuing problem. The basic process of the system has been modeled and analyzed, and an overall model for online appointment reimbursement has been established based on the actual situation and the basic behavioral profile relationships between activities. The overall model has been optimized through analysis of the overall model. Finally, the feasibility of the proposed reimbursement system in addressing reimbursement efficiency and data security was verified through practice, providing a new approach for this article [5].

Jing Cai, based on the actual financial management situation, established a university financial management and decision-making sample database. The reservoir sampling algorithm was used to uniformly extract university financial management and decision-making samples. Then, the decision tree algorithm was used to define the sample training set as the root node and divide it into different types of subsets. MBDT was used to optimize the decision tree, effectively improving the classification accuracy of the decision tree and providing information gain rates for each data sample. Thus, a financial early warning model was established that can realize the informatization of financial management in universities. Experimental simulations have shown that the proposed improved decision tree algorithm has high prediction accuracy and significant application value in the construction of financial management decision-making systems in universities [6].

Zicong Huang designed an intelligent financial system based on OCR and big language model. This system is suitable for mobile devices, starting with financial management functions and aiming to simplify management operations. It mainly implements OCR recognition, scanning, and accounting functions, supplemented by functions such as big language model financial analysis, big data consumption classification trends, and multi version version switching suitable for different age groups. This system not only greatly improves the efficiency of people's bookkeeping, but also promotes the intelligent financial transformation of society [7].

Xianchao Guo has achieved the goal of integrated management of scientific research funds by deeply integrating the scientific research management system with the financial system, in response to the problem of cumbersome financial reimbursement processes for scientific research personnel caused by the separation of scientific research projects and funding management, as well as the lack of data sharing between scientific research systems and financial systems in universities. Through the implementation of this project, the full process control of scientific research project funding management has been achieved, including budget preparation, bank payments, fund claims, fund receipt, fund disbursement, budget changes, and financial expenditures. This has reduced the need for research personnel to provide relevant proof materials in the financial reimbursement of scientific research project funds, minimized unnecessary approval processes, simplified the financial reimbursement process, promoted the "one-stop" service model for universities, and improved the efficiency of scientific research management [8].

Based on the above research results, the composition of this article is as follows: Chapter 2 mainly introduces some existing research successes, summarizes the current situation of financial construction and digital campus construction in various universities. Chapter 3 sorts out the characteristics of university finance and constructs the overall framework of the intelligent financial system to be established in this article. Chapter 4 completes the design work of the intelligent financial system in the digital campus. Chapter 5 mainly verifies and displays the experimental results to prove the rationality of the method proposed in this article.

3 Analysis of Financial Management Characteristics and Current Situation

The construction plan of high-level higher vocational schools and majors with Chinese characteristics (referred to as the "Double High Plan") refers to the major decision-making construction project of the Central Committee of the CPC and the State Council of the People's Republic of China to build a number of world-class higher vocational schools and backbone majors (clusters) that lead reform, support development, Chinese characteristics, and is also an important decision to promote the modernization of China's education, known as the "Double First Class Higher Vocational Education". The "Double High Plan" aims to create a highland for cultivating technical and skilled talents and a platform for innovative technical and skilled services; Leading vocational education to serve the national strategy, integrating into regional development, and promoting industrial upgrading [9].

On January 24, 2019, the State Council issued the "Implementation Plan for National Vocational Education Reform", proposing to launch the implementation of the plan for the construction of high-level higher vocational schools and majors with Chinese characteristics, which will be jointly studied, formulated and implemented by the Ministry of Education and the Ministry of Finance, and the "Double High Plan" will be officially launched; In order to cope with the construction of high-level universities, the number of horizontal projects and the amount of funds received for horizontal projects are all indicators for assessment and acceptance.

The funding for horizontal scientific research projects in vocational colleges mostly comes from social enterprises and some government commissions, which mainly include scientific research projects in the form of technology development, consulting and services, and achievement transformation. The purpose of establishing horizontal scientific research projects is generally simple and clear, mainly to achieve win-win development through

technological cooperation between university personnel and enterprises and institutions, which is conducive to promoting technological innovation and the transformation of industry university research achievements. Many application-oriented universities apply scientific research results to social and economic development, which also serves the function of serving the local economy. Compared to vertical funding, horizontal research projects are funded through the signing of contracts, so the amount of horizontal research funding is uncertain, and there is more autonomy in the use of funds and more flexibility in management. As a result, there is a significant increase in the workload of financial reimbursement and audit in universities [10]. Therefore, based on the analysis of the existing financial management system, we should improve financial reimbursement and management methods, enhance financial management efficiency, and at the same time, clarify the improvement direction of financial management within vocational colleges:

1) Transforming management concepts

The financial management concept of "double high schools" needs to gradually evolve from the previous focus on "income and expenditure" to a more comprehensive financial management function, including budgeting, fundraising, accounting, control, feedback, and performance evaluation, in order to meet the needs of internal management system reform in schools. Each secondary college should broaden its horizons and draw on the experience of building high-level vocational colleges in China, in order to change its financial management philosophy. With the goal of refined management, the college is granted certain financial autonomy and authority under the two-level financial management system of the school and college. At the same time, based on the scope of responsibilities of the school and college, the scope of expenditure for school and college level funds is clarified. The participation of secondary colleges in the school's financial management system can make the financial management system more decentralized, flexible, and focused on the important factors of grassroots needs, providing more targeted and sustainable financial support for the "dual high" construction. The participation of secondary colleges makes financial management more decentralized, specific, and refined. Each secondary college has independent disciplinary characteristics and development needs [11].

2) Targeting refined management

Secondary colleges have been granted certain financial autonomy and authority, and the scope of expenditure for school and college level funds has been clarified based on their respective responsibilities. The participation of secondary colleges in the school's financial management system can make the financial management system more decentralized, flexible, and focused on the important factors of grassroots needs, providing more targeted and sustainable financial support for the "Double First Class" construction. There may be differences in demand and development speed between different colleges, and the financial management system needs to be adjusted and optimized at any time according to changes in the internal and external environment of the college. The participation of secondary colleges enables financial management to respond more quickly to the needs of each college, provide timely support, help the college better cope with internal and external challenges, and promote the sustainable development of the college. In addition, the participation of secondary colleges has also prompted financial management to pay more attention to grassroots needs and the interests of teachers and students. Through the decentralization of financial power, with the college as the foundation, the management focus of the school has shifted downwards, and the position of the college as the main body of education has been strengthened, encouraging the college to actively manage finances and expanding its autonomy. This reform measure not only helps to improve the level of financial fine management in universities, but also stimulates the enthusiasm of colleges and helps to better meet the needs of education and research [12].

3) Characteristics of horizontal project funding management

With the establishment of assessment indicators for horizontal research projects, the acquisition, use, and settlement management of research funds for horizontal projects are carried out through the entire lifecycle of research projects, as shown in Fig. 1. In the project initiation stage, the key to scientific research fund management is to prepare the budget according to the project research plan, determine the project initiation, obtain scientific research funds, and during the project implementation stage, scientific research funds need to be reasonably arranged according to the budget plan, scientific research plan, and relevant national financial and economic systems; During the project completion and acceptance stage, relevant departments conduct a final review of the expenditure details, and after approval, prepare a final settlement report. The project acceptance is completed and the funds are transferred [13].

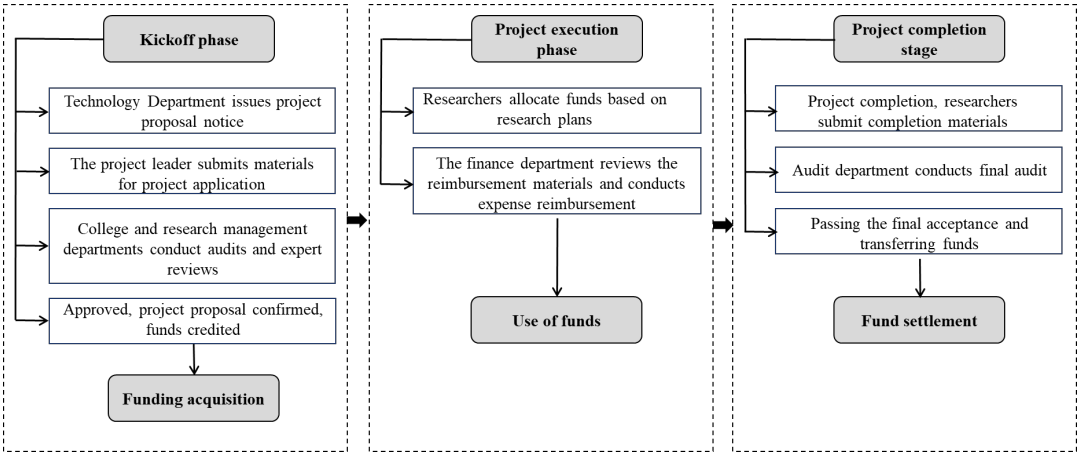

Fig. 1. Project funding management process

During the project execution phase, horizontal project funds are mainly used to carry out scientific research activities. The scope of project fund expenditures includes equipment costs, material costs, travel expenses, conference expenses, labor costs, expert consulting fees, school management fees, performance expenditures, and other actual expenditures that comply with relevant regulations. Under the condition that the total project budget remains unchanged, the project leader can independently adjust the budget during the project implementation process according to the needs of scientific research activities, without being limited by budget subjects and proportions. The adjustment of the project budget must be signed by the project leader and reported to the finance department for adjustment [14]. The specific reimbursement process for horizontal project funds is as follows:

1) The reimbursement handler first collects, organizes, and pastes the original invoices, payment records, product details, and other documents in a standard format on a paste sheet as required. Then, they log in to the reimbursement system, determine the reasons for reimbursement, number of attachments, amount, payment information, contract, and other reimbursement contents. They fill out, submit, and print the online reimbursement documents, and paste them together with the organized original invoices.

2) After organizing, the person in charge shall sign and confirm, and submit it to the project leader, centralized management department and other leaders for approval and signature. For example, when purchasing fixed assets, after approval by the project leader, it is necessary to register the asset entry information and handle the asset entry procedures at the asset management office; If the reimbursement amount exceeds the general standard, a purchase contract must be signed with the supplier, and an economic contract audit opinion letter must be issued by the audit department.

3) After all approvals are approved, the reimbursement agent will submit the paper reimbursement documents and various attachments to the school's finance department for initial review.

4) According to the submission time of the documents, they will be reviewed in order to verify whether the documents are fully approved, whether the business is authentic, whether the invoice and face information are standardized and accurate, whether the bill pasting meets the requirements, whether a contract needs to be attached and audited, and other multiple contents. If there are unqualified documents, contact the reimbursement agent to return the documents. The agent will modify the documents or continue to provide information as required, and work in a loop until the materials meet the reimbursement requirements.

5) After verification, reimbursement will be made. In the process of expense reimbursement, from application, approval, attachment organization, financial review, to final payment, it involves a wide range of scientific research projects and various business types. Although there are differences in specific reimbursement requirements for different business types, the overall reimbursement process is basically the same, as shown in Fig. 2.

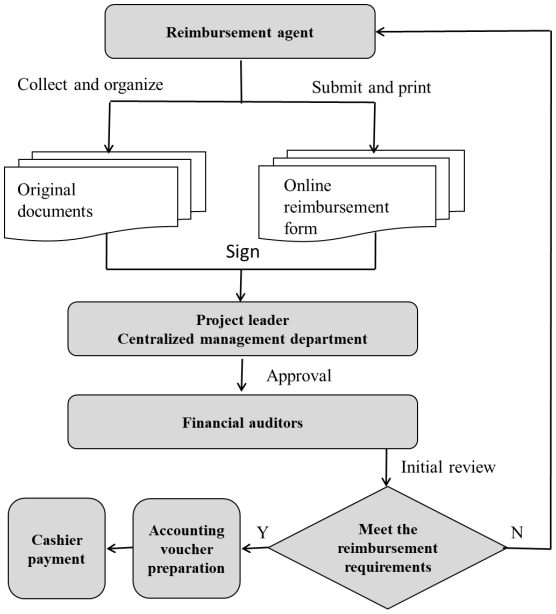

Fig. 2. Project funding reimbursement process

Fig. 3 shows the flowchart of the project completion stage. At the end of the project, the project leader compares the various tasks in the project proposal and prepares a project completion report. The finance department should cooperate with the project leader to provide authentic and complete financial information for review. The project leader must complete the final acceptance of the project and settle the account.

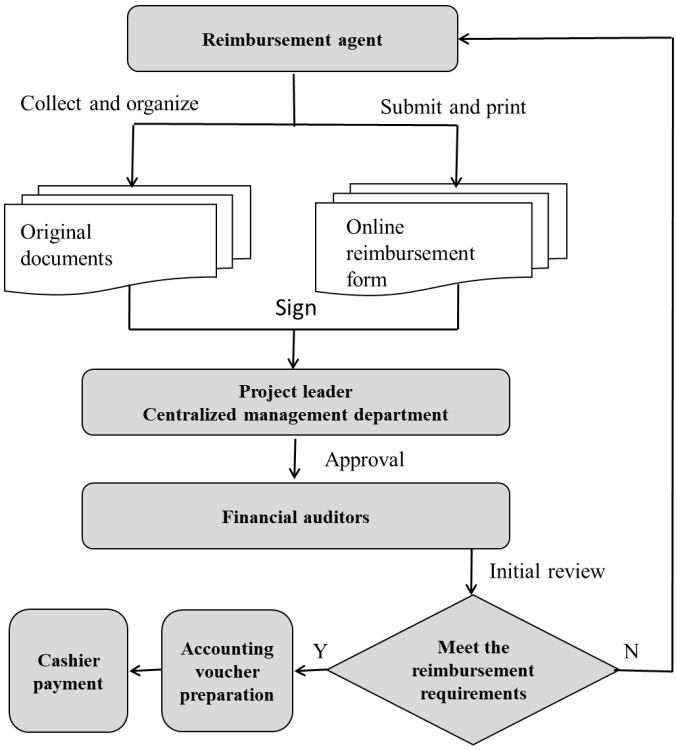

Fig. 3. Schematic diagram of project completion process

Based on the above analysis, a standardized and scientific approval process is a consistent process for all universities. Therefore, based on the above process, this article designs an automatic approval and response system for horizontal project funding reimbursement in universities managed by secondary colleges to improve the efficiency of funding reimbursement.

4 Design of Financial Management System

After analyzing the characteristics of financial management of scientific research funds in Chapter 3, the overall design scheme of the financial reimbursement system established in this article is as follows:

1) Automatic verification of invoices, the horizontal project funding reimbursement process mainly includes: initiating the reimbursement process, department leader approval, supervisory institute leader approval, document reception, financial review, payment and other nodes. Electronic invoices can automatically batch OCR recognize and verify invoices in the form of electronic invoice attachments, automatically recognize and verify the authenticity of invoices, and verify the accuracy of invoice header and tax number issuance [15].

2) Business approval process automatically descending

Add online approval function to the expense reimbursement process, which can automatically enter the next process node after each process node is submitted, and return to the corresponding process node after the process is rejected at a certain process node. The relevant processing of the process does not need to be separated from the process and solved using other tools [16].

3) Automatic response to reimbursement issues

Based on the relevant process of reimbursement for horizontal project funds in universities, the overall process design for implementing the question answering function is presented. Then, the database design in the automatic question answering based on question matching and the ES engine settings and document paragraph storage format in the paragraph positioning stage are highlighted [17].

The overall framework of the system is shown in Fig. 4.

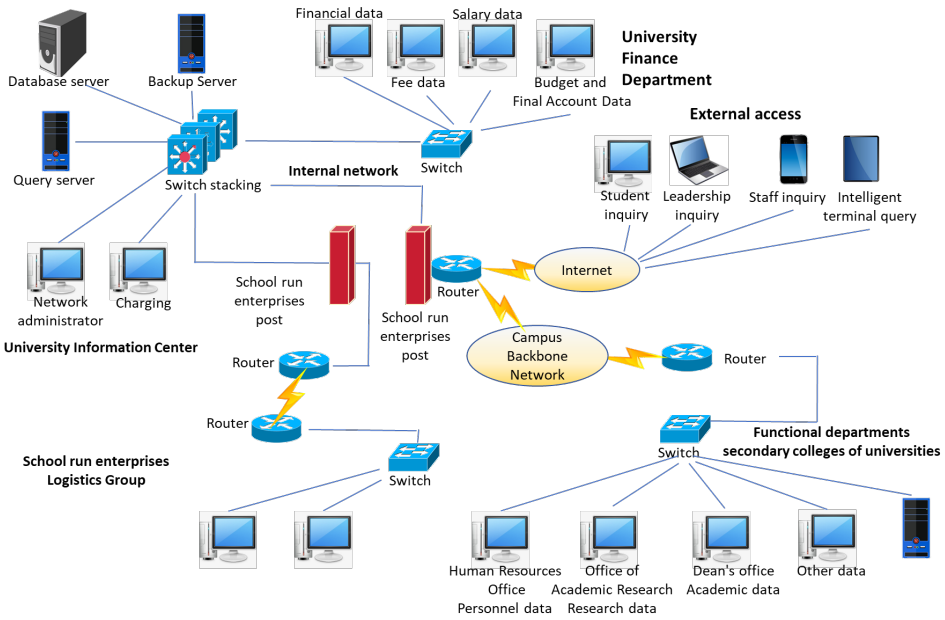

Fig. 4. Overall design scheme for smart financial system

Database design is the process of abstracting entities based on requirement analysis, summarizing their various attributes, and mainly designing the backend database in detail based on specific business data tables. Different users have various needs for databases in different environments. A high-quality storage model, power-

ful processing mechanism, and efficient overall database architecture are the basic properties that a well-designed database needs to meet. Programmers need to allocate the resources of the entire database reasonably during the development process.

4.1 Implementation of Login System

In the entire system design process, the personal information module mainly includes login, registration, and the display of personal information after user login based on user permission determination [18].

The key code for logging into the system is as follows:

```
  public String getAllUser (HttpServletRequest request, Model model) {
  System.out.println("login action");
  User user = new User();
  user.setPassword(password);
  user.setUsername(username);
  User loginUser = userService.login(user);
  If (null!= loginUser){
  System.out.println(" id is:"+ user.getId());
  model.addAttribute("username", loginUser.getUsername()); return "/loginsuccess";
}
  return "/loginfail";}
  @RequestMapping("viewJsp/register.action")
  public String register (HttpServletRequest request, Model model) {
  System.out.println("register action");
  User user = new User();
  user.setUsername(name);
  user.setPassword(password);
  int number=userService.addUser(user);
  if(number>=0){
  System.out.println(" id is:"+user.getId());
  return "/registersuccess";
  }
  else{
  return "/registerfail";//spring mvc.xml}
```

The user layer is the top-level of the system, which divides the system users into ordinary users, project leaders, department heads, accounting departments, and funding departments. The portal layer is the most basic part that users can see, providing basic functions such as reimbursement, review, verification, and authentication. Once again, for the business support layer, it mainly refers to the services provided by the entire system, including basic services such as unified authentication, online reimbursement, and online auditing.

4.2 Database Design

Using the SQL Server 2019 R2 Version database, based on the system requirements analysis and the design of the school reimbursement system [19], an E-R diagram of the database can be drawn, as shown in Fig. 5.

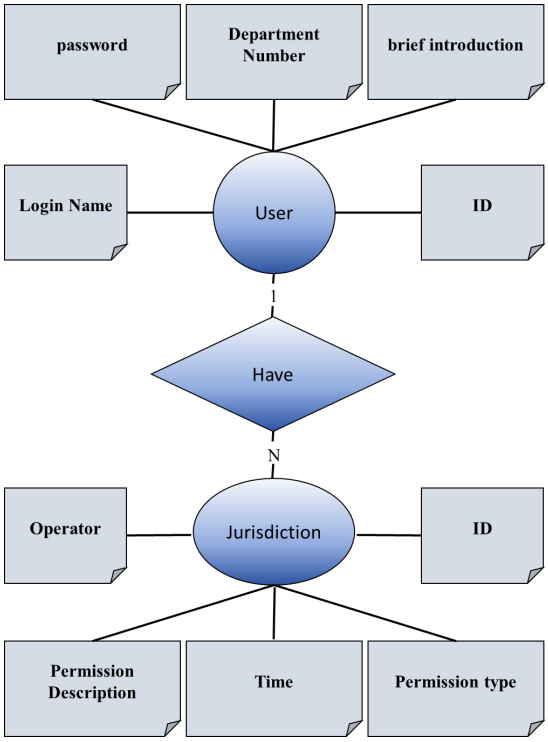

Fig. 5. Database system design

4.3 Character Control Design

The system is divided into several objects, including users (ordinary reimbursement recipients, project leaders, responsible leaders, accounting department, finance department), roles (permission control), system administrators, etc. User usually refers to the person who needs to use the system, and the role is the set of permissions that the default user in the system has. The system administrator is the user who manages the system, users, and user permissions, and is a default role that comes with the system. Among them, users also have certain roles, or in other words, users belong to certain roles; System administrators belong to a special type of user and do not require role based permission control. Administrators manage their supervisors, responsible persons, and other users. Their specific relationship is shown in Fig. 6.

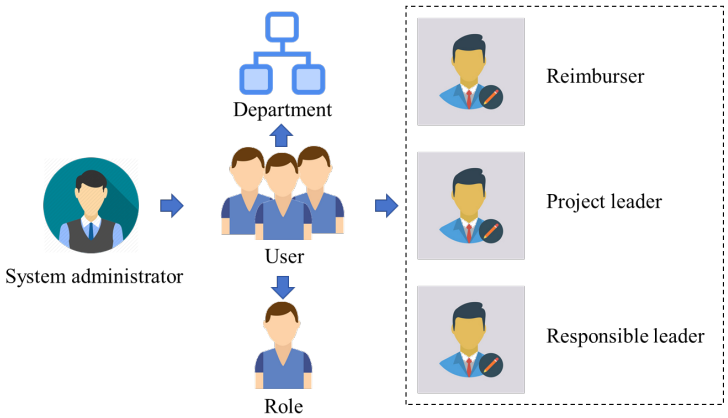

Fig. 6. Role relationship diagram

The schematic diagram of the system audit status is shown in Fig. 7.

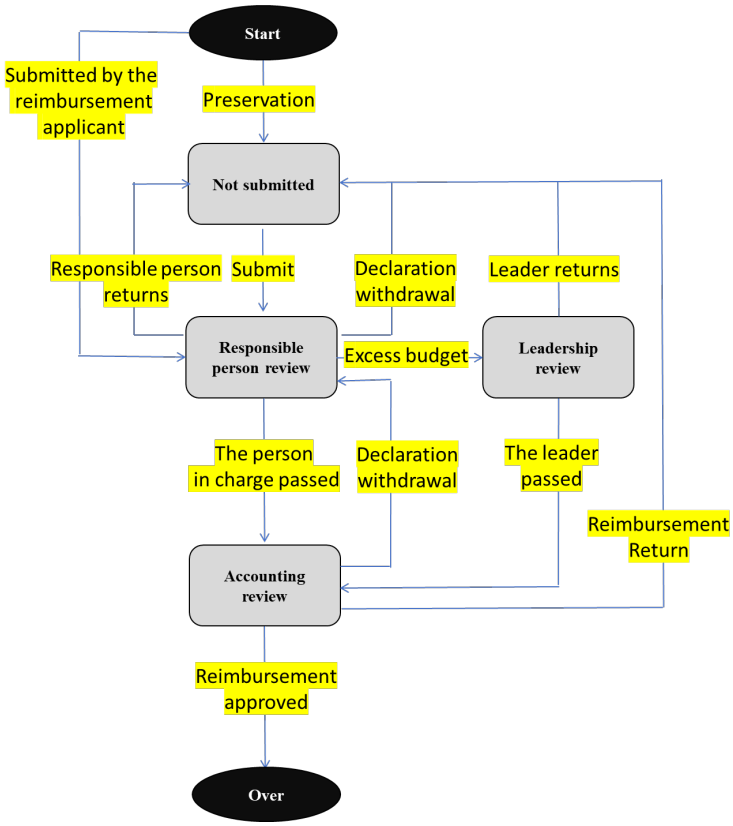

Fig. 7. System audit status diagram

4.4 Automatic Downward Design of Approval Process

Based on the prior design of the logical and physical structure of the financial approval workflow database, the entire financial approval process requires an instance process to run. The definition of the overall workflow of financial approval is actually the establishment of necessary information for process initiation, which includes event names, initiation times, process definitions, node permissions, etc. The instantiated process mainly executes the process definition based on a token object. In the instantiated process, the token stores token information such as version number, process initiator, start time, end time, node establishment time, parent node, child node, etc. All of the above information will be stored in the database. By saving and calling the above information in the database, the workflow engine can mobilize process instances and track any process throughout the process [20]. Therefore, the working mode of the financial automatic approval workflow engine is to manage the process by scheduling the process tokens. The database table structure diagram of the process instance is shown in Fig. 8.

1) Process Instance Table (JBPM_SROCESSENTINCE): This table is used to store specific process instance related information during process runtime. (ID number, VERSION represents version number, STARTTIME represents start time, ENDTIME represents end time, etc.), PROCESS represents Definition, ROOT TOKEN represents Token, SUPERPROCESS TOKEN represents Super Process Token;

2) Information Table (JBPM_MESSAGE): This table stores asynchronous information about each process and its related processes when creating a node. (ID number, CLASS represents category, DESTIATION represents termination node, EXCEPTION represents exception information, ISSUSPENDED represents blockage identifier, TOKEN represents token number, TEXT represents remark text, ACTION represents action list, SIDE represents node list, TRANSITIONNAME represents run conversion list), TASKINSTANCE represents task instance;

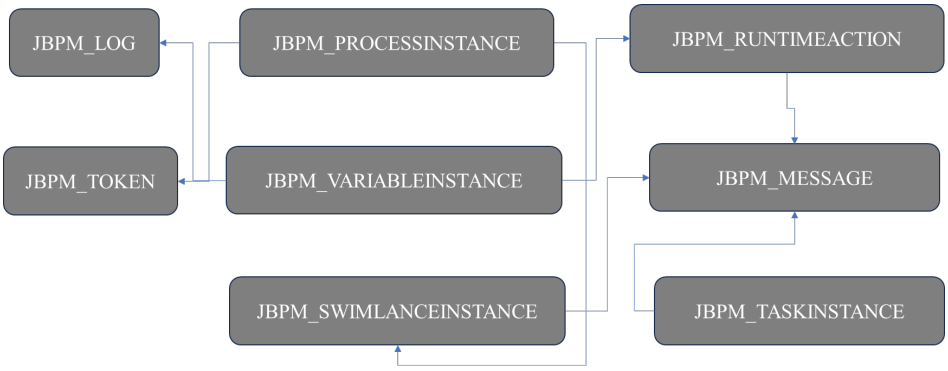

Fig. 8. Database table structure diagram

3) Token Table (JBPM_TOKEN): This table is used to store the status information of tokens at the current location during the flow of process instances. (ID number, VERSION represents version information, NAME represents name, STARTTIME represents start time, ENDTIME represents end time, NODEENTERTIME represents entry time into the node, NEXTLOGINDEX represents log pointer, NODE represents node number, PROCESS represents instance number, and PARANT represents parent token, SUBPROCESS ENTINCE represents sub process instance, ISSUSPENDED represents blockage identifier);

4) Task Instance Table (JBPM_TASKINSTANCE): Stores task instance information during process runtime. (ID number, CLASS represents category, NAME represents name, DESCRIPTION represents description, ACTORID represents execution action number, CREATTIME represents creation time, STARTTIMNE represents start time, ENDTIME represents end time, PRIORITYU represents priority, ISCANCELLED represents cancellation flag, ISSUSPENDED represents blockage flag), ISOPEN represents open identifier, ISSIGNALLING represents signature identifier, TASK represents task number, TOKEN represents token number, SWINLANENSTANCE represents lane instance, TASKMGMTINCE represents task management instance);

5) Lane Instance Table (JBPM_SWIMLANCEINSTANCE): Stores lane instance information during the runtime of process instances. (ID number, NAME represents name, ACTORID represents execution action ID, SWINLANE represents lane number, TASKMGMINSTANCE represents task management instance number);

6) Log Table (JBPM_LOG): Stores execution related information and processing result information during the process execution. (ID number, CLASS represents category, DATE represents date, TOKEN represents token number, EXCEPTION represents exception information, NOTE represents node information, ACTION represents action information, TRANSACTION represents conversion information, etc.), VARIABLEINSTANCE represents variable instance information, TASKINSTANCE represents task instance information, TASKATORID represents task action number, SWINLANENSTANCE represents lane instance number, OLDVALUE represents log value pointer, NEWVALUE represents current log value pointer, PART represents parent log, CHILD represents child log, log entry time, LEAVETIME represents log writing end time);

7) Variable instance table (JBPM_VARIABLEINSTANCE): Stores variable information at runtime. (ID number, CLASS category, NAME represents name, TOKEN represents token, TOKENVARIABLEMAP represents token execution diagram, PROCESS STANCE represents process instance, VALUE represents variable value, TASKINSTANCE represents task instance);

8) Runtime Action Table (JBPM-RUNTIMEACTION): Stores information related to runtime actions. (ID number, VERSION represents version number, EVENT represents event type, TYPE represents run type, PROCESS STANCE represents process instance, ACTION represents execution action, PROCESS STANCENDEX represents process index.

4.5 Design of Automatic Q&A System for Reimbursement Issues

This article focuses on professional issues in financial reimbursement and possible reimbursement keywords, and designs an automatic question answering function to achieve the efficiency of professional guidance in the reimbursement process and improve the efficiency of the reimbursement process. The Chinese semantic matching model BiLSTM [21], which integrates word level and sentence level interactive features, is used in the knowl-

edge base question answering stage based on semantic matching in university financial question answering. The purpose of Q&A is to provide professional guidance in reimbursement, avoid communication barriers during the reimbursement process, and improve reimbursement efficiency. The automatic Q&A system introduces deep learning, so it needs to match relevant datasets for training. In terms of datasets, it draws on financial system datasets, the model framework is shown in Fig. 9.

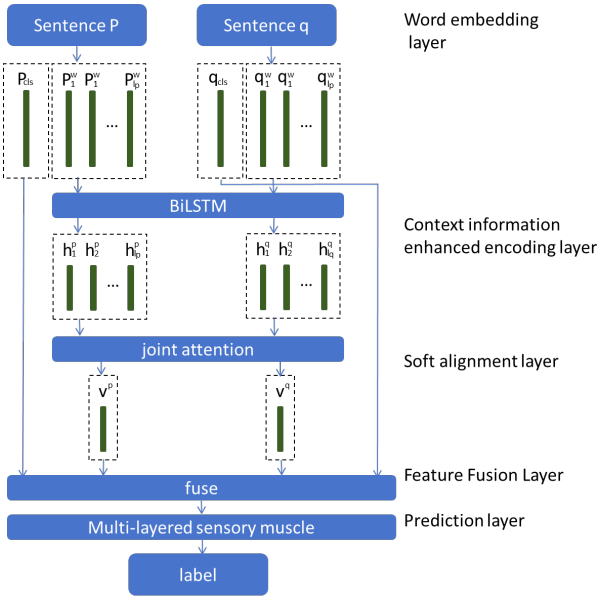

Fig. 9. Model framework diagram

Input Chinese sentences into the pre trained model and obtain sentence embeddings and character embeddings from the last hidden layer. The word level vector of a sentence is represented as:

$$V^w = \left(v_1^w, v_2^w, \cdots v_{nv}^w\right) \tag{1}$$

v_i^w is the vector representation of the i -th word in a sentence. Using the same method, obtain the word vector of another sentence, which is represented by T:

$$T^w = \left(v_1^w, v_2^w, \cdots, v_{nt}^w\right) \tag{2}$$

nv and nt respectively represent the number of words in different sentences, so each word vector in the sentence is represented as:

$$v_i^w = \frac{1}{nv}\sum_{k=1}^{nv_i} v_k^m \tag{3}$$

$$t_j^w = \frac{1}{nt}\sum_{k=1}^{nt_j} t_k^m \tag{4}$$

Then use a soft alignment layer to extract the association information of sentence (V, T), including the interaction relationships between words and between words and sentences. The size of the attention score matrix is rep-

resented as $nv \times nt$. The matrix is filled with zeros and fixed in shape as 30×30. After transformation, the attention matrix is represented as follows:

$$A_{mat} = \tanh\left(S_{mat}^{v} \cdot S_{mat}^{t} L_1\right) L_2 \tag{5}$$

$S_{mat}^{v} \cdot S_{mat}^{t}$ represents the attention score matrix, and the Softmax function is used to obtain the weight matrix for the attention score matrix. Then, another sentence is weighted and summed in sequence to obtain the correlation information between sentences, as shown below:

$$R^{v'} = \left(r_1^{v'}, r_2^{v'}, \cdots, r_{nv}^{v'}\right) \tag{6}$$

$$R^{t'} = \left(r_1^{t'}, r_2^{t'}, \cdots, r_{nt}^{t'}\right) \tag{7}$$

In the formula, $r_i^{v'}$ represents the correlation between the i-th word of sentence V and sentence T, and $r_j^{t'}$ represents the correlation between the j words of sentence T and sentence V. The representation method is as follows:

$$r_i^{v'} = \sum_{j=1}^{nt} \frac{\exp\left(A_{mat,ij}\right)}{\sum_{x=1}^{nt} \exp\left(A_{mat,ix}\right)} r_j^{t} \tag{8}$$

$$r_i^{t'} = \sum_{i=1}^{nv} \frac{\exp\left(A_{mat,ij}\right)}{\sum_{x=1}^{nv} \exp\left(A_{mat,jx}\right)} r_i^{v} \tag{9}$$

The prediction layer uses a three-layer feedforward neural network as a classifier to predict the matching labels of input sentence pairs. The activation function of the first two layers is ReLu, and the activation function of the last layer is Softmax. The overall sentence recognition principle is shown in Fig. 10.

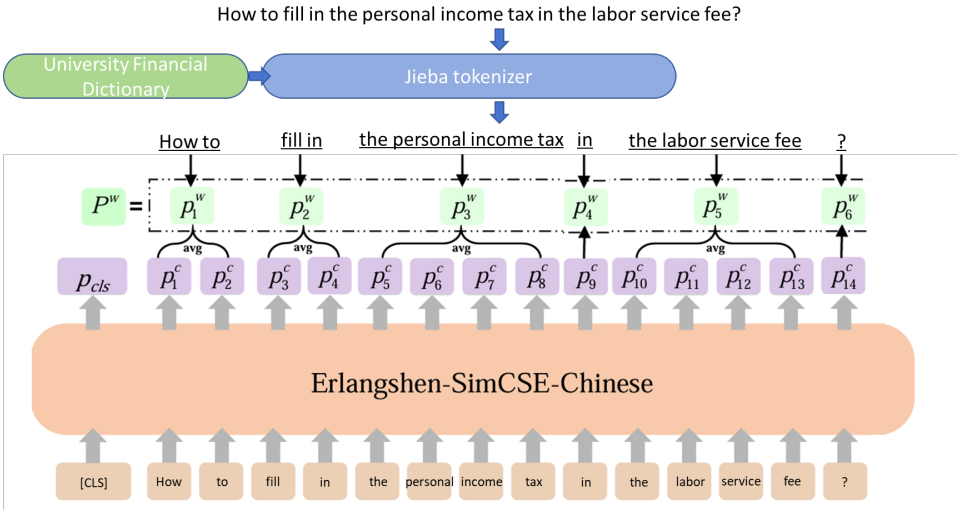

Fig. 10. Schematic diagram of sentence recognition model

This section mainly provides a reasonable design scheme for the automatic downward flow of the financial approval system approval process. At the same time, a technical framework design is carried out for the automatic Q&A process in the financial system. From the overall structure perspective, the financial system designed in this section can greatly improve the efficiency of financial reimbursement in universities, completing a reasonable design in the overall framework.

5 Experimental Result

This section completed the design of the system login interface through experiments. In order to highlight the superiority of the recognition model in this article compared to other models, this experiment further demonstrates it through two specific examples.

The improved system underwent simulation experiments on the hardware system, and the system login interface is shown in Fig. 11.

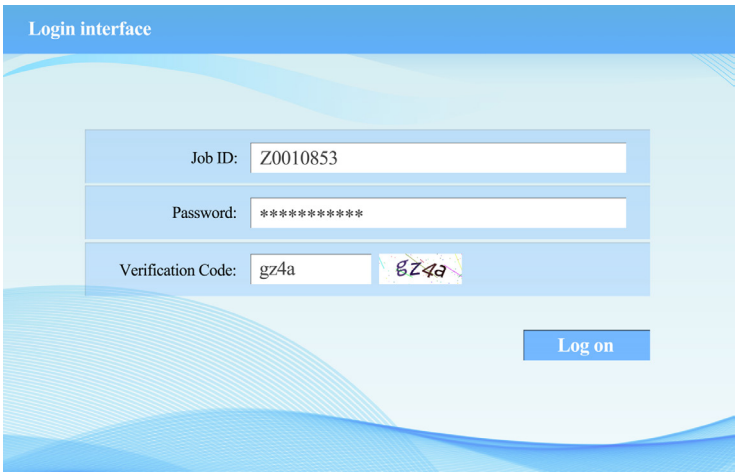

Fig. 11. Login interface design effect

During the reimbursement process, the specific task is to set the display of different reimbursement documents based on different reimbursement permissions and limit ranges. At the same time, it works in conjunction with the project management module, suitable for the subsequent process of the entire reimbursement document, including: checking the status of the reimbursement document, approving the reimbursement document by the leader, and the final approval work of the finance department. At the same time, after the expense approval is completed, it is required that all relevant information of the expense be entered into both the fund accounting system and the bank interface system. The implementation result is shown in Fig. 12.

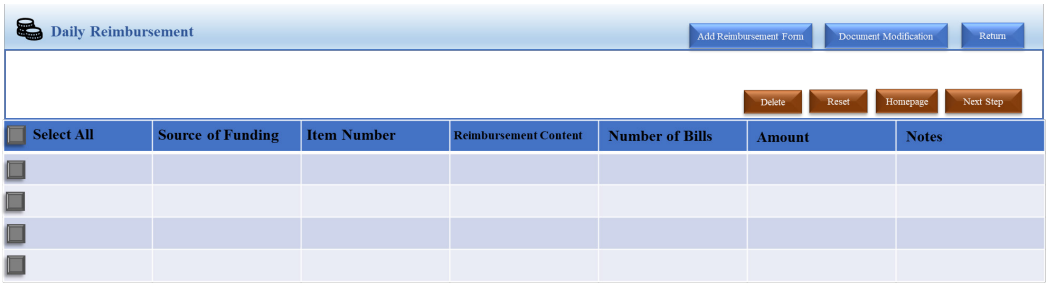

Fig. 12. Design results of reimbursement process interface

In the experiment on automatic reply language recognition, the dataset was randomly shuffled and divided into training and testing sets in a 4:1 ratio, using the dataset from the financial system. The word embedding layer obtains a word vector dimension of 587. In the context information enhanced encoding layer, the number of units for the recognition model BiLSTM is set to 200, the dropout rate during training is set to 0.3, the optimizer selects Adam, the initial learning rate is 0.0001, and the loss function is the cross entropy loss function. The experimental process was implemented using Python language and PyTorch deep learning library. The hardware devices used included an Intel Core i9-12900K processor, 32 GB of memory, and NVIDIA GeForce RTX 4060 GPU graphics card. In order to compare the accuracy of the algorithm proposed in this article in identifying reimbursement issues during the reimbursement process, the performance of the improved algorithm and the compared model in language recognition are shown in Fig. 13:

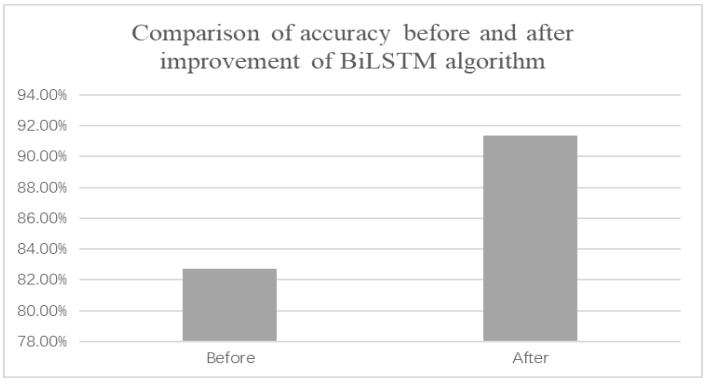

Fig. 13. Comparison of algorithm recognition effects

In order to highlight the superiority of the recognition model in this article compared to other models, this experiment further demonstrates it through two specific examples. Table 1 lists the prediction results of each model for two sets of samples, where "T → P" represents "true label → predicted label". (P1: "How should I fill in the personal income tax in the labor fee?"), The common intention of both sentences is to inquire about the details of expense reimbursement. However, sentence P1 contains an additional clause 'May I ask', which does not provide substantial assistance in expressing the actual intention. In the prediction results of each model, only Er EAR is correct, indicating that the model proposed in this chapter has the ability to reduce the influence of irrelevant statements. In the sentence pair (P2: "What is the highest cost for external evaluation experts?"), the main keyword is the evaluation expert fee, which has different reimbursement standards in university financial regulations and is determined based on the expert's professional title. Only Er Eir and Roberta obtained accurate prediction results, indicating that Er Eir can capture and distinguish semantic information of keywords in sentence pairs. The above experimental results and analysis indicate that the model proposed in this chapter can deeply understand the data features of semantic matching datasets for financial issues in universities, and can identify the similarities and differences within sentences.

Table 1. Comparison results of model prediction examples

Sentence	Model	$T \rightarrow P$
P1: "How should I fill in the personal income tax in the labor fee?"	Roberta	1-0
	BERT-Cosing	0-1
	BiLSTM	1-1
P2: "What is the highest cost for external evaluation experts?"	Roberta	0-1
	BERT-Cosing	1-0
	BiLSTM	1-1

This section validates the feasibility of the system designed in this article, and finally implements real scenario verification in the design of the login interface, automatic approval process descent, and intelligent Q&A section of financial automatic approval. The effectiveness and feasibility of the proposed method are demonstrated through experiments, and the design results of the relevant interface are provided.

6 Conclusion

This article studies the path of smart finance construction in the university where I work, proposes the requirements for smart finance construction based on the current situation of our university's financial work, explores the path of smart finance construction in our university, and proposes corresponding safeguard measures. This article first briefly describes the path of smart finance, the construction of smart finance in universities, and the smart finance platform in universities. It summarizes that the path of smart finance construction includes optimizing top-level design, improving and integrating business finance systems, analyzing and reengineering key processes, and building a smart finance platform. Then, from the key business processes related to horizontal project reimbursement in our university, to the optimization of reimbursement processes and AI assisted Q&A processes, it is analyzed that the construction of smart finance in our university is aimed at solving the problems of unclear job settings, unclear key processes, and lack of integration between business and finance in the finance department. Secondly, based on the actual situation of vocational colleges, the steps for the construction of smart finance have been determined. The first step is to optimize the top-level design, the second step is to redesign the business process, the third step is to couple the business finance system, and the fourth step is to build a smart finance platform to complete the construction of smart finance in vocational colleges. The design of relevant functional links has been completed, and technical improvement plans have been proposed.

Meanwhile, in the specific design process, the construction of digital campuses and smart financial systems is a long-term process, and different practical results may arise during the longer construction process, requiring continuous adjustment and improvement of implementation methods. Due to my academic ability and professional knowledge, there are still some areas of incomplete consideration and room for improvement in this article, including but not limited to the following three parts:

1) This article is only in the research stage for the smart finance construction work of the school where I work. In addition, there is currently no unified conclusion on the reference literature research of smart finance construction at home and abroad, and most of them are at the theoretical level, with few case studies to refer to. Therefore, the research in this article may not be in-depth enough.

2) The path of smart finance construction in universities studied in this article includes coupling business finance systems and building smart finance platforms, mainly focusing on internal construction and integration. We have not yet considered collaboration with external business departments and systems such as taxation, banking, and finance, nor have we considered expanding the scope of data collection and extensive data transmission.

3) As I have always considered issues from a financial perspective. The school is currently promoting the assessment of funding for horizontal projects, and the process of initiating and concluding horizontal projects has strong professional attributes. How to design a more convenient and suitable financial reimbursement system for professional teachers is also a question that I should consider. However, due to weak professional thinking, when proposing the construction needs of smart finance in universities, professional business factors may not be fully considered. In the process of building smart finance, there may also be some practical difficulties in business aspects that have not been fully mentioned. On the other hand, this article only explores business enabled financial data, so further research direction is to explore the characteristics of the existing horizontal project management and reimbursement data in our school from the perspective of big data and artificial intelligence, and provide financial guidance for other teachers in project application and project completion.

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