Marketing Service Management System for Science and Technology Innovation Projects Based on Full Life Cycle Management

Weiru Niu [a] *, Kai Wei [b], Hu Li[c]

*Corresponding Author: Weiru Niu Email: [a] 2443369702@qq.com, [b] 1472596401@qq.com, [c]1051266256@qq.com

Gansu Electric Power Company Marketing Division, GanSu, China

Abstract. With the continuous development of the times, the level of science and technology in China has improved significantly. Currently, the system system, process management and supporting support in the management of science and technology innovation projects in China cannot fully meet the management needs under the new situation. This paper designs a marketing service management system for science and technology innovation projects based on the whole life cycle management, optimises the project management system by designing corresponding modules according to the specific stages of the management process, and evaluates the project by designing a risk assessment model to improve the efficiency and quality of marketing project management, which is in line with the requirements of project managers for the management system, and also in line with the strategic requirements of the current high-quality development. The research content of this paper can provide new reference and ideas for the improvement of science and technology innovation project management in the future.

Keywords: Science, technology and innovation projects; Total Life Cycle Management; Project management module; assessment model;

1 Introduction

China attaches great importance to scientific and technological innovation and has always insisted on the implementation of the strategy of scientific and technological innovation-driven development; scientific and technological innovation is at the core of the overall situation of China's modernisation, which is related to the high-quality development of the economy and the enhancement of comprehensive national power. China's rapid rise to the status of the second largest economy, the level of science and technology from once running to parallel to lead, and in some areas opened up a new track. In recent years, it has even put science and technology innovation in an important position in the overall situation of national development strategy, and is committed to continuous innovation and research in science and technology projects[1].

Enterprises are the main body of China's scientific and technological innovation and scientific and technological investment, in recent years, the number of enterprise science and technology projects continue to rise, research funding increased year by year, science and technology project management has become the core content of enterprise management[2,3]. With the expansion of the development scale of enterprises, the business scope of broadening the types and number of

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science and technology projects are also increasing, the traditional science and technology project management model has been unable to meet the current stage of the development of enterprise science and technology projects, therefore, the need to combine the market economic environment as well as the needs of the development of enterprises, the science and technology project management system to carry out innovation and application. In-depth research on science and technology management projects is conducive to the realisation of the full cycle of project management, and improve the efficiency of science and technology project management[4,5,6].

Scientific and technological project management is to take scientific and technological projects as objects, through the establishment of organisations specifically responsible for project management, adopt systematic management methods and means, carry out high-efficiency planned and organised professional guidance and precise control of scientific and technological projects, so as to achieve dynamic management of the whole process of the project and comprehensive coordination and optimization of project objectives, thus to meet the manager's needs and expectations of the project[7]. In science and technology project management research, many scholars in the direction of science and technology project management to carry out related research, but the current science and technology management methods and management tools have been unable to meet China's scientific and technological innovation system presents the complexity of the complexity of the changing, cross-fertilisation and other characteristics of the scientific and technological researchers are difficult to manage science and technology projects, which seriously affects the rate of the work items, resulting in the comprehensive development of scientific and technological innovation needs and scientific and technological project management co-ordination capabilities are insufficient[8]. The contradiction between the demand for comprehensive development of S&T innovation and the insufficient capacity of S&T project management has become more and more obvious[9].

This paper starts from the existing problems and contradictions of the management system, and considers the higher and higher management demands and new functions that the managers may need under the current new development situation. It builds a comprehensive scientific research project management system based on the whole life cycle management by monitoring the whole process from the establishment of project research, implementation and execution to acceptance and evaluation, performance evaluation and final archiving. It can effectively improve the efficiency and quality of project management and enable researchers to better manage scientific and technological projects[10].

2 Risk assessment of STI project establishment

There is an inherent high risk in innovation projects, and with limited enterprise resources, it is often necessary to assess project risks before a project is established, and to provide reference for decision makers' decisions by analysing the results of the assessment. Among them, the uncertainty factors affecting the success or failure of innovation projects of science and technology-based enterprises include eight major elements: team risk, product risk, market risk, technology risk, financial risk, management risk, production risk, and environmental risk. The assessment results are taken as the affiliation degree belonging to the low-risk project, so the larger the calculated affiliation degree is, the closer it is to the low-risk project[10].

2.1. A Risk Assessment Model for Innovative Projects Based on Fuzzy C-mean Clustering Algorithm

Clustering algorithm is widely used in risk identification, the principle of which is to use the clustering algorithm to divide the risk factor scores into n classifications based on the clustering features and as the result of risk assessment. The basic principle of the innovative project risk assessment model based on fuzzy C-mean clustering algorithm proposed in this paper is to obtain a reliable risk assessment result by calculating the affiliation degree between the current project and the low-risk/high-risk project through the model based on the reference to the extreme risk project scores of the historical projects. The specific steps are as follows:

- Take risk score data for multiple groups of low-risk projects and multiple groups of high-risk projects.
- The data in step (1) are operated separately using the fuzzy C-mean clustering algorithm to derive the risk score clustering centre for low-risk projectsV_{low} and risk-scoring clustering centres for high-risk projectsV_{high}.
- The indicator scores of the projects to be assessed are imported and equation is used to calculate the degree of affiliation of the scores of the projects to be assessed to the scores of the low-risk projects, which is the result of the risk assessment of the project.

$$\begin{cases} \frac{1}{(\frac{d_{low}}{d_{high}})^{\frac{2}{m-1}}+1} & d \neq 0, d_{high} \neq 0 \\ 0 & d_{high} = 0 \\ 1 & d_{low} = 0 \end{cases} \tag{1}$$

In equation (1), $d_{low}$and d_{high} are the Euclidean distances of the items to be assessed from the low-risk item assessment clustering centre v_{low} and the high-risk item assessment clustering centre v_{high} respectively:

$$d_{low} = \sqrt{\|x_n - v_{low}\|} = \sqrt{(x_n - v_{low})^T (x_n - v_{low})} \tag{2}$$

$$d_{high} = \sqrt{\|x_n - v_{high}\|} = \sqrt{(x_n - v_{high})^T (x_n - v_{high})} \tag{3}$$

The risk scores of the projects to be assessed are compared multidimensionally with the historical risk scores of low-risk projects to calculate their affiliation with low-risk projects. If the stronger the affiliation to the low-risk project, the more likely the project is to be a low-risk project; while if the weaker the affiliation to the low-risk project, the more likely the project is to be a high-risk project. Therefore, the innovative project risk assessment model based on the fuzzy C-mean clustering algorithm is more intuitive, and its results are based on the extreme risk project scores, which are more reliable and of practical value.

3 Full Life Cycle Management Process for Science and Technology Projects

The so-called project life cycle is simply the whole process from the beginning to the end of the project. Analysis of the project can be seen that it presents a one-time feature. For science and technology project management, if you want to make project management more effective, you should refine the project, and the results of each project phase should be included in the scope of inspection. As shown in Figure 1, the project life cycle can be divided into several stages: project planning, project declaration, contract management, progress management, acceptance management, archiving management, project evaluation. In order to ensure that the science and technology project can be carried out smoothly, it is necessary to make the introduction of technology, technological innovation and other practical. To combine the process management and project life cycle in project management, and the workflow of enterprises and institutions, while quantifying the management regulations, 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.

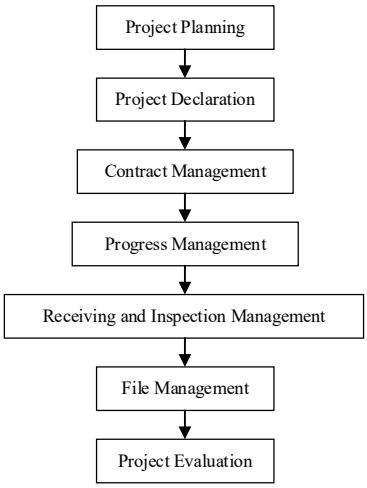

Fig. 1. Project Life Cycle.

3.1. Life-cycle science and technology project management measures

(1) Management of the project stage.First of all, the pre-field research should be strengthened. In order to ensure the successful completion of project decision-making, the management system and methods should be clarified to ensure that the pre-study work and the transformation of scientific and technological achievements are truly integrated and that each stage can be effectively controlled. We should give full play to the fundamental role of the pre-project guidelines and vigorously improve the effectiveness of project approval. Secondly, the project evaluation mechanism should be improved. It is necessary to find a suitable project assessment method to ensure that the relevant work can be more standardized, and to select and update the assessment method according to the actual needs to ensure that the assessment results are more accurate. When evaluating projects, it is necessary to conduct a comprehensive analysis of the market, technology,

society and other aspects to ensure that the principle of comprehensive evaluation and selection of the best among the best is truly implemented.

(2) Management of the implementation phase. Progress needs to be controlled. Effective monitoring is carried out from the actual situation of project implementation, and appropriate adjustments must be made if the progress falls behind. In the monitoring process, products, services, knowledge, etc. should be the focus of attention, and quality problems should be remedied immediately to ensure the successful completion of the programme standards. Finally, effectively monitor the allocation of funds. The segmented allocation model should be fully utilised to ensure that the operation and use of funds are effectively controlled.

(3) Management of the closing and acceptance phase.The management of time and acceptance should be strengthened, and the final acceptance should be completed within a set period of time, and if it is not possible to complete the project, an extension should be requested. It should be noted that if the project is not completed after the extension, the project should be terminated and the funds allocated to the project must be returned.

4 Module Composition and Design

According to the project life cycle management process, the design of management modules for each stage, clear management steps at each stage, subdivided management projects, to prevent the phenomenon of using a variety of systems to control the phenomenon of management in a rigid manner, mechanical uploading and downloading, the obsolete system is too much in the form of formalism, emphasis on the system, light on the implementation of the project, light on the management of the project, business processes are not standardised, the implementation of the implementation of the lack of uniform constraints on the standard.

4.1 Project planning module

The project planning module, as shown in Figure 2, firstly carries out demand analysis to clarify the source and purpose of demand, then carries out market analysis and market positioning, and analyses the current state of technology or products, as well as the forecast of development trends, so as to reduce the likelihood of the occurrence of erroneous development routes, and, on this basis, carries out technological and economic analyses, clarifies technological solutions and funding budgets, and finally carries out a risk assessment to form a project planning report.

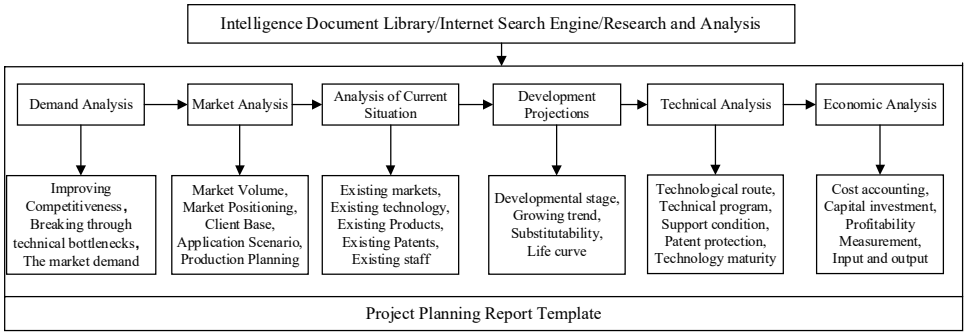

Fig. 2. Project planning module.

4.2 Project Declaration Template

After completing the planning module, as shown in Figure 3, project declaration is made for the science and technology project, and the project name, task name, subject name and sub-topic name are filled into the corresponding template, so as to achieve the purpose of clarifying the research objectives and research contents, refining the research technical programme and improving the declaration efficiency. At the same time, according to the time nodes recorded in the template, the coordinating unit and the person responsible for the subject can be urged to complete the content of the template as soon as possible.

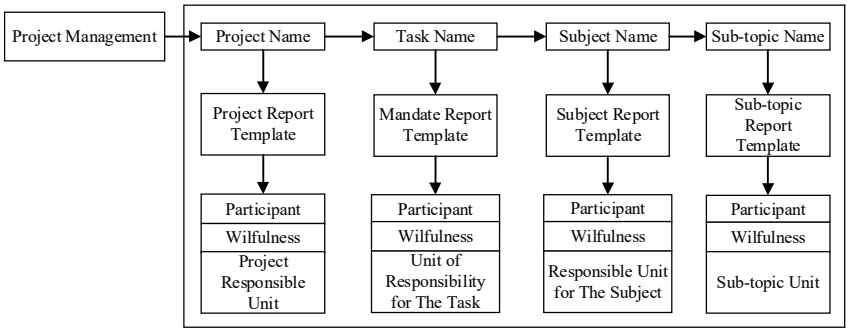

Fig. 3. Project Declaration Template.

4.3 Contract management module

Project established after the signing of the project contract, as shown in Figure 4, in the contract management module can be contract management, clear project, task, subject responsibility unit, as well as the responsible person and participant, their respective research objectives, research content, technical programmes, subject indicators, funding budgets, time nodes and planning for the final archived documents, so as to do in the process of project implementation can be based on evidence.

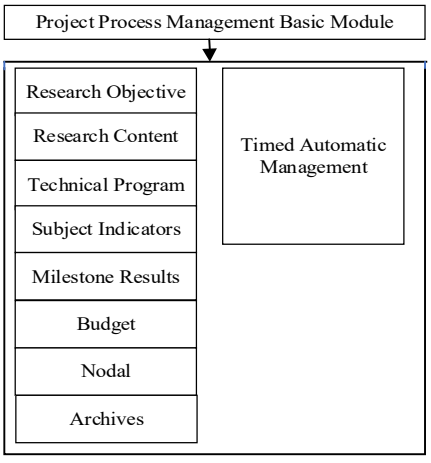

Fig. 4. Contract management module.

4.4 Progress management module

The design progress management module, as shown in Figure 5, manages the progress of the various types of work that have the longest cycle, the greatest work difficulty and the greatest workload in the project management process, tracks the completion of the project, and ensures that the project can be completed on time.

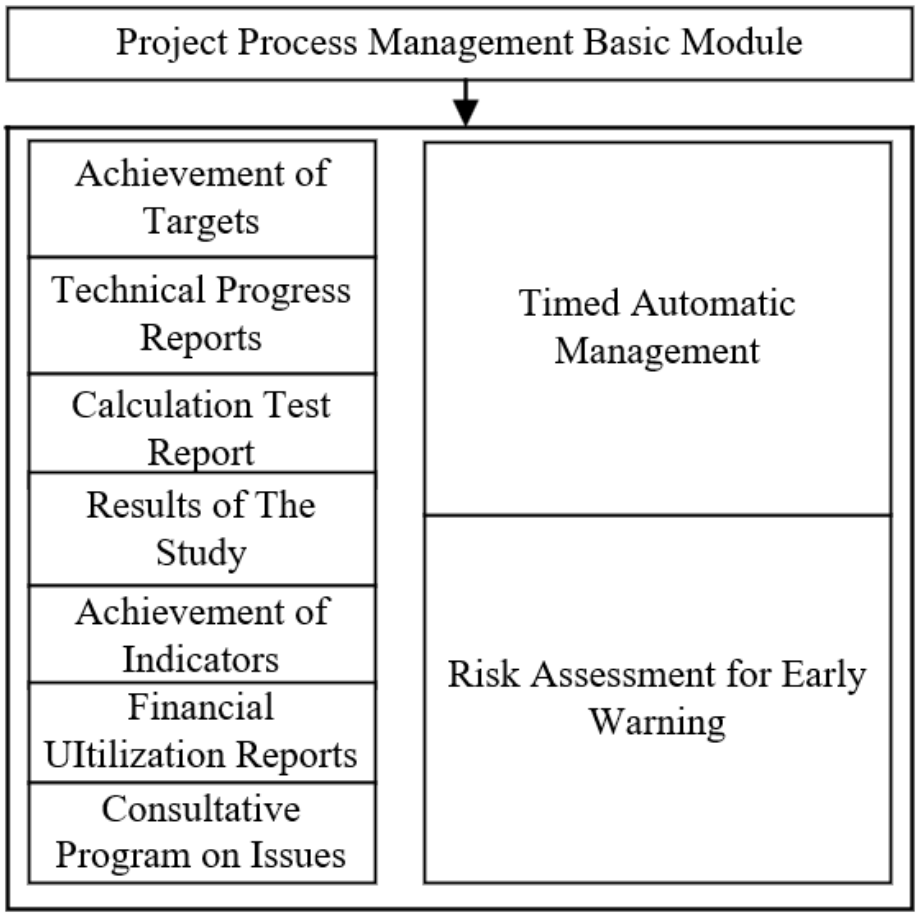

Fig. 5. Progress management module.

4.5 Receiving, Inspection and Archiving Module

After the project is completed, it enters the acceptance and archiving stage, as shown in Figure 6, in the acceptance stage, the person in charge of each unit uploads acceptance reports, scientific and technological reports, financial reports, design reports, results support materials, adjustments and applications for approval of materials and defence and evaluation materials, etc., based on the acceptance template, which is then integrated into the acceptance materials and then automatically formed into archived documents by unit and task, reducing the workload of project management.

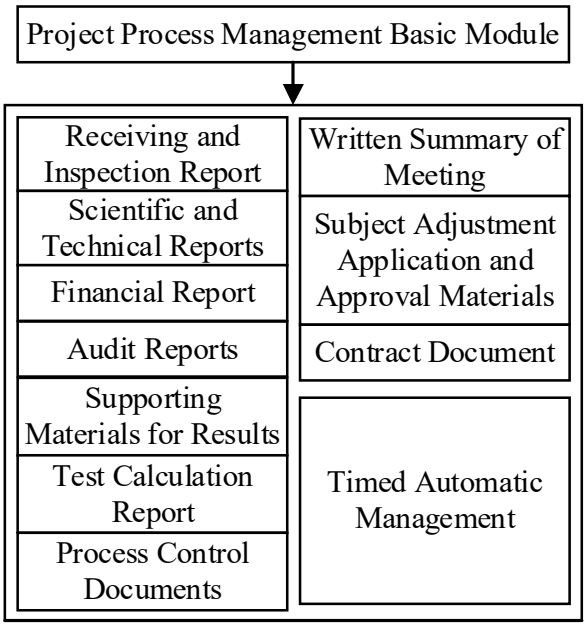

Fig. 6. Receiving, Inspection and Archiving Module.

4.6 Project evaluation module

After the completion of the project, it is necessary to carry out a comprehensive assessment of the completion of the project and the application of the effect of the project, involving the project objectives, indicators, results, technological maturity, the market and the ability of the collaborative team, etc., through the assessment of the algorithmic model to complete the evaluation of the project, the designed module is shown in Figure 7.

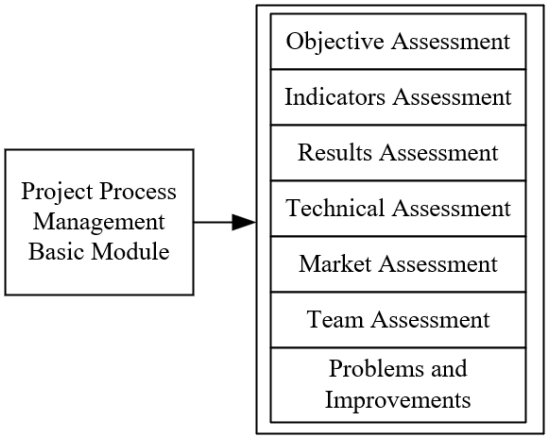

Fig. 7. Project evaluation module.

5 Conclusions

This paper is based on the whole life cycle of project management, according to the problems and characteristics of the project management process, the modular design of the project management system, in the process of project management based on the actual application of the design module function, in order to achieve the purpose of reducing the workload of project management. Since science and technology project management is a comprehensive work, it will encounter various problems in the process of management. Therefore, on the basis of the designed project management system for science and technology innovation, a more efficient project management system can be further developed according to the existing artificial intelligence, machine learning and knowledge reasoning technical means, which lays the foundation for improving the efficiency and quality of project management, and solving the problem of heavy workload of management personnel.

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