Optimization of Automization Control Project Progress Based on MS Project

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Abstract

This paper first states theory of project control and theory and method of project progress management, introduced the project management software MS Project; then it introduced the scientific research project management system of institute A, platform C project as well as platform automization control project in detail. Moreover, it used MS Project to make integral WBS decomposition on automization control project of platform C in institute A, found out critical path of automization control project and proposed and concluded various typical problems; after that, the proposed optimization idea and method were applied to make progress optimization on automization control project, and abstract work and WBS decomposition of detailed project were given out after optimization; at last, automization control project of platform C was compared before and after optimization in aspects of project schedule, network planning of project, project personnel and the new added parts after optimization. Finally, it was concluded that, the significantly reduced time limit of automization control project of platform C after optimization was feasible. Afterwards, it analyzed two aspects that affect scientific research progress, that is, plan of scientific research project and personnel management problems of scientific research project and some opinions and suggestions were given out.

Keywords: Project management; MS Project software; WBS; tabular management.

1 Introduction

1940s is considered as the initial point of modern project management. The typical application case is the Manhattan project. After entering 1970s, the application of project management gradually has expanded from traditional military and spaceflight to architecture, petrifaction, electronic power, water conservancy, etc. thereby project management looks like the important tool of daily management of government and large enterprises; meanwhile, with the rapid development f information network technology, theory and knowledge system of modern project management gradually form [1].

This paper made a further analysis and research on the subproject of C platform project-automization control project of platform C, and further analyzed and optimized the most important part of automization project-progress management. In analysis process, relative knowledge of project management and project management software was applied to make a progress optimization on integral automization control project, and the results after optimization was comprehensively and carefully compared and analyzed. Relative experience and method was concluded in analysis process to provide relative experience and help for establishing new similar advanced experimental platform in the future.

2 Theory Overview

A. PROJECT MANAGEMENT THEORY

Project management is developed from the demand of starting and producing large-scale and expensive complex system with high requirements on progress. in the early 20th century, project management has had no scientific method system; management of whole system has still remained on individual experience and talents. In 1930s, Gantt chart invented by Heliry Gantt became the important tool for planing and controlling military engineering and construction project [2]. In 50s, project management has regarded as an important management means and was widely applied in scientific research field and production practice; in late 50s, network planning technique brought convenience for the effectiveness of management project, since it overcomes various defects of Gantt chart, reflects the logical order relationship between processes in project progress, describes the interface between work link and work unit and project progress, and realizes relative scientific arrangement [3]. Only aviation, spaceflight, national defense and building industry were willing to adopt project management in 60s. In 70s, project management expanded from new product development field into medium enterprises with low complexity, rapid change and stable environment. In late 70s and 80s, more and more SME began to notice project management and apply it into management of enterprise activities. In this process, project management technique and method gradually developed and perfected. In 80s, project management has been recognized as a vivid method that can realize complex enterprise

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objective [4]. Project management so far has formed a complete set of practical methodology for scientific management project.

According to Project Management Body of Knowledge [5] edited by American Project Management Institute, project management can be divided into the following nine aspects: project integration management; project scope management; project expense management; project quality management; project human resource management; project rick management; project procedure management.

B. OVERVIEW OF PROGRESS MANAGEMENT THEORY

Simply, project progress management is a series of management procedures and activities to ensure project can be completed in time. In a practical project, that means formulate reasonable and economical progress plan within the limited time. In the process of implementing this project, we should examine whether the practical progress follows the requirements of plan. If there is deviation, then we should find out the relative reason and adopt necessary remedial measure or adjust and modify the original plan until the project stop.

Progress management can roughly divide into four stages: prepare project plan, implement project plan, and adjust project plan, analysis and summary. In every feedback cycle process, the continuity of latter stages and former stages is realized by information feedback. The project is constantly improved by solving the problems existing in relative stage and collecting and sorting relative experience. Project progress plan and progress control is shown in Figure 1.
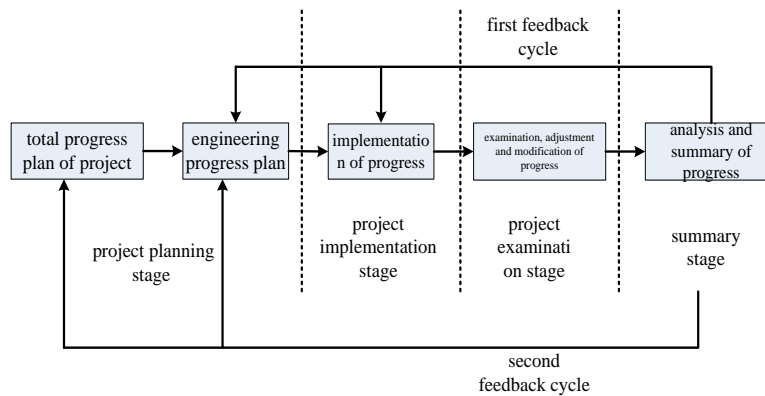

FIGURE 1 Project progress plan and progress control

C. MICROSOFT PROJECT SOFTWARE

There is hundreds of project management software on market so far. The relative widely applied ones are: Primavera; Project Planner; Microsoft Project; Project Scheduler; TimeUneO. This paper adopted Microsoft Project software as project management software. Microsoft Project software (as shown in Figure 2) is a kind of project planning and management software with strong functions and adaptation. It can help user's management simple individual plan as well as complex enterprise task, and user can plan and track the proceeding of task [6].

Project software provides a strong project management. It is reasonable combination of usability, effect and flexibility. We can more powerfully and effectively manage project with it. In addition, we can constantly receive the newest information as well control project, schedule and task.
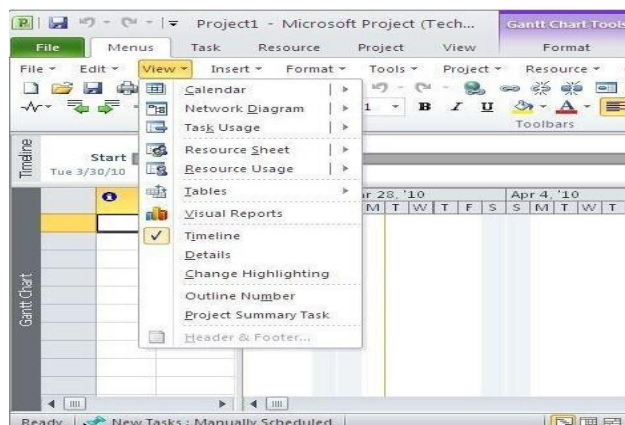

FIGURE 2 Microsoft Project software work interface

3 Optimization Scheme of Automization Control Project Progress

A. WBS DECOMPOSITION OF AUTOMIZATION CONTROL PROJECT

Work break down structure (WBS) is to grouping project elements with deliverable result orientation. It concludes and defines the whole work scope of project. Each drop of a layer represents more detailed definition on project work. Simply, it means to decompose a project according to certain principle. Project is decomposed into tasks and tasks are composed into events of works. Then the works are allocated to the daily work of project team members. WBS is always the center of plan process, and is also the important basis of formulating progress plan, resource demand, cost budget, risk management plan and purchase plan. Meanwhile, WBS is also the important basis of controlling project change. Project scope is defined by WBS; therefore WBS is also a comprehensive tool of project.

WBS includes Summary WBS (SWBS), project SWBS (PSWBS) and Contract WBS (CWBS); in some specific application areas, the common decomposition structure includes organization BS (OBS), resource BS (RBS), bill of material (BOM) and project BS (PBS).

WBS has four main uses: WBS is a planning and design tool for describing idea and it can help project manager and project team to confirm and effectively management the work of project; WBS is a structure design tool used that can clearly represent mutual relationship between various project works; WBS is a plan tool for presenting full view of project and stating the works that have to fulfill; WBS defines milestone events and can report project completion situation for senior management and clients as the report tool of project situation.

B. PROJECT NETWORK CHART OF AUTOMIZATION CONTROL PROJECT

For a detailed project, the application of project activity sequencing can clear the structure of project. Project activity sequencing refers to identify correlation and dependency between various activities in project activity list, and then arrange and confirm the order of project activities. There are two methods and tools for arranging and describing the order of project activity: precedence diagramming method (PDM) and arrow diagram method (ADM). PDM is also called activity on node (AON). Single node (box) represents an activity and the arrow between nodes represents the relationship and dependency between activities. In most projects, project activity sequencing use PDM mostly.

C. THE DETAILED IDEA FOR AUTOMIZATION CONTROL PROJECT PROGRESS OPTIMIZATION

Make Reasonable Sequencing Adjustment of Project Work According to Job Nature
In integral project network chart, it is a conterminous serial line since the means of project before proceed according to the sequencing of project equipment that is, project work is fulfilled according to the situation of practical project equipment rather than integration understanding and optimization on the whole project. For the project progress optimization, under the premise of deep understanding of the whole project, we optimize project progress according to job nature. That is, we divide the whole project into several big types, and then make reasonable adjustment on project personnel. Assembly and debugging work is assigned to auxiliary personnel and software engineering is assigned to core team members. At last, a proper intersection is selected to precede two kinds of works parallelly.

Add Special Table of Automization Control Project of Platform C Aimed at Project Experience Sorting in Optimized Project Progress
There are two main purposes to use this table: (1) detailed record the relative important data, experience and method of project control appeared in the process of self detection to field debugging to final debugging. (2) At the end of the project, proceed relative sorting and file, in order to provide valuable data information for other similar platform automization project construction.

4 Analysis of Optimization Effect of Automization Control Project of Platform C From A Institute

A. COMPARISON OF TIME LIMIT OF PLATFORM AUTOMIZATION PROJECT

First, compare the total time limit of automization control project before and after optimization (as shown in TABLE 1).

TABLE 1: The comparison table of total time limit of automization control project of platform C before and after optimization

Name	Time limit (day)	Starting time of project	Completing time of project
Automization control project of platform C	1220.81	2013.1.21	2017.10.1
Automization control project of platform C (optimization)	293	2013.2.9	2014.3.16

It can see from TABLE 1 that, total time limit of automization control project obtained before optimization is 1220.81 days. Total time limit of automization control project after optimization is 293 days. Time limit progress shortens 927.81 days and 76%.

B. COMPREHENSIVE COMPARISON OF PROJECT PERSONNEL

The effect before and after optimization is analyzed in aspects of man hour, personnel placement and the table of

man hour comparison before and after optimization. Comparison proceeds in the following two aspects: work placement of project progress and the personnel assignment comparison of project.

C. COMPARISON OF PROJECT PROGRESS WORK PLACEMENT

Project work placement is compared by abstract task placement of automization control project before and after optimization. Abstract work can roughly reflect the progress flow and some basic information of detailed project work. Therefore, we conduct level three abstract tasks after project progress optimization, as shown in Figure 3.

	WBS	Task modules	task name	time limit for project	starting time	completion time
1	1	📌	automization project of platform C of institute A (optimization)	293 working days	February 9th, 2013	Mar. 25th , 2014
2	1. 1	📌	preparation in earlier stage	55 working days	February 9th, 2013	Apr. 25th , 2013
3	1. 1. 1	📌	market research	5 working days	February 9th, 2013	Feb. 14th ,2013
5	1. 1. 2	📌	order needed components	9 working days	February 11th, 2013	Feb. 21th , 2013
7	1. 1. 3	📌	discuss and confirm relative scheme	10 working days	February 25th, 2014	Mar. 10th ,2014
9	1. 1. 4	📌	formulate special table of automization control project of platform C	9 working days	February 12th, 2013	Feb. 22th ,2013
11	1. 1. 5	📌	obtain control protocol	6 working days	February 26th, 2013	Mar. 5th , 2013
13	1. 1. 6	📌	special control design	36 working days	Mar. 8th , 2013	Apr. 26th , 2013
15	1. 1. 7	📌	fill relative information into special table	2 working days	May 10th , 2013	May 13th , 2013
16	1. 2	📌	assembly project	68 working days	Apr. 20th , 2013	July. 23th , 2013
17	1. 2. 1	📌	assembly control	27 working days	Apr. 20th , 2013	May 27th , 2013
19	1. 2. 2	📌	connect control circuit	42 working days	May 28th , 2013	July. 24th , 2013

FIGURE 3 Level three abstract task after project optimization (part)

There are too many repeated project works in automization control project before optimization. We merged them. Phase work of abstract task table of project after optimization includes preparation in earlier stage, assembly project, detection project, software project; single debugging of automization control of platform C, joint debugging of automization control of platform C and sorting and file of project. They are classified by the nature of practical work. By doing that, the integral project situation is comprehensively considered, thus the work that can be merged is merged. Software project, assembly project and detection project are paralleled, which not affect the whole project will progress, since the personnel that participate the project is different. Thus, the time of project greatly reduces.

5 Conclusion

Under the condition of current scientific research management of an institute, this paper further decomposed and analyzed platform automization control project in the process of establishing platform C, decomposed automization control project of platform C into several types of abstract works, and then made WBS decomposition. It applied MS Project management software to make WBS decomposition on the whole automization control project. Then the critical path of project was found out and analyzed. Its problems were found out. Then the optimization scheme and method for automization control project of platform C is given out according to the analysis of the problems. After that, new project optimization on automization project of platform C was carried out. The main strategy of optimization is to transform the progress plan determined by project equipment into project plan designed by project flow. In addition, the project risks brought by submitting some task to single project team member is transformed into fulfilling works by project team member with same work scope in member task assignment table of automization control project of platform C provided in the beginning of the project. It not only reduces the project risk brought vt single project member, but also plays positive function in the time limit of project. When optimizing the project, the project was divided into several kinds of abstract works. These abstract works are refined and decomposed, and basic data of WBS decomposition figure and time limit of project was given out.

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