Information Management Based Marketing Technology Project Management System

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Abstract. Facing the new situation of science and technology innovation development, it is necessary to improve the service capacity of dynamic management, progress tracking and scientific evaluation of scientific and technological projects, and to realize the display and monitoring of the whole process of marketing science and technology project management. In this paper, a marketing science and technology project management system is designed, which modularizes the functions required for project management services according to the whole life cycle of the project, and adds a security module on the basis of which the security of project data can be effectively maintained. This system can effectively improve the efficiency and quality of project management while taking into account the confidentiality of the project data, which is in line with the needs of more management personnel, and is also in line with the current strategic requirements of high-quality development. It also meets the requirements of the current strategy of high-quality development.

Keywords: science and technology project management; full project life cycle; management module; security module.

1   Introduction

At present, under the impetus of economic development, the development scale of enterprises is expanding, and the types as well as the number of scientific and technological projects are also increasing, the traditional scientific and technological project management mode has been unable to meet the needs of the development of enterprise scientific and technological projects at the present stage, therefore, it is necessary to combine with the market economic environment as well as the development needs of the enterprise, the scientific and technological project management system to carry out innovation and application [1]. However, some of the current science and technology managers due to the survival and development of enterprises and the lack of funds, to a certain extent, ignored the improvement of science and technology management, which requires these science and technology enterprises to change the management concept, pay attention to the enterprise's science and technology project management

and set up a sense of crisis, and to seek for new development in the changes brought about by the new scientific and technological revolution [2].

Existing scientific research management tools and management tools can not meet the new development form of science and technology project management more and more high requirements, in the project management process will appear a variety of problems, such as: lack of organizational structure; scientific and technological projects in various forms, management complexity; the lack of process management; acceptance of the management requirements are not clear and so on. A perfect science and technology project management system can help science and technology project managers to further manage scientific research projects, but also to a certain extent to improve the efficiency of work to promote the benign cycle of modern science and technology-based enterprises [3].

In this paper, starting from the existing problems and contradictions of the management system, considering the higher and higher management demands under the current new development situation and the new functions that may be needed by the management personnel, a science and technology project management system based on the management module of the whole life cycle of the project is designed, which fully takes into account the functions needed by the management and adds a security module to maintain the security of the project data, which effectively improves the efficiency and quality of the project management compared with the existing management system, and at the same time, takes into account the confidentiality of the project data, which can better serve the management of the science and technology project.

2 Project Management Module Functionality Build

Science and technology project management system function construction should not only consider a stable, two accurate, three management services; four test, five files, six assessment of the project management characteristics, but also to solve the current contradictions in the project management process, but also combined with some of the realities of the project management process.

2.1 Project Classification Process Management Function

Projects are divided into different project levels, project confidentiality, project categories according to different sources, different sub-units have different management requirements, while different levels of administrative units and enterprises and institutions have their own management process, the project based on their own characteristics, there is a set of project management process; at the same time, the state and enterprises and institutions on different projects, there are special project management rules and regulations, which leads to carry out Project management, the first thing to sort out the different management processes and different management regulations applicable to the project category situation. Establishment of optional, generic project management process modules. For different project requirements, quickly carry out the

selection of different process modules and process adjustment to make it have a wider range of generality.

2.2   Full Life Cycle Institutionalized Management Function

The full life cycle management of the project is from the whole process of the project, emphasizing the systematic and global nature of the project, using the full life cycle theory for science and technology project management [4], the general project life cycle is shown in Fig.1, divided into several phases of project planning, project declaration, contract management, progress management, acceptance management, archiving management, and project evaluation. It is necessary to combine the process management and project life cycle in project management, and the workflow of enterprises and institutions, and at the same time to quantify the management regulations, the relevant subsidiary documents, supporting materials and management processes. For the management process in the existence of special circumstances, in a separate addition to the description and proof or approval of the function of the material.
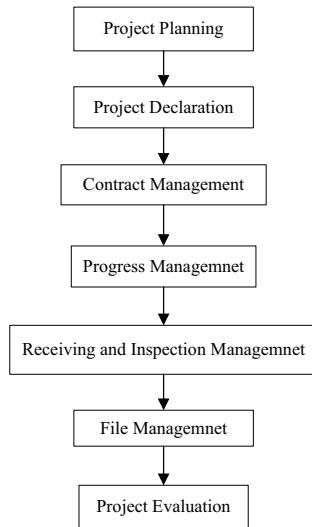

Fig. 1. Project Life Cycle

2.3   Task Assignment and Template Customization Functionality at all Levels of the Project

Since many research projects require multiple collaborations, or consist of different team collaborations within the unit, project task assignment functions at all levels are required to refine the management. For different task levels, customized project management templates need to be created for automatic combination of textual materials and automatic generation of project reports at all levels.

2.4 Timed Automatic Management Function

In order to reduce the management workload, it is possible to set up the timed reminder checking and automatic distribution function, emergency reminder function, etc. in the system according to the progress planning and requirements at different stages, so as to allow the system to automatically carry out progress reminder and progress management of the collaborative units according to the time nodes and to reduce the workload.

2.5 Hierarchical Collaborative Management Function

According to the management authority of different levels of the project, set up the hierarchical management function of each participating unit of the project, so that the project participants can effectively participate in the project management process, which can not only reduce the pressure of the management personnel, but also improve the efficiency and professionalism of project management.

2.6 Project Online Coordination Function

In the process of project implementation, there are bound to be a lot of problems that need to be coordinated, the establishment of online problem coordination function, put forward the problem and the problem solution, determine the responsible unit and responsible person, cooperate with the unit and the cooperator, the time point, the adjustment and allocation of tasks, the adjustment of funds and other issues, in the system automatically record, automatically form the minutes of the meeting. At the same time, projects requiring changes in personnel, tasks and funding, synchronized in the coordination function module for application and record filing, which can not only improve management efficiency, but also can be traced back to the later process.

2.7 Background Data Statistics and Analysis Functions

Establish backstage data statistics and analysis functions, statistics on various sub-topics, integration into topic data and project data, as well as system-wide project data, and at the same time, establish a mathematical model of risk assessment indicators based on the indicators, so as to provide technical support for the risk assessment of topics and projects.

2.8 Risk Assessment Function

In the process of project process management, various risk problems are very easy to appear in the three phases of project planning, progress management and project acceptance, and it is necessary to establish different risk assessment models based on the requirements of key indicators in different phases, such as technical indicator warning, financial indicator warning, time plan warning, completion warning and so on. In a nutshell, it mainly includes time plan risk assessment, task achievement risk assessment, financial utilization risk assessment, technical indicator risk assessment model,

researchers' credit risk identification and assessment, and approval risk assessment. Approval risk assessment has a very important impact on management efficiency, project management process can not avoid the need for a variety of authority to approve, which leads to a more troublesome problem in the project management process will often occur, that is, the time of the approval process in all phases of the project management nodes in contradiction with the approval process. Approval of the leadership is more consideration of the approval of risk issues, but in most conditions on the specific professional content of the project does not understand, resulting in insufficient risk assessment, in the consideration of the process there will be other things interfering with a lot of time will be wasted, the project management staff is not good to urge, resulting in frequent delays in the problem. Therefore, in each project management process stage should be based on the existing artificial intelligence means, the establishment of compliance matching identification capability model, assisting the approval staff to quickly assess the risk of each stage of the project, for completely risk-free approval can let the system automatically approved. Combining process control and risk control at all stages can improve project management efficiency and reduce project management risks.

2.9   Safety Function

In order to ensure the integrity and reliability of the information system, the system will need to establish a set of multilevel security control model, set the access range of all the access subjects and access objects in the system, and set an access rule in accordance with these access ranges, so that whenever a subject needs to access an object, the system will be compared in accordance with the established access rules to see whether the two constitute an accessible relationship [5]. The main users of the security management module are the system administrator and the permission managers of each department. The system administrator is responsible for the allocation of the overall rights and assigns the rights to the departmental administrators, and the departmental administrators assign the rights they have to the departmental users, therefore, the security management module has the functions of both management and security information query.

The management functions of the security module include the following two aspects: management of data object classification - including classification management of ODS data objects, classification management of DDS data objects, and initial classification management of applications[6]. Using object level management - i.e. all the personnel role information of the provincial marketing department and the highest level that can be viewed. Front-end managers can set the initial level attributes according to the requirements of data level management. For data users, depending on their roles, each user has a suggested maximum level of authority.

The security information query function of the security management module will provide system administrators with detailed reference information when authorizing applications. This information includes: the user's role and its highest level, the application's initial level, the application's direct data source information (name, level, etc.), the application's contained business information and its level, the application design document connection and its data conversion information.

3   Module Composition and Design

Based on the functional requirements analysis, combined with the project management process and project life cycle, design the project collaborative planning module, the project schedule management and risk assessment module, the project business management module, the project assessment module and the security management module.

3.1   Project Collaborative Planning Module

The project collaborative planning module, as shown in Fig.2, firstly carries out demand analysis, clarifies the source and purpose of demand, then carries out market analysis and market positioning, and analyzes the current state of technology or products, predicts the development trend, and reduces the possibility of the occurrence of erroneous development routes, based on which, it carries out technological and economic analyses, clarifies the technological program and financial budget, and forms the project planning report.
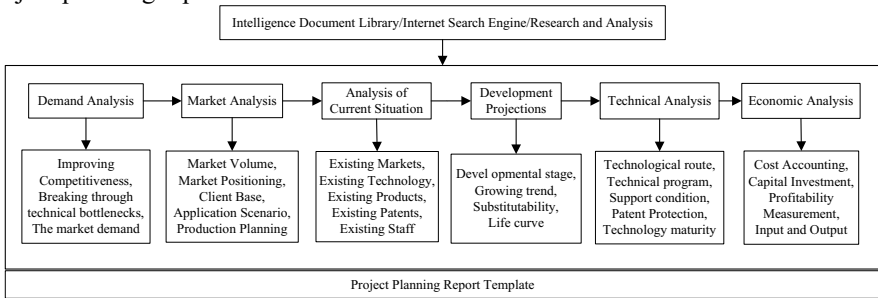

Fig. 2. Project collaborative planning module

3.2   Project Process Management Basic Module

In the project life cycle, the processes of project declaration, contract management, progress management, acceptance management, archiving management, and project evaluation uniformly need to go through from the sub-topic reporting team to the topic reporting team to the task reporting team, and finally summarized to the project reporting team. And each management team is divided into the general director, the person in charge and the participants[7]. Therefore, the design of the basic management module of the project management process, based on this module, and then connected to the subsequent corresponding modules to form an overall complete management process, which can better realize the management of the whole process, improve efficiency, but also to facilitate the subsequent improvement of the system. The basic module of project process management is shown in Fig.3.
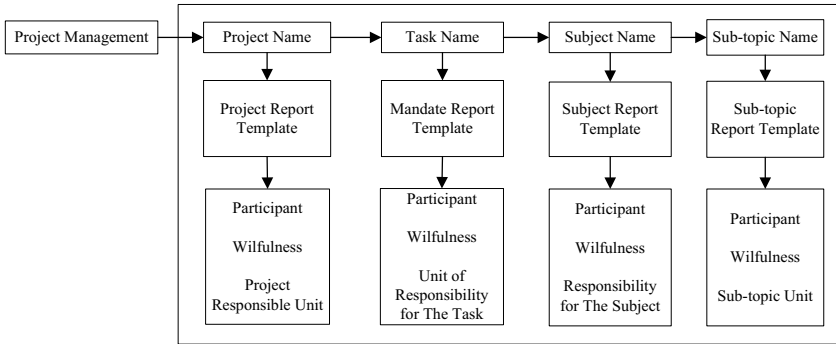
Fig. 3. The basic module of project process management

3.3   Project Operations Management Module

After completing the planning report, project declaration and contract management are required. Through the project collaborative declaration and contract management module, you can convene advantageous collaborative units to make collaborative declarations, and at the same time sign a project contract after the successful establishment of the project. In this module, you can define the research objectives and research contents, refine the research technology scheme, carry out financial accounting, define the indicators and time nodes for acceptance, and plan in advance the relevant documents and materials required for project acceptance. Contract management after the signing of the contract, clear project, task, subject responsible unit, as well as the responsible person and participants, their respective research objectives, research content, technical programs, subject indicators, funding budgets, time nodes and planning for the final archived documents, so that in the process of project implementation can be based on evidence[8]. In order to improve the overall management efficiency, preset timed automatic management function, according to the time node to urge the collaborative unit and the subject responsible person as soon as possible to complete the sub-topic template content, and automatically summarized into a project report. Project collaborative reporting and contract management module shown in Fig.7.
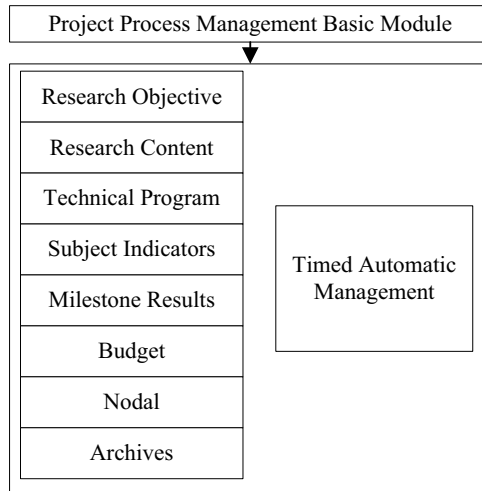
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┌─────────────────────────────────────────────┐
│         Project Process Management Basic Module        │
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Research Objective	
Research Content	
Technical Program	
Subject Indicators	Timed Automatic Management
Milestone Results	
Budget	
Nodal	
Archives	

Fig. 4. Project collaborative reporting and contract management module

3.4   Project Schedule Management and Risk Warning Module

In the process of project management, the longest cycle, the most difficult work and the largest workload is the project progress management, in order to solve the outstanding contradictions in the process of project management and real-time risk perception of the project, the design of the project progress management as shown in Fig. 4, decentralization of authority to take the collaborative management program so that the sub-topic responsible person to participate in project management. Equipped with timed management module, the system automatically reminds the responsible person of the project to improve the project progress regularly in the system, and the timed automatic management module is shown in Fig. 5. The system evaluates the risk of the project progress through the risk warning module and generates the early warning information, and the risk warning module is shown in Fig. 6. For the problems that need to be coordinated in the process of the project, the responsible person of the project can submit the specific problems and the coordinated program in the system by himself, and the system will send the risk warning information and the project coordination program to the responsible person of the project. The system sends the risk warning information and project coordination information to the project manager quickly, and the project manager analyzes the problem and then can carry out the coordination work of the project in time. This not only improves the quality and efficiency of project management, realizes real-time project risk perception, but also reduces the workload of managers.
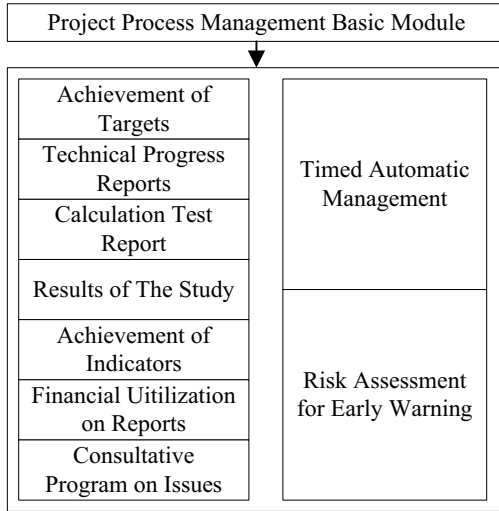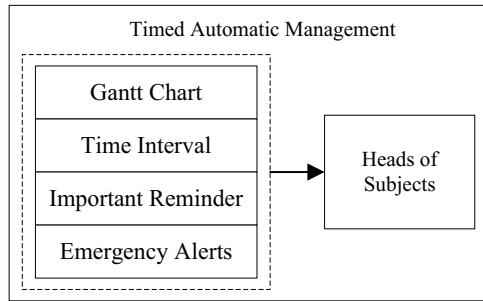
Project Process Management Basic Module

Achievement of Targets	Timed Automatic Management
Technical Progress Reports	
Calculation Test Report	
Results of The Study	
Achievement of Indicators	Risk Assessment for Early Warning
Financial Uitilization on Reports	
Consultative Program on Issues	

Fig. 5. Project schedule management module

Timed Automatic Management	
Gantt Chart	Heads of Subjects
Time Interval	
Important Reminder	
Emergency Alerts	

Fig. 6. Timed automatic management

Risk Assessment for Early Warning
Technical Warning
Financial Warning
Warning of Completion
Personnel Warning
Time Warning
Management Warning
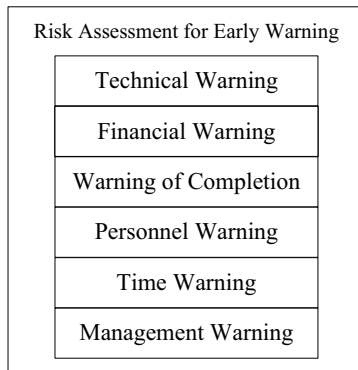
Fig. 7. Risk assessment for early warning

3.5   Project Acceptance and Archiving Management Module

After the completion of the project, a very important part is the project acceptance and archiving management. In order to reduce the workload of project management, the project acceptance and archiving management module is designed, as shown in Figure 8. Through this module, the responsible person of each sub-topic uploads the acceptance report, scientific and technical report, financial report, design report, results support materials, adjustments and application for approval materials, and defense and evaluation materials, etc., which are automatically synthesized into project acceptance materials to complete the project acceptance[9]. And in the process of archive management, the file acceptance needs the closing acceptance materials, process management documents and test calculation report documents, so as to carry out the problem tracing in the later stage of the project. Through the uploading of project archiving documents by the responsible person of each sub-topic, the module will automatically form archiving documents by unit and task, which greatly reduces the workload of project acceptance and archiving management.
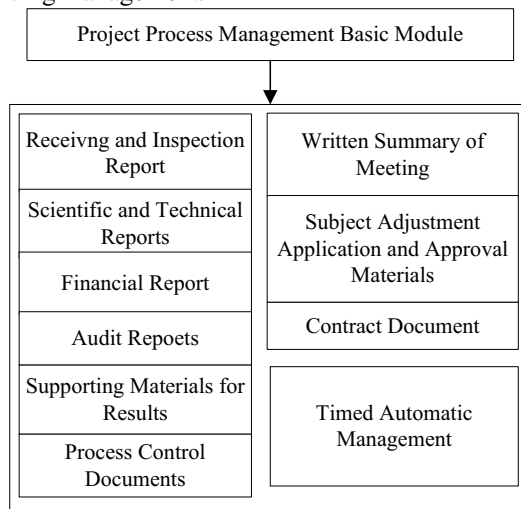

Fig. 8. Project acceptance and archiving management module

3.6   Project Evaluation Module

After the completion of the project, we have to conduct a comprehensive assessment of the implementation of the project, which requires the assessment of the project objectives, indicators, results, technical maturity, market and the ability of the collaborative team. The design of the project evaluation module is shown in Fig.9, based on the background data of the project acceptance materials, as well as the knowledge database and

Internet engine retrieval data, through the evaluation algorithm model, a comprehensive evaluation of the project is conducted, problems are identified, and support is provided for the further refinement and improvement of the project at a later stage.
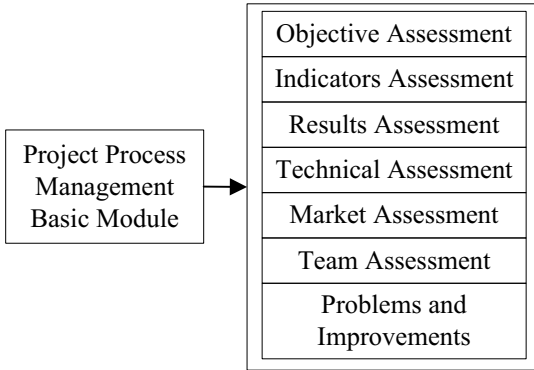

Fig. 9. Project evaluation module

3.7   Security Management Module

The security management module includes a meta-model support part and a security management application part. The meta-model support part, i.e., how to provide the data base of the application, mainly provides two types of data, namely, data relationship and security level definition, which are stored in the Summary-Model and EntSupportModel respectively. The application part of the security management includes the functions of query and management, i.e., basic object security management and derived object security query.

The security management module includes two parts: security level management and security level information query. The security level management includes user level management and data level management, which provides administrators with the maintenance of data level and the designation of the highest level for data users. The security level information query provides information about the security level of the application and the user who makes the permission request. User security management provides role setting for users and assigns the highest access level to users by assigning role attributes to them. Data security management, including security level setting for ODS, DDS, and applications. Users can select the system to be managed, then select the object to be managed and set the security level. Security classified information query, including the classified information of the application and the classified information of the requesting user[10]. The security level information of the application includes the initial security level of the application, application transfer information, and application-related data flow information. In addition, in order to support the security management application, the metadata repository must provide data objects, data relationships, classification definitions, and associations between classifications and data. The structure of the security management module is shown in Fig.10.
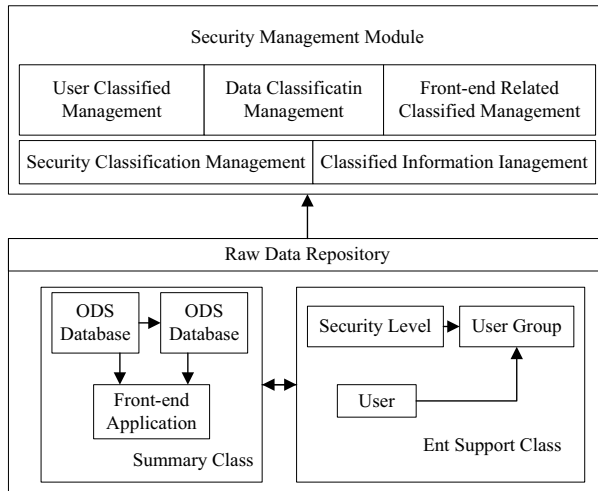
Fig. 10. Security management module

Based on the problems and characteristics of project management, the module design of project management system is carried out, and the practical application of some functions is carried out in the process of project management, which reduces the workload of project management. On this basis, an efficient project management system can be further developed, which can effectively reduce the workload of the project management personnel, improve the quality of management and the efficiency of management, and solve the contradictory problems existing in the process of existing project management.

4   Conclusions

In this paper, from the current characteristics of project management and the existing problems, it is proposed that a new type of scientific and technological project management system is constructed based on existing artificial intelligence, machine learning, knowledge reasoning technology and other means and the concept of the whole project lifecycle, analyzing the functional requirements required by the system and designing the composition of each module. The overall design of the project management system designed in this paper is superior to other management systems, especially in the structure and process design is more scientific and reasonable than other systems, which can further improve the efficiency of project management and the quality of project management, and better respond to the needs of management personnel, but the details of some of the processes have not been well considered, and need to be further improved in the future.

Acknowledgment

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