

Controlling as a tool of the project management

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1. Introduction

Project controlling applies to activities of a company which leads the project-activity. A task of the project controlling is the assurance of the effective preparation of projects and the assurance of their efficient realization. The project controlling delivers to project managers suitable tools, which contribute to the proper division of the competence and the responsibility. These tools have a direct influence on the rationalization of the costs in the project preparation and its realization.

A main objective of the article is to present the gist and the significance of project controlling in the management and the indication of the most important tools.

2. The gist of the project controlling

A *project* is determined as a single task with a defined duration, definite resources and with the definite target of its realization, most often delivering solution of the concrete problem in the company¹. The main features characterizing the project are:

- purposefulness – the success of awaited effects,
- innovativeness – the target of the project is unrepeatable within the conception and the realization,
- temporariness – the project has the beginning and the end,
- complexity – the utilization of different resources and know how,
- autonomy – the project is realized parallel with relation to the current activity of the company,
- risk – always greater than in case of routine activities.

Two horizontal levels of controlling can be marked in companies, which lean their activity on the realization of projects:

- controlling of the single project (it has to assure the profit from realized contract),
- controlling of project-groups (the assignment of results to each projects, according to the calendar or reporting period).

Projects can be classified according to different criteria (table no. 1).

Types of projects

Criterion	Types of projects	Description
The target of the project	of development	targeting the development of the company
	of reproduction	necessary for the maintenance of the running activity, the reduction of costs
	of adaptation	targeting adaptation of activities of the company to changed norms or legal regulations
	from the range of research and development	fixed on the creation of new products or technologies
The area of the project activity	of investment	connected with costs for the creation of new assets or additions to fixed assets
	organizational	connected with restructuring activities
	business	targeting conquest or the enlargement of markets
Size of the project	technical	connected with the processing
	Large	the cost of the project above 25 millions EUR, the labour intensity above 50 people/year, the number of the project-team above 50 people
	average	the characterization among large and small projects
	Small	the cost of the project till 0,05 millions EUR, the labour intensity below 0,4 people/year, the number of the project-team to 6 people

Source: M. Łada, A. Kozarkiewicz-Chlebowska, *Podstawy controllingu projektów*, AGH, Kraków 2005, p.13-16.

The person responsible for the project must take part in its realization before the approval of its run, settlement of time-limits and determination of costs. The project director is the highest decision-maker in the hierarchy, responsible for the realization of the project. He answers for the long-term choice of projects and their realization, directly before the management, stockholders, shareholders or external customers. The project manager answers for the coordination of activities within the framework of the project, ensures its realization in accordance with the business of the company. The project controller is accountable for: the coordination of the realization of several projects, delivery of information necessary to the proper utilization of resources, interpretation of figures and the transparency of costs. The regional or technical manager bears responsibility for the counteraction to deviations. To the remaining people directly connected with the concrete project ought to be numbered also the project team – employees directly committed into the realization of the project, the essential team, whose aim is to help in difficult cases connected with the project. The current actualization of changes in the project is the background of the planning, forecasting and inspection of the project-activity and simultaneously the necessary, decisive condition regarding the responsibility for the realization of the project.

3. Elements and tools of project controlling

The specificity of business or spheres of the project use decides about the variety of models of the life cycle of the project. This cycle consists of five stages²:

1. defining of the project – the specification of the target and determination of possibly solutions, as well as the qualification of the time and resources intended on the realization of the project,
2. planning – the arrangement of the main objective on tasks and their embedment within the time framework (the settlement of the schedule of works for each member of the team, determination of „milestones”, it is: separated stages of work),
3. realization – the enforcement of the plan worked out,
4. inspection – the coordination of work of the team with the schedule, eliminating of deviations between planned and real run of work,
5. closing – the delivery of the ready project to the customer, settlement of the project (final report), evaluation of the project and drawing conclusions for the future.

3.1. Planning of the project.

The phase of the project planning is a moment, where the active formation of the project run, costs and values follows. The operating-planning begins with the moment, when the project is close to the phase of the realization, and assumptions of the project determine the operating-plans. Basic measurements of the planning of the project run are: the range of the project defined in detail, the quality and the time-limit of its realization. Then, activities are settled, which lead to the success of established features of the project. These activities are spread on the definite time of the project. A following stage is the allocation of resources to each activity and a check of their accessibility. In the last order, there is determined the influence of the project on the economic-financial situation of the company.

A most popular method of the planning of the project run are timetables, qualified also as Gantt graphical graphs. There is a graph prepared, whereon the horizontal axis is the time, and the vertical axis presents activities realized within the framework of the project. The preparation of the timetable consists in the drawing of the period of the realization of each activity in a form of sections, which present the lengths of the duration time on the accepted time scale (picture no. 1).

The improvement of Gantt graphs determines the idea of milestones, consisting in the marking of decisive moments of every activity, just milestones which determine coordinative and supervisory points of the project.

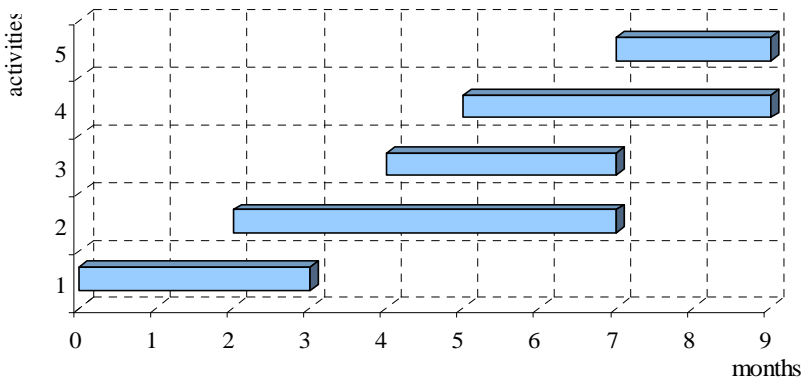
In the phase of the operating-planning the essential role plays the estimation of the size of requisite resources necessary to the realization of each activity of the project. Plans of the utilization of resources are quantitative plans. They show how many units of the given supply ought to be gained and used up, in order to fulfil the activities of the project in the appointed time. The planning of the project run determines the introduction to the fundamental issue in the project planning which is the qualification of costs and advantages, which can be reached thanks to the realization of the project.

Costs of the project are the values (expressed in money) of own resources of the company and resources of third parties, used directly and also indirectly in connection with the preparation and realization of the project. The methods of the planning with reference to costs of the project can be shown as follows³:

- the planning on the rule of the analogy – the information on real costs of similar projects and the correction of these values for differences between projects,
- the parametric modelling – planning of project costs basing on constant cost parameters by qualification of the unit cost for essential variable units,
- the planning from the ground up (basic) – qualifying of costs without reference to real data of other projects,
- computer models and other techniques (Harvard Project Manager, Microsoft Project, CA SuperProject, SureTark Project Manager, Primavera Project Planner)⁴.

Picture no. 1

The Gantt graph – planned schedule of the realization of the project



Source: M. Łada, A. Kozarkiewicz, *Rachunkowość zarządcza i controlling projektów*, Studia Ekonomiczne, C.H. Beck, Warszawa 2007, p. 110.

The planning of costs consists in suitable estimation of prices of resources and calculation of the quantity of necessary resources on the value of these resources, taking into account the accepted price level. The estimation of costs with the method ABC consists in separating of activities in the functional sphere of the company, then in classifying of elementary acts into processes (homogeneous) and also in defining the costs carrier of the process and in the settlement of costs of the process⁵.

In the stage of the operating-planning the value of the project must be transferred on concrete advantages expressed in value. A most simple manner of the measurement of the project value is applying the market prices in analyses. To the comparison are subjected the market value of the project and costs of its

realization. The fixed price of the project determines the financial dimension of obtained financial advantages and is first of all a business decision.

A following stage of the project planning is a planning of cash flows connected with the project. It is a planning of inflows and outflows necessary to the realization of the project and their assignment to these periods, in which they will appear. In the whole life cycle of the project the value of inflows is equal to incomes or to other advantages reached during the realization, and expenses / outflows are equal to the cumulative sum of costs reduced by the not financial cost (e.g. the amortization).

It is also proper to mention that the planning of the project is also the indication of performers of each project activity.

3.2. Calculations of the project⁶.

Before the decision about the realization of the given project there are prepared calculations, which, depending on the phase of the project, can be divided into preliminary calculations and offers.

Preliminary calculation is treated as the first element of the selection of potentially unprofitable projects, these, which wander from the basic profile of the activity of the company. This calculation helps to estimate, whether some quantity of potential users exists. The preliminary calculation determines a superficial estimation of material and personal costs, which are necessary to the realization of the order and must prove that the prospective profit or advantage are greater than their minimum- awaited value, expressed as an amount and as a rate of return. In this calculation takes place also the split of projects regarding the value and the time of their realization into:

- long-term projects (at least two or three months') – there is a detailed inspection of projects carried out,
- short-term projects – following stages of project controlling are limited to the estimation of the result, and the final settlement.

The preliminary calculation is based on the average historic unit cost of the supply and on the analogy to already finished projects:

Cost = the duration x the number of units of the supply x the average cost of the unit of the supply.

A task of an *offer calculation* is to fix the full cost of the project realization and offer price. The difference between these amounts determines the expected profit of the project. The offer calculation includes:

- planning of time-limits of the project realization,
- planning / the accessibility of productive capacity,
- planning of costs,
- setting the offer price.

This calculation is distinguished by the greater degree of the analysis' details than the preliminary calculation.

The submission of the offer is an element of the preparation to the negotiation of conditions of the project realization: the time, methods of the financing, the possibility of taking advantage of services of subcontractors. During the negotiation of the conditions, there are worked out simulations of the proposed solutions of the economic effects. After finishing the negotiations, the cost of the project realization for negotiated conditions are calculated once again.

3.3. Budget of the project

A basic tool of the planning of resources and costs of the project is a budgeting which is define as the process of preparing, approval and the inspection of the realization of the project budget. The budget of the project is a document presenting the way of the allocation of resources accepted to the realization. The budgeting procedure consists of three phases: the preparation of the budget, the realization of the project and the inspection of the budget realization. In the budgeting cycle there are prepared two documents:

- the budget of the project (plan figures which show the financial aspect of the project),
- the report on the realization of the budget (the comparison of the budget data with the real results of the project).

A base of the budget preparation are strategic and operating plans of the project, and especially the timetable of the project. In the phase of the budget realization the performers of the project are guided by the project assumptions, so they aim to reach such a financial effect, which was forecasted in the budget. In the last phase, it is in the inspection of the budget realization, the comparison of the real values with the budgeted values takes part and the deviation between these figures is fixed. The analysis of deviations leads to discover the irregularities and to collect suitable activities.

The budgeting of projects can be presented as the capital and operating budgeting. The capital budgeting is intended for long-term decisions, for investment projects with a great value, whose realization has a considerable influence on results and a financial situation of the company in a long-term (above one year). The operating budgeting applies to decisions of the definite, short period (till one year). The operating budgets can be prepared for projects of costs, incomes and of investment, but within the range, which refers the period on which the general budget is prepared. The table 2 represents different classifications of project budgets with short description.

Table no. 2

Types of project budgets

Criterion	Types of the budgets	Description
Time	Short-term	For long- and short-term projects, can be used practical exclusively for the given project without any connection

	Long-term	with budgets of other areas of the activity. The period > 1 year, prepared within the capital budgeting and refer exclusively long-term projects.
Period, which the budget refers	Constant	The period is calendar-stable, equal to the cycle of the project realization, and the approved budget is obligatory until the completion of the project.
	Progressive	Systematically verified on following budgetary periods during the realization of the project.
The range of the project included in the budget	Comprehensive	Include the whole cycle and the range of the realization of long- and short-term projects
	Partially	They include a part of the range of the project
The range of budgeted data	Net	Positions: incomes, costs, outlays, financial flows are directly connected with the project.
	Gross	It includes direct results of the project and positions indirectly connected with the project.
The way of fixing the budget data	By analogy	Prepared on the basis of historic data i.e. incremental budgets.
	From the beginning / base budget	Prepared on the basis of the project timetable and on the prospective application on resources.
The way of coordination the budget data	Top-down	Prepared under supervision of superiors by other divisions and forced to the project performer.
	Down-top	Prepared by the project manager, negotiated with superiors and after corrections confirmed to the realization.
Preparation of budget data to inspection	Static	Each position is determined in an amount. In the phase of inspection the value of these positions is a comparative base for real figures and for the calculation of deviations.
	Flexible	Each position is described as a formula taking into account the degree of the project realization.

Source: own study, based on: M Łada, A. Kozarkiewicz, cited book, p. 135-137.

In the literature appears also the idea of the ‘screenwriting’ budgeting of projects⁷. The idea of this budgeting consists in the preparation of several alternative budgets of the same project for different variants of its realization, it is:

- the basic plan – for the most probable ‘screenplay’,
- the optimistic variant – the expected financial situation at advantageous conditions of the environment,
- the pessimistic variant – the prognosis of results of the unprofitable ‘screenplay’ of the market situation.

A most often obligatory version of the budget is the one calculated according to this example:

$$(\text{the optimistic budget} + 4 \times \text{the realistic budget} + \text{the pessimistic budget}) \times 1/6.$$

3.4. Inspection of the project realization

The inspection of the project realization consists in the current monitoring of the project run and attained results. One of methods of the inspection is the comparison the real data with planned ones, and drawing conclusions concerning the estimation of the existing project run, and also the further ‘fate’ of the project.

Supervisory activities are evidenced in form of suitable reports, which show the project progress and the realization of the project budget⁸. Supervisory reports can be divided into three groups: reports about problems (prepared in case of the recognition or expectation of difficulty, in order to take the immediate action), reports about progress (control of the real project run and the check with the planned schedule) and financial reports (the analysis of real results and their comparison with budgeted values).

The inspection of the project in the phase of realization gives the possibility of the influence on further stages of the project, and the inspection of the realization of the whole project gives the necessary knowledge for the realization of following projects in the future. The final analysis of the real results is carried out after the project accomplishment and these are so called analyses or ex post audit of the project.

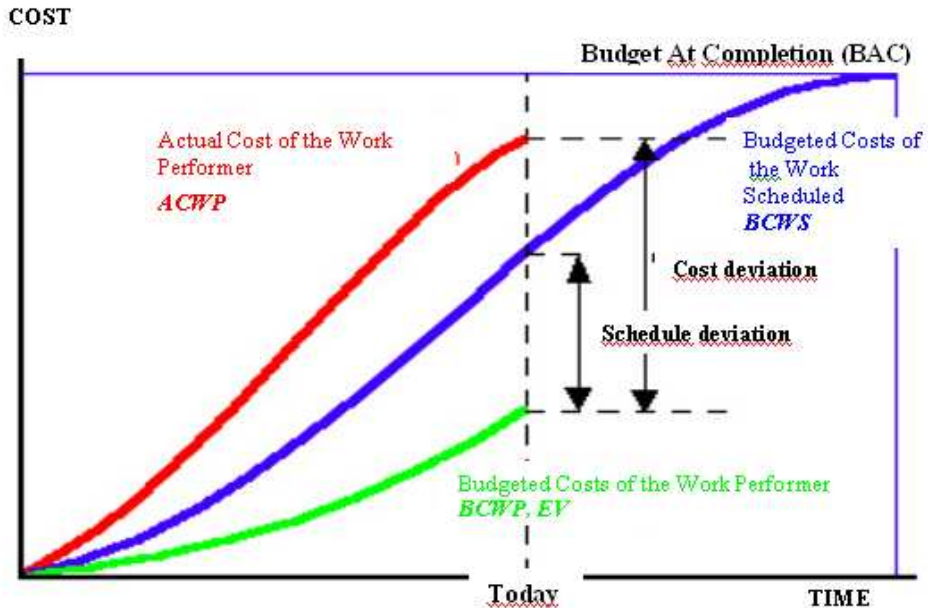
The report on the realization of the budget contains the comparison of these in fact recorded figures with these planned in the budget, and the calculation of deviations. Deviations from the budget can be divided into:

- essential – concerning the key-position for the project,
- independent (not under control) – as an effect of a wrong estimation of a value being outside the influence of the performer, at the moment of the budget preparation,
- dependent (controlled) – as a consequence of another way of the project realization than planned in the budget.

The determination of acceptable limits of deviations is the criterion of the classification of deviations as significant (exceeding the deviation limit) or insignificant (being within the determined limits).

The comprehensive look at the project, with regard to the quantity of performed work, the time of its realization and costs assures the method of the earned value (EV). Thanks to this method it is possible to track the realization of the budget by defining, how much the real costs amounted and how much should amount the planned costs. The method EV allows to estimate not only the real performed work, but also to forecast the further workflow (picture no. 2)⁹.

Forecast of costs and time of the project realization with the method EV



Source: own study, based on: T. Tammo Wilkens, Earned value, clear and simple, Los Angeles County Metropolitan Transportation Authority, http://www.projectsmart.co.uk/docs/earned_value.pdf, 1999.

The entire budget of the project – BAC (Budget At Completion) ought to be divided into costs of each assignments in the schedule¹⁰, what will make possible to calculate and to outline a curved line: planned cost of planned activities – BCWS (Budgeted Costs of the Work Scheduled). The value at the moment of the project end is equal the entire budget of the project (BAC). The curved line is outlined by division of assignments, the schedule of the project and then by attribution of suitable costs to each assignment in the schedule. The preparation of the list of assignments in a form of a schedule demands the exact analysis of the existing system, so that it would be possible to identify potential difficulties as earliest. A following step is the determination, which assignments had been performed till the day of the inspection. The planned cost of these assignments, recorded in the budget, is a base for drawing a line of cumulated earned value – BCWP (Budgeted Costs of the Work Performer, Earned Value). This line answers a question: how much according to schedule should cost this, what was produced / performed in the project:

$$EV = \text{Progress of Work (\%)} \times BCWS$$

The calculation of EV has a certain measure of the subjectivism, because the project manager must estimate the progress of works; here can be used the technique of milestones.

The actual cost of performed activities - ACWP (Actual Costs of the Work Performer) creates the next line presenting the sum of expenses, which really were incurred from the beginning of the realization of the project. The data to assignment this line come from invoices and bills evidencing incurred expenses, and also from documents recording the working hours of workers (in this way we can take into account wages costs).

On the basis of this data there is calculated a deviation from the schedule – SV (Schedule Variance):

$$SV = \text{Earned Value (BCWP)} - \text{Budget (BCWS)},$$

and from the budget (the deviation of costs – CV (Cost Variance):

$$CV = \text{Earned Value (BCWP)} - \text{Real Costs (ACWP)}.$$

Other practical measures of the project realization are:

1. The index of Cost Effectiveness (CPI - Cost Performance Index):

$$CPI = EV / ACWP$$

The index lower than 1 means that the budget was exceeded.

2. The index of the Realization of the Schedule (SPI - Schedule Performance Index):

$$SPI = EV / BCWS$$

The indicator lower than 1 means the delay of the schedule.

3. The percentage of the Project Accomplishment (PC - Percentage of Completion):

$$PC = EV / BAC$$

PC means the real percentage of the completion of the whole project, with regard to deviations of costs and the schedule.

4. Estimated cost of the project (EAC - Estimate At Completion):

$$EAC = ACWP / PC$$

EAC informs, how much will amount the entire budget of the project with regard to current deviations.

5. The estimated delay of the budget (VAC - Variance At Completion):

$$VAC = EAC - BAC$$

VAC informs, how far it is likely that the budget of the project will be exceeded.

After the close of the project there is carried out an ex post audit, it is the final verification of the effectiveness. It consists in examining if all targets of the project

were realized and whether its run was correct. Results of this analysis cannot already have an influence on the project, but can deliver valuable conclusions for future projects.

4. Conclusion

The article is an attempt to concentrate the knowledge about project controlling. The interest in this subject is connected with the continuously growing role of projects in many companies. Managements of these companies aiming to flexibility of their own activity, trying to adapt to a dynamic environment, trying to fulfil the requirements of customers and in connection with growing competition, are forced to changes, and to create new ideas. The companies run their own activity more and more often in the direction of the project-activity.

One of prior tools of project controlling is the system of their estimation which should be adapted to the specificity of every company and to the kind of the realized projects. It is not possible to construct one, universal model, which will determine a point of reference. The variety in the project-activity causes the necessity to build the models individually, for own specific needs and functional circumstances.

Key words:

Controlling, Project controlling, Management, Budgeted Costs.

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Summary

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