

Application Research of Mind Mapping in Aerospace Military Project Management

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Abstract: Mind mapping is an important graphic thinking tool at present, which can show the objective intuitively and has strong logicity. The rational application of mind map in aerospace military project management can also show strong value. This paper focuses on the effective application of mind map in aerospace military project management, which can be used for the future project management level.

1. Introduction

Aerospace military project management is an important link in aerospace science and technology innovation. Due to the long process from project approval, implementation to acceptance of aerospace and military projects, there are uncertainties in the research and development process, which brings difficulty to project management and control. At the same time, in the implementation process of aerospace and military projects, involving technology, indicators, funds, personnel and other factors, the whole process, comprehensive control of the project implementation process is particularly important [1]. At present, in the aerospace and military project management, the use of digital, text management, but the lack of visualization, structure and concise management. In this paper, combined with the practice of project management, using the theory of mind mapping, the exploration and practice of aerospace and military project management, aiming at using modern management tools to improve the efficiency of aerospace and military project management. [2]

2. Basic theory of mind mapping

2.1 Generate background and basic theory

Mind mapping was created by British scholar Tony Buzan in the 1970s. In general, mind mapping is a scientific exploration based on the way of thinking of the human brain [3]. It is characterized by the expression of radioactive thinking and conforms to the function and law of human thinking. It is an important tool and means to open the potential of the brain with graphics technology. Mind map is an effective mode of thinking [4]. It is a thinking "map" applied to memory, learning, thinking, etc., which is conducive to the expansion of the brain's diffuse thinking. At present, mind mapping has been widely used in the world. The Ministry of Education of Singapore has listed mind mapping as a compulsory subject in primary schools, and a large number

of Fortune 500 enterprises are also learning mind mapping [5]. China has been applying mind mapping for more than 20 years.

2.2 Basic features of mind mapping

1) Structural features. Compared with traditional representations (such as articles, notes, books), maps are more structured. In practice, an article or an orderly thing has its own structure. Usually, this structure is implicit and will not be shown obviously. The map is based on this form. The map not only has a clear structure, but also a strong sense of hierarchy [6]. Through the association between the folder and the map structure, we can better understand why the map as a tool or a method can produce a good effect. The most significant feature of mind mapping is its structure. No matter the process or the result, it is its essential feature to present the whole picture of things through structure.

2) Systemize the concept. All maps start with the theme, and everything revolves around the theme. No matter how big or small the map is, it always forms a relatively complete system [7]. In a mind map, branches vary in number and level, but they are interrelated, and the branches below one branch are subsystems. The process of mind mapping is the thinking that develops according to the form of "total system - subsystem - subsystem".

3) Radioactive function. In mapping thinking, each document selected is taken as a minimum branch of the map. When there are many documents, the documents have to be classified, or even classes of many levels. At the same time, each document represents a subsystem.

4) Special graphical representation. The most important feature of a mind map is that it is a visual diagram, a holistic thinking tool. The central image is used to capture the main content, and its branches scatter around from the center of the picture. It is first divided into major themes attached to the central image, and then the sub-themes are also shown in the form of branches attached to the branches of the upper layer. Branches consist of a key image or a keyword printed on a related line.

3. The basic idea of mind map in aerospace military project management

The project management of aerospace and military industry has both common characteristics and particularity. Generally speaking, the management of aerospace and military projects can be divided into three main stages: project planning, project implementation and project acceptance. The introduction of mind map management thought in aerospace and military project management is to structure and systematize the management elements, to show the whole process and all aspects of aerospace and military project management by radioactive and graphic representation, to minimize the accumulation of text materials in the project management mode, so as to conform to the human brain thinking, so that the human brain is easier to accept and understand [8]. It can be widely used in the whole process of project management, work report, supervision and inspection [9].

4. The main practice of mind mapping in aerospace military project management

4.1 Structured design of aerospace and military project management

Based on the needs of the whole process, all-round and multi-level presentation of the elements of aerospace and military project management, using the structuring principle of mind map, the aerospace and military project management is grouped into five modules, namely, the modules of project information, project plan, project implementation, project acceptance and project status. The module setup is shown in Figure 1.

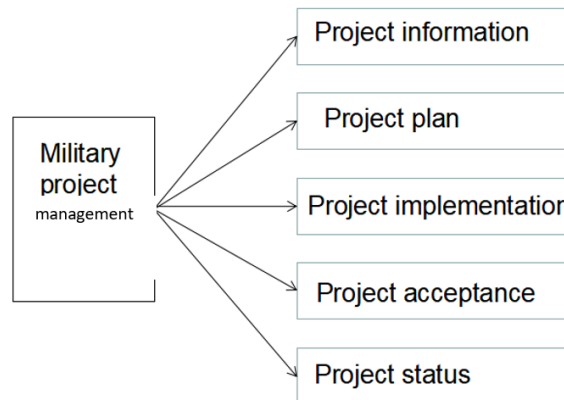


Fig. 1 Aerospace military project mind map management module

The design idea of the above module is as follows: as a first-level manager, first of all, it is necessary to understand and master the basic information of the project, such as the source of the project, project funds, implementation time, main content and target results, etc., which can be all collected into the "project information module" in the mind map for reflection. Secondly, the implementation plan of aerospace and military projects should be formulated to guide the specific operation of the project. Therefore, the "project planning module" is set in the mind map to collect various plans of the project, such as project start-up, research, funds, materials and service procurement plans. Thirdly, the setting of "project implementation module" is the core of the mind map project management system, which should reflect the project start-up, research progress, expenditure, materials, service procurement, inspection and supervision in a comprehensive and detailed manner and display it in a panoramic manner, so that managers at all levels can grasp the latest project trends and implement control. The final stage of the implementation of aerospace and military projects is the project acceptance. Relevant elements are set up according to the requirements of the project acceptance system and procedures, such as final account audit, final acceptance data, results extraction and data archiving. In addition, in order to strengthen the real-time control of aerospace and military projects, a "project status module" is set in the mind map, whose elements include phased results, monthly work situation, funding situation, existing problems, next month plan, etc. The main purpose of setting this module is to facilitate managers at all levels to implement effective control and intervention in the project process [10].

4.2 Mind map specific level content design

4.2.1 Project Information module

The project information module mainly reflects user requirements, project sources, funds, main objectives, project team and other basic information, which is the overall presentation of project information, as shown in Figure 2.

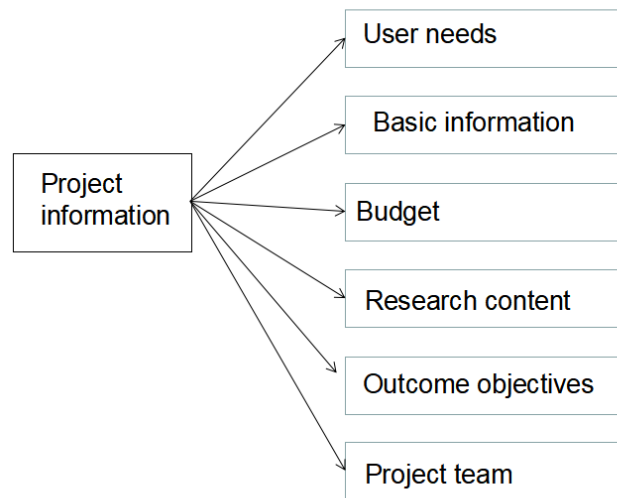


Fig 2. Project information module

User requirements include project background, annual urgent need, progress requirements, funding sources, expected results and other factors, reflecting the overall profile of the project. Basic information includes project name, project abbreviation, project number, project source, project approval document (document number), project deadline and other elements, reflecting the brief overview of the project. The fund budget contains the total fund of the project, the annual fund, the unit fund and other information, which is the time and space display of the project fund. The research content includes project overview and sub-topics. The overview shows the overall implementation objectives and main technical contents of the project. In the subproject, the research content of each subproject is described. The results target is based on the project contract (assignment) requirements, including research report, development equipment, publication of papers, patents, software copyright, technical standards, personnel training and other elements. In addition, the project budget to achieve the reward declaration, achievement appraisal and other specific reflection. The project team consists of three layers: the first layer is the project director; The second layer project research and development group, technical audit group, implementation monitoring group, advisory group; The third layer, such as the project research and development group, consists of project leaders and technical guidance.

4.2.2 Project planning module

The project planning module focuses on the whole process planning from project initiation to acceptance, as shown in Figure 3. The project launch planning includes data collection, launch meeting planning and so on. The project research plan shall follow the technical route of the project research, mainly including scheme determination, theoretical analysis, device development, test testing, demonstration application, report writing, etc. Plan the use of funds according to the implementation schedule of the project, plan the use of each sub-item in time order, so that the total funds undertaken by the project are decomposed by year and month. Material purchase plan includes project bidding plan, material (service) purchase plan, contract signing and other information. The project communication plan includes communication information such as project launch, technical research, equipment supervision, technical contact and project acceptance.

Three types of management of people

The three-type management of personnel refers to the management of knowledgeable, relational and loyal talents formed in practice in order to give full play to their talents in the development, use and management of weapons and equipment. Knowledgeable personnel are those who have abundant scientific and technological knowledge, management knowledge and practical experience. People who act according to the laws of science. They have strong creative ability. Technical leaders (chief engineers, chief designers, etc.) are often knowledgeable talents. Relational people are those who have abundant natural knowledge, social knowledge and coordination ability. Talents who act according to the viewpoint of balanced development. They have a strong ability to call. The head of administrative command needs relational talents. Loyal people are those with professional knowledge, humanistic knowledge and operational skills. According to the division of labor and responsibilities of the personnel, they have a strong sense of responsibility. Relatively speaking, front-line scientific research managers need more loyal talents. In real life, more personnel are compound talents, compound talents have the characteristics of knowledge type, relationship type and loyalty type, they are often able to adapt to the complex technology, complex types and complex environment of weapon equipment.

The final acceptance plan includes data preparation, final accounting of funds, audit, acceptance application, project acceptance and so on. The results cultivation plan includes patents, papers, software works, technical standards, award declaration, achievements appraisal and other relevant information.

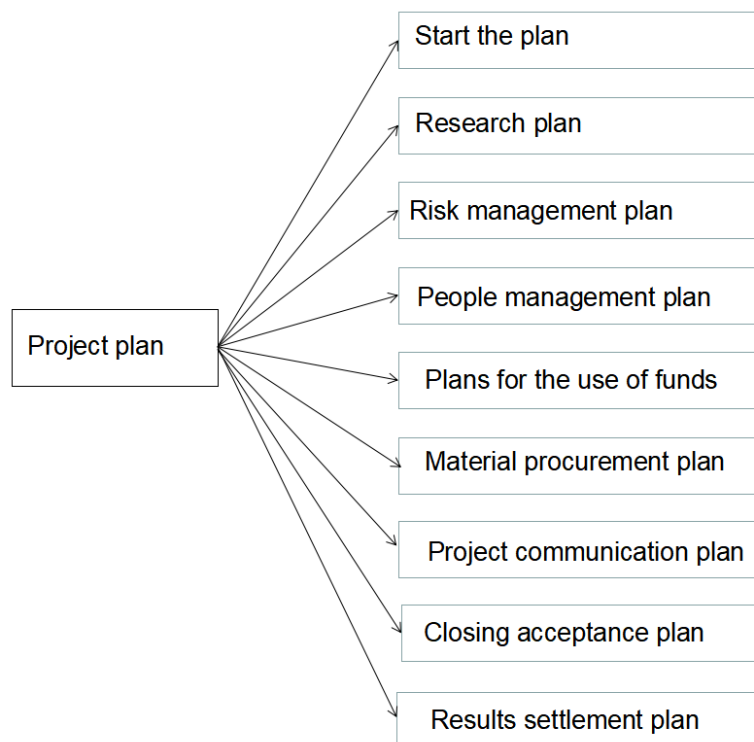


Fig. 3 Project planning module

4.2.3 Project implementation module

The project implementation module shows the main states in the project implementation process, as shown in Figure 4.

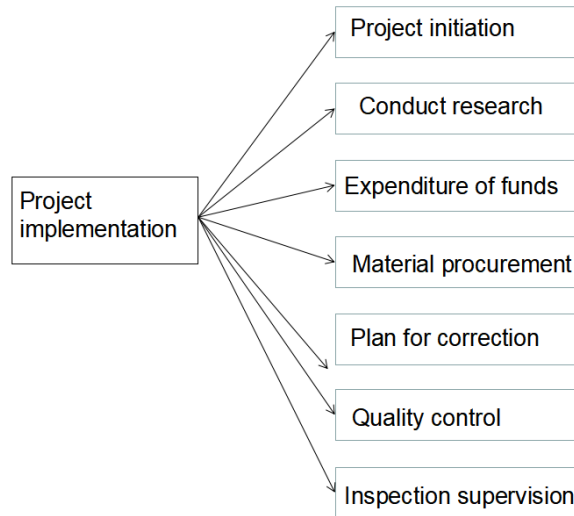


Fig. 4 Project implementation module

The launch and implementation of the project include the preparation of launch data, the organization of consulting experts, cooperative units, the launch process, the sorting of expert opinions and meeting minutes, and the revision of the implementation plan, etc. Based on the project implementation plan, the key nodes in the implementation process are sorted out and refined in time order, so that the project implementation can form a complete and orderly chain display. The expenditure of funds for each section is shown in detail in chronological order. Materials procurement the equipment, materials, data and services required during the implementation of the project are listed in a comprehensive and detailed manner. In accordance with the important links of project implementation, check the progress of technology, indicators and funds of each subject and each cooperative unit in stages to ensure the orderly progress of the project according to the plan.

4.2.4 Project acceptance module

The project acceptance module takes the project concluding acceptance as the main line, and displays the necessary technology, achievements, funds and other information for the project acceptance, as shown in Figure 5.

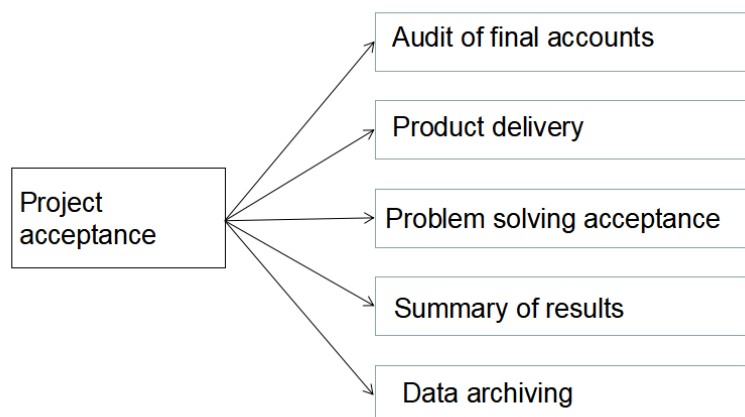


Fig. 5 Project acceptance module

The audit of the final accounts of the project is the prelude to the acceptance of the project,

showing the overall completion of the project funds, the schedule, the issue of the final accounts report, the audit and other matters.

The final acceptance is to display the acceptance items such as project acceptance data sorting, results sorting and demonstration project preparation. Results summary is the stage summary of the formation of the project or the presentation of the overall results declaration at all levels of awards. Data archiving is the archiving and display of various reports, results, models and certificates formed by project research according to the relevant system requirements of superiors and the unit.

4.2.5 Item status module

Based on the phased characteristics of the project progress, the project status module concentrates on reflecting the achievements, funds, problems and other information during the implementation of the project, as shown in Figure 6.

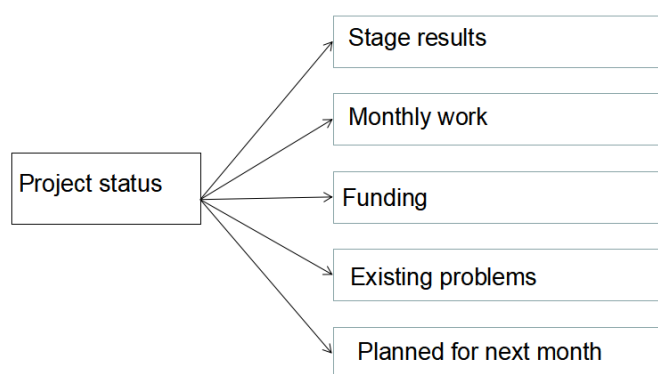


Fig. 6 Project status module

The project status module reflects the real-time status of each element of the project. With the progress of the project, the content of the module should be dynamically adjusted. For each content in the project plan, the state of related achievements such as reports, patents and papers is dynamically reflected in the stage results. In monthly work, briefly reflect the project technology, achievements, indicators and funds completed last month. The personnel cost, equipment cost and operation cost incurred in the last month are listed in detail in the fund situation, so that the progress of the use of the project cost can be shown in a panoramic view. The existing problem refers to the expression of the technical and financial problems existing in the process of project implementation, so that the superior managers can grasp or coordinate the solution. The plan for the next month is to plan the key work and direction of the next month and make detailed deployment and arrangement for the next stage of work according to the current project work status and supervision and suggestions of the management department.

4.3 Application of mind map in science and technology project management

The mind map mainly characterized by structure includes the main links of science and technology project management. By compiling the mind map, the project leader can sort out the progress information of each project at any time, and find out the weak points and blank points that need to be strengthened for promotion. Through mind mapping, managers at all levels can grasp the dynamic progress of project technology, indicators, achievements and funds in real time, visualizing and structuring the display to make the project implementation at a glance. In the specific application, it is important to grasp the following elements:

First, make full use of the infinite expansion of mind map to reflect the basic information of the

project completely, so as to grasp the basic information at any time during the implementation of the project;

Second, the project planning and implementation module should focus on reflecting the representative nodes and events in the project implementation, and focus on showing the important milestones in the project implementation;

Third, detailed description of the project status module, detailed description of the actual progress of the project from the aspects of technology, indicators, funds, and so on, and dynamic control and modification. It is better to conduct monthly control, so that the project team members, project management department and superior leaders can grasp the progress at any time, timely solve the problems encountered in the implementation of the project, and ensure the orderly progress of the project as planned.

5. Conclusion

The application of mind mapping to science and technology project management is a brand new work, which requires users and managers to master the basic knowledge and skills of using mind mapping, and establish the idea of structure and hierarchy of project management. In particular, the department in charge of the project should carefully understand the basic idea of project mapping, and in the process of project implementation, timely reflect the key elements formed in the mind map, so that the map and the project implementation can be displayed simultaneously. The application of mind map in science and technology project management is a kind of exploration to make full use of its powerful function to implement project management, which is of great significance to promote the scientific management of aerospace and military projects.

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