Innovative Application of Computer Technology in Engineering Management

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Abstract. With the rapid development of China’s economy, computers have been well developed at a certain level. In most of our project management process, if we can effectively use computer technology, to a certain extent, we can improve the quality and efficiency of the project. Based on this, this paper studies the innovative application of computer technology in engineering management. In this paper, an engineering team is selected as the research object. Based on the theory of computer technology and RDF graph data flow division algorithm, the engineering resource utilization rate, project management efficiency and engineering difficulty of the engineering team before and after the application of computer technology for project management are compared. The research results show that before the application of computer technology for project management, the resource utilization rate of engineering team is 72.5%, the project management efficiency is 61.6%, and the engineering construction difficulty is 76.3%. After the application of computer technology to project management, the data have changed, the resource utilization rate has increased to 88.3%, the pipeline efficiency has increased to 79.3%, and the engineering difficulty has been reduced to 81.2%. It can be seen from the data changes that the same engineering team has changed significantly before and after the application of computer technology in project management, which not only saves engineering resources, but also effectively improves the engineering efficiency.

Keywords: Computer Technology, Engineering Management, Innovation Strategy, Partition Algorithm of RDF Graph Data Flow

1. Introduction
With the rapid development of computer technology and application, especially the emergence of large-scale and super large-scale integrated circuits and microcomputers, new technologies such as computer graphics, computer-aided design and computer-aided manufacturing have been developed rapidly [1-2]. At present, computer technology has been widely used in electronics, shipbuilding, aviation, aerospace, machinery, construction, automobile and other fields, and has become the tool with the most production potential, showing a bright future and achieving huge economic benefits [3-4].
The so-called project management is to make effective use of various resources according to relevant plans, so as to complete the construction period within the specified period [5-6]. There are many problems in the process of traditional engineering project management, which lead to low utilization rate of project resources, low management efficiency and low engineering quality [7-8]. If the manual drawing drawings and calculation data are used in the construction process of the project, the difficulty of the project will be further increased. In the specific management process of the project, the use of computer related technology can effectively enhance the quality and efficiency of the project, and effectively reduce the difficulty of project management [9-10]. Therefore, it is of great significance to study the innovative application of computer technology in engineering management for improving the quality and efficiency of engineering management.

In this paper, the computer calculation in engineering management is introduced. We know that VR technology can show the engineering structure, RDF technology can judge the engineering data, and BIM Technology can simulate the engineering 3D. Based on this theory, we investigated and interviewed the same engineering team, and compared and analyzed the index differences of the project before and after the application of computer technology. The results show that the application of computer technology can improve many aspects of the project, so as to improve the quality of the project and promote the efficiency of the project.

2. Computer Technology and RDF Graph Data Stream Partition Algorithm Theory Overview

2.1. Computer Technology
Computer technology refers to the technology, method or means used by people in the field of computer. Computer technology contains a wide range of content, it can be roughly divided into system technology, components (hardware) technology, computer assembly technology and so on. Computer system technology literally means the sum of all the technologies used in a complete computer system. The basic purpose of system management technology is to make full use of the software and hardware of the computer, so as to improve the data processing ability of the machine and the operation performance of the whole system.

2.2. Partition Algorithm of RDF Graph Data Flow
RDF technology is one of the main technologies in engineering management, which is applied to resource description in reflective LCD. Through Rd technology, data and other resources can be described, the connotation of metadata can be analyzed, and unreasonable data can be screened out.

Assuming that there are k partition nodes, the maximum resource node capacity of each node is C. P (i) represents the current node and edge state of partition i. | P(1) | denotes the number of nodes in partition 1. P = {P (1), P (2)... P (k)} is the sum of the current state of all partitions. For graph G = (V, E), node set V = {v1, v2,... vn}. Edge set E = {e1, e2,... em}. e (v1) = {e | edge with v1 as vertex} denotes the adjacent edge of vertex v1, f (v1) represents the set of adjacent nodes of v1 as vertex, |e(v1)| and |f(v1)| denote the number of adjacent edges and adjacent points, respectively. After receiving e (v1) or f (v1) information, the partition heuristic function determines that the storage area of node v1 is index.

Several heuristic partition functions are given as follows:

(1) Balancing strategy
Select the partition with the least number of nodes. If more than one partition meets the requirements, select one randomly.

\[ \text{index} = \text{random} \left( \{ \min \{ |P(i)|, i \in [k] \} \right) \]

(2) Blocking strategy
According to the order of node arrival, the storage starts from the first partition. When the capacity is full, it is put into the next partition until all nodes are stored. |P| refers to the total number of all partition nodes currently, and \([x]\) indicates that x is rounded down.
\[ \text{index} = \left\lfloor \frac{|P| + 1}{C} \right\rfloor + 1 \]  
\hspace{1cm} (2)

(3) Hash strategy
Given a function \( H: V \rightarrow \{1,2,...,K\} \), here we simply choose the remainder function.
\[ \text{index} = H(v) = (v_{id} \mod k) \]  
\hspace{1cm} (3)

3. Research Ideas and Experimental Design

(1) Research ideas
This paper first consulted a large number of literature, through the study of the existing research results at home and abroad, to understand the theory and method of engineering project management and its application of computer technology in project management, which provides theoretical basis for the study of this paper. Secondly, through practical application, this paper highlights the innovative application advantages of computer technology in engineering management.

(2) Experimental design
This paper selects an engineering team as the research object, and analyzes the application of computer technology in the innovative application of engineering management. In the research, we compare the difference of resource utilization rate, project management efficiency and engineering difficulty before and after the use of computer technology. Finally, we summarize the innovation strategy of computer technology in project management.

4. Innovative Application of Computer Technology in Engineering Management

4.1. Computer Technology in Project Management
In this paper, some computer technologies in project management are counted by consulting data, and the advanced computer technologies commonly used at present are sorted out and analyzed, as shown in Table 1.

| Application of computer technology | Effect                  |
|-----------------------------------|-------------------------|
| VR technology                     | Show engineering structure |
| RDF technology                    | Data judgment            |
| BIM technology                    | 3D mode project schedule |

It can be seen from Table 1 that some advanced computer technologies have been applied in modern engineering management. These computer technologies can effectively help all aspects of project management and show different roles. VR technology can show engineering structure, RDF technology can judge engineering data, and BIM Technology can simulate engineering 3D, so as to better manage the whole project.

(1) VR technology
VR technology can reflect the real structure of the future construction of the project, so that the management operation can be carried out smoothly. VR technology can also be regarded as a kind of communication media, belonging to the advanced user working environment. This technology can solve some problems in military, mechanical, medical and other aspects. The technology displays the designer's ideas in the form of magnification. For example, before the construction of a project, the overall building structure of the project must be carefully designed. In order to ensure the accuracy of the data, a large number of professional design drawings are needed. These design drawings are a form of reflecting the thinking of human designers. Compared with design drawings, VR technology is more powerful and more authentic.
(2) RDF Technology

RDF is one of the important events in the development of computer technology. In the project management, its main function is to automatically judge the data information. It is mainly used for project management personnel to check data and financial management personnel to carry out fund management. The technology makes the structure more clear by analyzing the data hierarchy structure, so that the data can be properly programmed to make the logical relationship between data more clear. In the face of complex and various data in engineering construction, RDF computer technology undoubtedly has clearer data management function and provides clearer data information for engineering construction.

(3) BIM Technology

In the process of project construction, BIM Technology is used to simulate the whole construction process. Generally speaking, 3D technology is used to show the whole construction site. In the simulation process, the relevant personnel can intuitively and clearly identify the problems existing in the development project process and improve them, so as to eliminate the same problems in the actual project construction. Therefore, BIM Technology can effectively improve the quality and level of engineers in project management.

4.2. Analysis of Innovative Application Effect of Computer Technology in Project Management

The application of computer technology in project management has many advantages

1. Using resources and optimizing resource allocation

Information is a very important resource. If it is not properly managed and stored, it will be a waste of resources. For example, the equipment management of the construction unit requires a lot of large-scale equipment. When the equipment is put into use, the data of the equipment should be dynamically managed and input into the computer, which has a direct relationship with the progress of the project. If the equipment is not effectively managed, the information of the equipment is not handled properly, it is a waste of resources.

2. Solving engineering calculation problems

Engineering calculation is relatively complicated. In the construction project, valuation is an important part of the project cost. In the implementation of this work, we have to go through the complex steps of sorting and collecting, and finally use computer technology to arrange the project cost. This also requires the computer software to carry out the relevant application services for the project cost, and provide certain reference data, which is also the intelligent requirements for the realization of computer software engineering management.

3. Improve project quality

Computer electronic information technology can improve the overall quality of the project, help to improve the use of data information, and thus ensure the overall quality level of the project. First of all, the application of computer electronic information technology can make up for the shortage of manual operation, and the robot can complete the construction operation in complex and dangerous environment, so as to improve the overall effectiveness of construction. Secondly, the introduction of computer electronic information equipment can optimize the project design scheme, control the specific construction scheme and project cost under the support of strong data information, so as to achieve the goal of optimal construction.

4. Improve management efficiency

Computer electronic information technology can build a high-quality project management system, further clarify the specific division of responsibilities of engineering projects, and promote the relevant departments of engineering projects to carry out specific project tasks. The introduction of computer electronic information technology for project management is helpful to bid farewell to the traditional manual management mode, and more emphasis is placed on the professionalism of project management and construction operation under the leadership of information technology. High and new technology can not only comprehensively evaluate the progress of the project, optimize the construction mode according to the existing human and material resources, but also help to promote
the construction personnel to optimize and improve the construction methods, so as to achieve the goal of improving the overall efficiency of construction.

The computer technology is applied to the project management, and the comparison results before and after the application effect are shown in Figure 1.

**Figure 1.** Comparison before and after the application of computer technology in project management

This paper investigates the same engineering team and compares the resource utilization rate, project management efficiency and engineering difficulty before and after the application of computer technology in engineering management. It can be seen from Figure 1 that before the application of computer technology for project management, the resource utilization rate of the engineering team was 72.5%, the engineering management efficiency was 61.6%, and the engineering construction difficulty was 76.3%. However, after the application of computer technology for engineering management, various data changed, the resource utilization rate increased to 88.3%, and the engineering pipeline efficiency increased to 79.3%. The computer technology reduces the complexity and difficulty of engineering calculation and effectively reduces the engineering difficulty, which is reduced to 51.2%. From the changes of various data, we can see that the application of computer technology can improve many aspects of the project, so as to improve the quality of the project and promote the efficiency of the project.

4.3. Project Management Innovation Strategy in Computer Engineering

According to the shortcomings of traditional project management and the effect of computer technology in project management, this paper puts forward the innovation strategy of computer technology in project management, as shown in Figure 2.

**Figure 2.** Innovation strategy analysis of computer technology in project management

As can be seen from Figure 2, the innovation strategies of computer technology in engineering project management are as follows: popularizing and updating computer equipment, improving project
management plan, realizing highly sharing of engineering information, paying attention to the introduction and training of talents, and improving computer engineering management software. Among them, popularizing and updating computer equipment is the most important, accounting for 26.6%, followed by paying attention to the introduction and training of talents, accounting for 25.3%. Not only that, but also improving the computer engineering management software, which accounts for 24.8%. In addition, the proportion of improving the project management plan and realizing the high sharing of engineering information accounts for 11.3% and 12.0%. This is analyzed in detail below.

1) Popularize and update computer equipment

The implementation of engineering projects may be faced with complex and changeable situations. Most enterprises have introduced the mode of computer electronic information management, and the computer operation mode has become the main mode of enterprise engineering management. In this case, it is necessary to carry out engineering management technology innovation, vigorously popularize new computer electronic information equipment, and pay attention to improving the effectiveness of project management in the intelligent, automatic and electronic environment. We should increase the innovation of the application direction of computer electronic information, pay attention to expand the application scope of electronic information technology, and apply electronic information technology to project tracking, quality analysis, risk assessment, financial management and construction method optimization, so as to meet the new requirements of engineering construction.

2) Improve project management plan

In order to better play the value of electronic information technology, we should reasonably carry out project planning, increase the popularization of advanced electronic information technology. First of all, the application direction of electronic information technology is clear, the contents and difficulties involved in the project are comprehensively sorted out, and different software is developed and used around engineering cost control, engineering material purchase, engineering risk control, optimization of engineering project design scheme, etc., so as to achieve the goal of effective project control. Secondly, improve the monitoring level of project data and information, form a standardized data information collection mechanism, so as to collect project data information regularly, timely and accurately, and ensure the effectiveness of data information supply.

3) Realize high sharing of engineering information

Modern engineering project management should form a perfect internal communication mechanism to promote the effective participation of various departments in the construction of the project. The project management should also meet the needs of the construction party and the supervision party to understand the engineering data and information, and timely report the progress of the project. Only by establishing a perfect data information sharing mechanism and developing professional Internet information transmission channels can all parties participate in the construction of engineering projects.

4) Pay attention to the introduction and training of talents

When the introduction of new computer equipment, there must be professional staff to explore and master the instrument, so as to ensure the rational use of new equipment. Therefore, the talents who can master computer technology must be introduced into the engineering work, so as to make the talents play their role quickly and improve the work efficiency in the later work.

5) Improve computer engineering management software

In the construction industry, there is a very detailed division of work, the work content is also very different. Therefore, a kind of computer software can not meet the needs of all work in the project, which urges the continuous improvement of computer technology and the continuous updating of computer management system to meet the needs of project management, so that computer technology can play the greatest role in engineering management.

5. Conclusions
With the development of science and technology, computer technology is widely used in project construction management, which improves the management efficiency. The project construction project is huge, the data is more, the construction site is difficult to manage, in view of this situation, the application of computer technology in modern enterprise project management is the inevitable requirement of enterprise sustainable development. This paper studies the innovative application of computer technology in engineering management. The research results of this paper show that the application of computer technology can improve many aspects of the project, so as to improve the quality of the project and promote the efficiency of the project.

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