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**АДАМАНТ**

**FORMATION OF COMPETENCE IN PROJECT ACTIVITY PLANNING UNDER  
CONDITIONS OF VARIABLE RESOURCE LIMITATION WITH THE HELP OF  
"PRIMAVERA" SOFTWARE**

*The article considers formation of competence in project activity planning in the process of project management specialist training based on project realization process modeling with the help of "Primavera" software using the innovative approach of variable resource limitation for further project implementation graph optimization with a detailed analysis and report of the changes made.*

Innovations implementation has become a mandatory tool in the struggle for leadership in modern highly competitive markets. The tendency to reduce the duration of product life cycle continues invariably, which requires constant adjustment of businesses and improvement of existing solutions. Under these conditions, the high level of uncertainty in the process of project plan developing and a large number of changes during project realization is becoming a typical feature of innovative projects.

The nature of innovative projects implementation has acquired specific features. There are almost no cases of project implementation according to a previously designed detailed plan. In real conditions the project manager encounters the need of constant changes and optimization of the project plan within the framework regulated by the contract. This task requires the project manager to have a high level of competence in project activity planning and change management.

According to current market requirements, the basic project activity planning course in the project management specialists training program, which ought to ensure the necessary level of competence for successful project implementation, is no longer sufficient since it does not include classes with application of acquired knowledge in situations of project plan changes. It is also necessary to form the ability to analyze changes and resource limitations in the project with their further optimization.

Acquiring this knowledge in the process of education is only possible if we create models that reproduce the specifics of comprehensive projects with clearly defined resource limitations and enable the analysis of the changes made at the stage of project realization. The system must provide sufficient speed of model development within the academic hours allocated for the course.

In order to model the process of the project realization with the changes of project implementation conditions it is proposed to use a variable resource limitation approach. Using the approach involves two stages: "Creating a project model" and "Application of the variable resource limitation approach."

**Creation of a project model**

The project model, with the help of which students can analyze variable resource limitations, should include a list of variable factors of the project through the optimization of which the project will be managed. To fulfill this condition it is necessary to form initial data before the development of the project model.

Initial data for the planning stage should include a summary of the project and a list of limitations that regulate the project. The basic list of project model creation limitations at the planning stage provides information about the duration of the project, the project cost, OBS and WBS structures, and workforce and material resources limitations to be applied in the project. There shall also be a list of project activities describing the technological sequence and intensity limitations of their implementation with the help of project resources. Using data concerning the limitations students can create project models by themselves.

Firstly, in order to apply the approach students need to develop a detailed comprehensive plan of the project. Comprehensive planning involves distribution of the project plan into the following blocks: design, tendering, delivery, major project activities and others. Comprehensive planning

enables to model the situation with the emergence of changes in different groups of project activities and keep track of their interaction. The results of activity packages interaction analysis in project realization gives students an illustrative example of project implementation specifics on the principle of network planning, which significantly increases the efficiency of specialist competencies and skills formation.

Secondly, there should be a list of resources necessary for the project implementation with their further distribution into activities, as well as quantitative and cost estimation. This data must be compared with the initial data and optimized within the task.

Thirdly, in order to enable project analysis it is necessary to create a target project plan, i.e. a copy of a model with time, resource and cost indicators. When creating a target plan one should clearly define the mechanism of data analysis and create a list of project milestones.

#### **Application of variable resource limitation approach**

The second stage of variable resource changes approach also regulates the formation of the initial data. They include a list of influence factors which will be the subject of student research.

Influence factors are events that cause changes of the basic limitations such as:

- 1) Time limitations.
- 2) Financial limitations.
- 3) Workforce, nonlabour and material resources limitations.

Typical examples of factors of influence include violations of financing schedule, delay in a certain project activity package, temporary absence of project management group members, delay in project documentation issue, delay in project supplies terms, detection of significant defects of project activities and others.

In fact, influence factors can be classified as project risks. Only by using a comprehensive project model can students have the opportunity to conduct qualitative and quantitative analysis of influence factors, examine their influence on each part of the project and plan anti-risk measures [1]. The list of influence factors should assume their variability, i.e. focus on the change of different kinds of basic project limitations.

Students must take turns to model influence factors of the project according to the task and perform project analysis in order to determine deviations from the target plan. As a result of the analysis they should prepare a report on the progress of project implementation describing the changes of all the basic project limitations.

The next stage is the optimization of project limitations in order to ensure project implementation according to the initial data. To provide project realization modeling it is only allowed to optimize that part of the project which is performed after the influence factor emergence. Optimization phase also includes a report on the project progress with a list of changes in the implementation plan. This report is the initial information for changing the plan for the project management group and coordinating all the participants of the project.

In case the planned time reserves are not enough to level influence factors a report should be made according to the procedure of project change management [2]. The deficiencies detected in project implementation plan are to be recorded and the project model is to be fully changed.

#### **Application of "Primavera" software**

Using the variable resource limitations approach in project realization without applying modern powerful planning and calculating automation system implies significant time spent on project modeling on the principle of network graph construction, making changes and calculating changes of all the project milestones. The time required for the development of each model within the individual approach by far exceeds the time allocated for studying project planning in the course of project managers training.

Project Management module within the "Primavera" software package is a powerful tool for multi-project planning and monitoring, which operates on the basis of MS SQL, Oracle and provides the possibility of scaling project management system in an organization [3].

"Primavera" Software enables the development of a detailed comprehensive project implementation plan using network approach. Automated mechanism of calculating the project

resources usage given the limitations saves time for quantitative and cost estimation of the project.

One of the features of "Primavera" software is a possibility of saving the project plan as a full copy of the project model with a possibility of further changes in the original copy of the model. This feature provides the comparison of a basic project plan with the project model after the application of project influence factors and direct optimization the basic plan without changing the actual state of the project.

Another advantage of the program is a wide range of project analysis mechanisms and notifications about project changes. Customized reports of the project according to the requirements of the project milestones enable to carry out quick project analysis in the process of optimization.

### **Conclusion**

Application of the variable resource limitation approach using «Primavera» software makes it possible to reproduce the process of realization of real projects not only at the planning stage but also at the stage of project realization. Modeling project implementation with variable resource limitation enables students to develop skills of analyzing the project progress and quantitative estimation of the project, develop the ability to optimize project resources and acquire practical skills of using the changes management mechanism in the project.

Implementation of «Primavera» software in the process of project managers training enables to model situations that provide approbation of theoretical knowledge acquired during the course of study.

The competence in project activity planning with variable resource limitation enables to apply the project management methodology under in the conditions of constant changes, adaptation and optimization in innovative projects.

### **References**

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