Study on the New Buffer Management Method in Key Chain Project Management

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Abstract. The application of the constraint theory in project management is called key chain project management. It emphasizes project management from a systematic point of view. Different from the past, the key chain has become the focus of project management. It reduces delays through the management of buffers and improves project execution efficiency, thus solving the problems that traditional project management methods cannot solve. The common calculation methods of key chain project management buffers are introduced in detail. The buffer calculation method is improved and a new management method is proposed. The new method is validated as a valid buffer calculation method.

Keywords: Buffer Management Method, Key Chain Project Management, Work Method

1. INTRODUCTION

Dr. Eliyahu M. Goldratt, the founder of the Theory of Constraints (TOC), published a management novel "Critical Chain" in 1997, introducing TOC theory into the field of project management. The Critical Chain Project Management (CCPM) emphasizes project management from a systematic perspective. Key chain project management based on statistical principles and organizational behavior theory, under the influence of student behavior syndromes such as student syndrome, Parkinson's law, etc., led to the completion of projects with sufficient time, project cost overruns or sacrificed project design scale. With regard to the content and content of this issue, it proposes to estimate the construction period with a probability of 50%, and integrate the uncertainty factors of a single process into the buffer of the project [1]. The key chain is taken as the key point of project management. By reducing the delays in the management of the buffer zone and improving the efficiency of project implementation, the problems that traditional project management methods cannot solve can be solved. CCPM has been used successfully in a number of European and American developed countries: The Israeli government expressly stipulates that companies must obtain formal training in key chains to obtain defense research and development contracts or orders; otherwise, they are not eligible to compete; some well-known software companies have started to key The chain management method is embedded in its project management software, such as the PS8.

2. THE PRINCIPLE AND PURPOSE OF SETTING THE BUFFER

The setting of the buffer zone is like buying insurance. If there is no insurance company, then everyone should prepare some money to deal with various unexpected situations. Not everyone may have encountered an unexpected situation, but in the event of an unexpected situation, money is definitely not enough for the individual; people who do not encounter unexpected situations will usually spend the money again. Similarly, it is wasteful for such one-off activities as projects. With an insurance company, everyone needs only a few dollars to get more protection. According to this principle, each activity in the project network can be seen as an insurance object, and the time difference of each activity—the difference between the latest start (end) time and the earliest start (end) time—is considered to be Insurance premiums regard the buffer zone as an insurance company. Less security time is added to the buffer from each activity and the entire project is effectively protected[2].

The work chain C1 consists of a series of activities to form a work chain. Assuming that the chain length is L, the estimation of the execution time of each activity includes a certain amount of security time. It is assumed that the probability of all the activities in the work chain C1 completing in such a long time is L P. The length of the rectangles 1, 2, and 3 represents the estimated execution time of the activity. S1, S2, and S3 indicate the security time of activities 1, 2, and 3, respectively. S is the buffer length. If the security time of each activity is separated and all are placed behind the work chain, an "aggregated" security time is formed. This "aggregated" security time is equal to the sum of the security time of each activity on the work chain, as shown in Figure 1. The work chain C2. However, from the principle of risk aggregation (Aggregation of Risk), it can be seen that the probability that all work in the work chain C2 is completed in such a long time in L will be greater than P. In this case, the same protection effect can be

achieved with less safety time. The middle work chain C1 has the same effect as the work chain C3 [3].

3. BUFFER MANAGEMENT CALCULATION METHOD

The following are three commonly used methods of management calculations. The meanings of the formulas are as follows: Tb represents the buffer size; j is the process number of the project project; t represents the time confidence of the project project; I is a non-critical chain. Tier 1: Half of the sum of the 90% of the estimated time value of the critical chain project and the 50% estimated time difference, ie Tb=1/2 Method 2: Half of the estimated 50% of the activity duration on the critical chain project, That is, Tb=1/2 Method 3: Root Variance Method. First determine the value of the execution time of the project on the critical chain, that is, the execution time calculated using the conventional method is Sj, the execution time of the estimated process j is obtained as aj, the difference between the two is j=Sj-aj, then the buffer The size of the above three cache management methods are the most commonly used, although the operation is simple, but it is too sloppy to handle. Determining the execution order of tasks, allocating appropriate resources, meeting project constraints, and achieving expected goals are the four basic principles of project scheduling. Using project scheduling theory to solve the problem of resource conflicts in key chain project management is a hot topic in recent years. Rabbani [4], uses the reverse scheduling method to consider the random network environment and studies the problem of how the critical chain is determined under the condition that the activity has a definite time probability distribution. Liu Shixin et al. designed a heuristic algorithm based on priority rules under the resource-constrained project scheduling theory, taking into account the free time of the activity under resource constraints, and then using the root variance method to calculate the buffer. This method sets time buffers for activities on non-critical chains, which not only protects the critical chain, but also reduces the net cost of the project. Solving resource constraints has always been an important part of the critical chain approach [5]. In the existing research, heuristic algorithms are mostly adopted, and the project scheduling theory is used to solve the problem of resource conflicts on the critical chain. In the future, further consideration should be given to how to comprehensively deal with the determination of buffer size and resource conflicts.

4. BUFFER MANAGEMENT NEW METHOD

Here we combine with the expert's research to propose a new processing method—an experience-based buffer setting method. In the above three methods mentioned by us, although they are easy to operate and simple to implement, they do not take into account the actual conditions and characteristics of the processes. They cannot be dealt with specifically according to the particularities of the processes. They lack reasonable inference and are strict. For example, such treatment is too simple and sloppy. The new method can estimate the risk index of the project, and then classify the buffer demand according to the rating. The specific implementation operation process is as follows:

(1) The data must first be handed to an experienced team of experts. They can estimate the probability of a shortage of resources in each key chain project project. (2) Consider the sub process as the important value of the project of the entire critical chain project as S ij. The corresponding cost that can be paid is E ij. We score for each of them and we can calculate the risk index R ij =S ij ×P ij ×E ij (3) According to the risk index, that is, the value of Rij can classify the buffer demand level: then the value of Rij is from Sorting is small, and then ranks are sorted. Among them, R ij is one of the effective methods of buffering the ratio of critical chain project time δij and buffer demand. The effective method is to set the buffer management decision-making square, and the probability period of fifty percent appears. The probability of delay is high, so managing the buffer zone is an important step in the key chain project. The above method is used to pave the way, and then combined with the progress of the key chain project, and also the items on the critical chain are divided into three equal parts, and a buffer management decision-making square can be obtained. The description of the buffer management decision-making grid: (1) Under the impetus of this approach, the situation will be better than we expected, and in most cases we will finish ahead of schedule. (2) It is simple and easy to carry out, and the progress is good. There is no need to take excessive measures and actions. (3) Since we will consider the influence of "Student Syndrome", we should change the green color to yellow, which will, to a certain extent, exert a supervising effect on students. (4) According to the original plan, it should be yellow at this time, but the project of the work chain has almost reached the end of the project and the buffer zone has one third of the remaining area. There has been no unexpected trouble, so change it to green. . The project progressed smoothly and no other measures were required. (5) If the progress of the project is okay, but the buffer zone is not enough, the monitoring of the project work should be accelerated and the project control should be strengthened on this basis. (6) In the beginning, it is red, and there is no extension of the construction period, and the progress of the work chain is also close to the end. If the interference factors in the project process are not as much as imagined, it will generally be changed to yellow, and quiet attention will be paid to the development of the project. Happening. (7) If there are serious difficulties

in the project, remedial measures can be implemented and corresponding solutions taken to ensure the smooth progress of the project. (8) If necessary, certain radical measures may be used to reduce delays more or less.

5. KEY CHAIN PROJECT MANAGEMENT FUTURE DEVELOPMENT DIRECTION

(1). Further research on multi-resources and multi-project issues Generally, the management of key chain projects is limited to single project management under a single resource. Research on how to determine the critical chain and buffer size settings for projects containing multiple resources is currently scarce. Although the predecessors involved, the method of managing multiple resources in multiple projects is not perfect. It is often on the basis of shortening the construction period that the cost will increase and the others will be lost. Or, although the stability of the problem and the project progress of the overall optimization are solved, the problem of buffer determination in the multi-resource and multi-project environment is not solved. (2). The influence of human factors The reason why a large amount of safety time is included in the study period is due to human factors, and the safety time is often wasted due to factors such as student syndrome and premature completion of the report. Therefore, research on human behavior and psychology will be a more important and meaningful research direction in the future. However, people's behavioral factors are difficult to measure, individual differences, etc., so how to determine the key role of people in the implementation of the project and make full use of it is a worthwhile issue in the future. The existing key chain project management methods are mainly based on the shortest construction period as the main optimization goal. However, in actual situations, project management often considers not only project duration, but also multi-objective optimization, such as the lowest cost, the lowest level of resource consumption, etc. . For example, if a project follows the current trend, although the project duration will exceed the planned duration, it will not exceed the contractual party's final deadline. In order to save project costs, it is not necessary to change the schedule at this time. Therefore, the problem of buffer setting based on multi-objective optimization in key chain management still needs further study.

Conclusion

The setting of project buffers is a core part of key chain project management. This new method not only shortens the construction period, but also increases the probability of completion on time. As a new type of project management technology, buffering has attracted the exploration and research of many scholars. However, research on buffer setting methods has not yet formed a system, and research is relatively rare. This article summarizes the buffer setting method by comprehensively combing the existing domestic and foreign literature, and classifies and reviews it scientifically. By reviewing the setting methods, a clear research context can be formed, and combined with the current status and insufficiency of research, further research directions are proposed.

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