Application Analysis of Computer Technology in Construction Project Schedule Control in Information Age

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Abstract. Construction industry is one of the pillar industries in China, which has made great contributions to China's economic development. However, because the overall management level of the construction industry in China is still relatively low at present, the construction procedures of many projects are complex and involve many factors. In order to make the construction proceed smoothly, it is necessary to control the progress of construction projects reasonably. Therefore, the purpose of this paper is to analyze the application of computer technology in construction project schedule control in the information age. In this paper, according to the actual situation, the project management software Project 2019 in computer technology is used to control and manage the progress of the project. Project 2019 can work out a set of optimal construction schedule within the specified time limit, compare it with the actual schedule, find out the deviation and its causes, make reasonable analysis and make corresponding adjustments. At the end of this paper, the construction projects controlled by the project management software Project 2019 are compared with those not used, and the actual effects of both are analyzed. The experimental results show that the project management software Project 2019 can effectively control the progress of the construction project reasonably, and can make corresponding adjustments according to the actual situation, which can accelerate the overall progress of the project by about 10%, which is of great significance for improving the existing construction project progress.

Keywords: Information Age; Computer Technology; Construction Project; Project 2019

1. Introduction
With the continuous improvement of China's engineering construction system and the continuous improvement of national policies and regulations, it is very important for engineering builders to realize information-based management in the whole process of engineering project construction, which includes the scientization of engineering project management theory, methods and means. In order to make the construction project carry out effectively and coordinately, it is necessary to work out a plan to control and guide the construction progress and resource utilization of the project. In the information age, the application of computer technology project management software will become the mainstream. Facing all kinds of complex engineering projects, there are a lot of information and
data that need to be dynamically managed. If we want to improve the management level and project progress, we must use advanced management methods and tools.

At present, in the progress control of construction projects, the research results of computer technology at home and abroad have emerged one after another. Abroad, Taghavifard first used the crossing chart when arranging production and planning management. Since then, the crossing chart has become an important tool for planning and controlling engineering projects, but it still has many shortcomings, so people have studied milestone system to overcome the defects of the crossing chart [1]. In China, Li and Cong believe that an engineering project should be managed effectively, that is, the quality, schedule and cost of the project should be managed reasonably in the whole process of construction and implementation. According to its theory, project management is to constantly adjust the three elements of project quality, construction period and cost in the process of project construction, so that the project can be completed and put into production better, faster and more economically[2].

In the information age, this paper analyzes the application of computer technology in construction project schedule control. Based on the basic theory of project management, this paper discusses the characteristics, principles, contents, related theories and analysis methods of construction projects. In this paper, according to the actual situation, the project management software Project 2019 in computer technology is used to control and manage the progress of the project. The main impact of Project 2019 on the project schedule is analyzed qualitatively. Finally, a comparative experiment is made between Project 2019 and the unused construction projects, which fully verifies the rationality and advantages of Project 2019 on the construction project schedule control, which is of great significance to the construction stage schedule control.

2. Application of Computer Technology in Construction Project Schedule Control in the Information Age

2.1. Information Age
The information age is the age when information produces value. Informatization is the general trend of the development of the present era, and represents the advanced productive forces. According to toffler's point of view, the third wave in the information age is the information revolution, which started from the mid-1950s, and its representative symbol is "computer", with information technology as the main body, with emphasis on creating and developing knowledge. With the decline of the agricultural era and the industrial era, human society is transitioning to the information age and striding into the third wave of civilization, and its social form is developing from industrial society to information society. The biggest difference between the information society of the third wave and the agricultural society and industrial society of the first two waves is that it no longer focuses on physical and mechanical energy, but on intelligence [3].

2.2. Computer Technology

2.2.1. Concept of computer technology
Computer technology refers to the use of computer's fast and accurate computing ability, logical judgment ability and artificial simulation ability to quantitatively calculate and analyze the system and provide means and tools for solving complex system problems [4].

2.2.2. The main application fields of computer technology
With the development of computer technology, it has become an indispensable technical tool for human society. Going to a bank, getting a certificate, going to school for medical treatment, working in a government department, shopping in a supermarket, making friends for entertainment, etc., are all inseparable from computers and computer technology. Up to now, there are over 400 million Internet users and nearly 800 million mobile phone users in China. Among them, the number of mobile
Internet users reached 277 million, which means that more than half of Chinese people use computer technology every day.

Counting in detail, computer technology can be seen everywhere in life: weather forecast, from physical examination, treatment and rehabilitation to patient management in hospitals; School enrollment to graduation, student status management, educational administration and so on all depend on computer information technology. E-government, e-commerce, computer aided design, digital animation, digital media technology, virtual reality technology, GPS global positioning and other new terms emerge one after another[5].

2.3. Construction Project

2.3.1. The construction project
Refers to an engineering construction project with a design task book and overall design, independent accounting in economy and independent organization in management. A construction project often consists of one or several single projects. Such as: a factory, a residential area, a school, etc.

2.3.2. Single project
Refers to a project with independent design documents in a construction project, which can independently exert production capacity or engineering benefit after completion. It is an integral part of the construction project, and the project budget should be prepared separately. Such as: production workshop, office building and residence in the factory; School buildings, canteens, dormitories, etc. [6].

2.3.3. Unit project
Unit project refers to a project with independent design, which can organize construction independently, but generally cannot produce or bring into play benefits after completion. It is an integral part of a single project. Such as: civil engineering, installation engineering, etc.

2.3.4. Sub-project
Sub-project is an integral part of unit project, which is further divided according to different engineering parts, types and models of equipment, materials and types of work, and is mainly used for calculating engineering quantities and classifying when applying quotas. Such as foundation engineering, electrical engineering, ventilation engineering, etc. [7].

2.4. Project 2019

2.4.1. Project 2019 concept
Project 2019 is excellent application software for project management. According to the principle of project management, it uses computer software to build a model to simulate the establishment and implementation of project management, and completes the project management through a series of charts related to project management. It defines the project management model perfectly. The software thinks that the core content of project management is the control and management of tasks and resources, and the rural workers can complete the project with the lowest cost and the fastest progress [8].

2.4.2. Project 2019 functions
1) Effectively manage and understand the project schedule
Use Project 2019 to set realistic expectations for the project team and customers in charge of environmental protection, so as to make schedules, allocate resources and manage budgets. Understand the schedule through various functions, including "Task Driver" for tracing the root of the
problem, "Multi-level Undo" for testing and testing the scheme, and "Visual Cell Highlight" for automatically shading the tasks affected by changes.

2) Quickly improve work efficiency

Project Wizard is a step-by-step interactive cloud planning assistant tool, which can help you quickly master the project management process. This tool can be customized according to different purposes, and it can guide you to complete operations such as creating projects, assigning tasks and resources, tracking and analyzing data, and reporting results. Intuitive toolbars, menus and other functions enable you to quickly master the basic knowledge of project management [9].

3) Build professional charts and diagrams

The "visual report" engine can generate templates of charts based on Project 2019 data, and can be used to analyze and report data through professional reports and charts. You can share the templates you created with other users, or choose from a list of ready-made report templates that can be customized.

4) Follow up the project as needed

A rich set of predefined or custom measures can be used to help you track the required related data completion percentage, budget and actual completion, earnings analysis, etc. You can keep track of the project performance during the project by saving project snapshots in the maximum number of baselines [10].

2.4.3. Project 2019 related algorithms

Project 2019 will determine and check whether the design process of scheme creation deviates from our original value goal during the information collection and functional analysis stage. After that, it is necessary to establish evaluation criteria for the evaluation items. Now, it is necessary to introduce an important evaluation criteria to determine the technical feasibility of the scheme-technical value criteria. If we use \( X \) for technical value, \( P \) for average score and \( P_{\text{max}} \) for maximum value, the technical value can be expressed in the following form:

\[
X = \frac{P}{P_{\text{max}}}
\]  

(1)

The lowest cost method of function is based on the standard of realizing the same function with the lowest cost. By comparing this standard with the current cost of realizing the function in this case, it is determined whether there is surplus or deficiency in this function through the high or low current cost, and then the method of modifying its scheme to enhance its value [10]. This method embodies the principle and thought of value engineering, and can achieve the purpose of cost analysis and functional value evaluation. The formula is:

\[
V_i = \frac{F_i}{C_i} = \frac{C_{\text{min}}}{C_{oi}}
\]  

(2)

\[
\Delta C_i = C_{oi} - C_{\text{min}}
\]  

(3)

In which \( I \) represents the serial number of function, if there are \( n \) functions, \( i=1,2,3,...,n \), \( v \) represents the value coefficient of function \( i \). \( \Delta C_i \) indicates the expected cost improvement of I. \( C_{\text{min}} \) represents the target cost of realizing function \( i \). \( C_{oi} \) indicates the current cost of function I in this case.

3. Experimental Research on the Application of Computer Technology in Construction Project Schedule Control in the Information Age

3.1. Experimental Data
The research projects in this paper are as follows: the planned construction period of villas is 550 days, the planned construction period of bungalows and garages is 650 days, and the planned construction period of model areas is 200 days.

3.2. Experimental Process
According to the characteristics of building design of this project, the situation of construction site and the requirements of the owner, the construction schedule planning arrangement should not only ensure the completion on schedule on the premise of ensuring the project quality and safety, but also highlight the key points. In this paper, the construction progress plan of this project is compiled by Project 2019. Because of the large scale and complex construction organization, it is necessary to compile multiple construction progress plans. Considering the overall management, it is necessary to prepare the overall construction progress plan. Different water flow sections need to have their own progress plans, and each unit project should also have its own progress plan. Finally, this paper compares the construction projects controlled by the project management software Project 2019 with those not used, and analyzes the progress effect of both.

4. Experimental Analysis of the Application of Computer Technology in Construction Project Schedule Control in the Information Age

4.1. Investigation on the Effect of Project 2019 on Project Schedule Control
In this paper, the construction projects controlled by the project management software Project 2019 are compared with those not used. So as to obtain the recognition, application and cognition of 200 project managers. Understand more truly the problems existing in the schedule control of traditional construction projects. The survey results are shown in Table 1 and Figure 1.

| Table 1. Investigation on the effect of Project 2019 on project schedule control |
|-------------------------------|----------------|-------------|----------------|----------------|
|                               | Recognition   | Good quality | High efficiency | Good optimization | Good application |
| Project 2019                  | 184           | 163          | 166            | 174            | 170            |
| Traditional method            | 121           | 111          | 105            | 103            | 123            |
Figure 1. Investigation on the effect of Project 2019 on project schedule control

It can be seen from the survey data that the evaluation of the two technologies by project managers is quite different. Most project managers agree with the project management software Project 2019 proposed in this paper, and think that the project management software Project 2019 has better control effect, higher quality and higher efficiency in the construction project schedule. This is mainly because Project 2019 combines a large number of computer technologies, which can efficiently process and analyze a large number of project data, and then work out the optimal construction scheme according to the actual construction situation, so as to achieve the fastest construction progress as possible. It can also use the optimization algorithm to optimize the project schedule and make timely adjustments, which greatly speeds up the construction schedule, improves the construction quality and controls the potential safety hazards.

4.2. Project Schedule Control in Project 2019

In this paper, the construction progress plans of villa, villa, garage and model area are compiled by Project 2019. Because of the large scale and complex construction organization, it is necessary to compile multiple construction progress plans. Considering the overall management, it is necessary to prepare the overall construction progress plan. Different water flow sections need to have their own progress plans, and each unit project should also have its own progress plan. In this paper, the actual time of schedule control of three projects by two methods is counted respectively. The research results shown in Figure 2.
From the experimental results, we can see that the progress of the three projects under the control of Project 2019 has been greatly improved, which is about 50 days faster than the planned time limit, with higher efficiency and better quality. However, the progress of the three projects without using Project 2019 is almost the same as the planned time limit, and even exceeds the planned time limit. This is because in the process of building construction, the structural forms of modern buildings are becoming more and more complex, and most of the projects have exceeded the ability of managers themselves. However, Project 2019 has the ability of fast and accurate calculation, logical judgment and artificial simulation, can quickly process all information data including engineering projects, such as rule style, geometric dimensions, physical attributes, etc., and can also provide actual models before and after optimization for reference, which greatly reduces the construction difficulty and speeds up the construction progress.

5. Conclusions
In the information age, this paper analyzes the application of computer technology in construction project schedule control. In this paper, the characteristics, principles, contents, related theories and analysis methods of construction projects are discussed by referring to a large number of literature materials and combining with investigation and analysis. According to the actual construction projects, the main factors affecting the project schedule are analyzed. Then, according to the actual problems, this paper puts forward the engineering project management software Project 2019 using computer technology. Then, through integrating theory with practice, the impact of Project 2019 on the project schedule is qualitatively analyzed. At the end of this paper, a comparative experiment is made between the construction project controlled by the project management software Project 2019 and the construction project not used. It is verified that Project 2019 effectively speeds up the construction progress, improves the construction quality and controls the potential safety hazards, which has advantages in project management and guiding construction, and is of great significance to the control of construction project progress.

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