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APPLICATION OF THE WORK BREAKDOWN STRUCTURE IN DETERMINING COST BUFFERS IN CONSTRUCTION SCHEDULES

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The paper presents methods of determining the location of cost buffers and corresponding contingency costs in the CPM schedule based on its work breakdown structure. Application of correctly located cost buffers with appropriately established reserve costs is justified by the common overrunning of scheduled costs in construction projects. Interpolated cost buffers (CB) as separate tasks have been combined with relevant summary tasks by the start□to□start (SS) relationship, whereas the time of their execution has been dynamically connected with the time of accomplishment of particular summary tasks using the "paste connection" option. Besides cost buffers linked with the group of tasks assigned to summary tasks, a definition of the cost buffer for the entire project (PCB) has been proposed, i.e. as one initial task of the entire project. Contingency costs corresponding to these buffers, depending on the data that the planner has at his disposal, can be determined using different methods, but always depend on the costs of all tasks protected by each buffer. The paper presents an exemplary schedule for a facility and the method of determining locations and cost for buffers CB and PCB, as well as their influence on the course of the curve illustrating the budgeted cost of work scheduled (BCWS). The proposed solution has been adjusted and presented with consideration of the possibilities created by the scheduling software MS Project, though its general assumptions may be implemented with application of other similar specialist tools.

Keywords: Cost Estimating, Cost Contingency, Cost Buffers, Work Breakdown Structure, Construction Project

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1. Introduction

Methods of planning building schedules that would be resistant to numerous risk factors during facility projects have been sought for a long time [1–9]. One of the proposed solutions is locating elements known as buffers in the schedule hierarchy; they gather reserves to be released in the case of expected or unexpected disturbances during the building works [10,11]. Most reports focused on this issue are based on traditional PDM or ADM CPM schedules [12]. E. Goldratt, the founder of the theory [13], concentrated mainly on schedule supervision in order to meet the scheduled deadline of enterprise accomplishment and described methods of determining time buffers. In literature this method is known as Critical Chain Scheduling and Buffer Management (CC/BM) [14] and represents expanded solutions known as the Theory of Constraints (TOC) [13].

Fulfilling the scheduled time of enterprise accomplishment is obviously a crucial issue; however it is not the only one that results in a successful contract. It is equally important (if not the most important) to stay within the scheduled budget. Numerous studies by various authors carried out at different facilities and at different times indicate a common problem of overrunning of scheduled costs [15-19]. The authors of these reports have pointed out a number of factors responsible for this phenomenon, e.g. non-realistic or over-optimistic cost planning for the project accomplishment. In the search for solutions to achieve higher economical effectiveness for both the owner and the work contractor, attempts to optimize costs are highly justified. However, the quest for additional income often exceeds the limit of feasible possibilities and brings the opposite results, i.e. overrunning scheduled costs, difficulties fulfilling the time schedule, activation of unscheduled reserves, decrease in quality standards in the accomplished works, the charging of liquidated damages, etc. Negative effects appear if the party responsible for current obligations does not realize in time the hazards posed by lack of cash flow and is not prepared to cover costs other than those scheduled.

2. Methods

Introduction of time and/or cost buffers to CPM schedules comes down to two basic issues: setting their quantity and location as well as determining their value. In the case of time buffers, their location should be linked with the course of the critical path (or the critical chain when resources are included) and their duration is a function of the time in a protected sequence. In the case of financial buffers it should be considered whether the schedule will include both time and cost buffers, or only one buffer type. If time buffers are applied, then establishing their quantity and location is governed by strict rules. In this case it seems rather natural that separate cost buffers should not be planned; in turn the scheduled time buffers should be enriched with essential financial reserve measures. This solution has been presented by the author in an earlier report [20].

However, the case is different when the schedule needs to be enriched only in financial buffers. The paper presents a solution in which the basis for setting the location of cost buffers is the work breakdown structure (WBS) accepted in the schedule. The proposed solution has been adjusted and presented in consideration of the possibilities offered by MS Project scheduling software. However, its general assumptions can be implemented with application of other specialist tools.

As commonly recognized, most schedules for building facilities are constructed with a multi-level WBS structure. This solution increases the schedule clarity, enables assigning responsibility for particular technological processes or single tasks to particular teams or persons. It allows for aggregating, analysing and presenting the schedule at several levels of detail, or precise planning of the distribution of time, resources and financial measures onto separate sub-tasks [12,21]. A work breakdown structure is usually created taking into account the course of particular technological processes and in connection with the employment structure of subcontractors or workgroups. As a result, the set of real activities at the lowest level of the WBS structure covered by a single summary task is usually uniform in terms of technology and reflects the execution of a particular facility fragment or work type. Accomplishment of a task group such as this takes place in similar conditions and with exposure to similar risk factors that can disturb the work process. Costs assigned to such tasks have also been created on a methodologically similar assessment. All these factors indicate that it is favourable to cover such a task group with one cost buffer. Their technological uniformity and exposure to similar risk factors allow reasonable determination of the quantity of indispensable financial reserve measures to accumulate in such buffers.

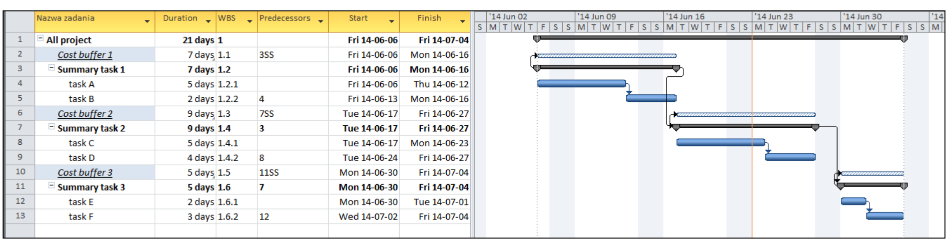
3. Buffer location

The range of each cost buffer introduced to the schedule has been assumed to cover an explicitly determined group of tasks distinguished at the lowest WBS level. On the other hand, each task at this level will be protected by one cost buffer. According to these assumptions, particular CB buffers should be correlated with summary tasks located at one level above the work describing the particular technological tasks, and each summary task at this level should be supplemented with a separate CB buffer.

Because the CB buffer protects all real tasks within a particular summary task, an arising solution locates the buffer at the same level as the real tasks, e.g. as the first or last task within a particular summary task. In this case, the cost assigned to the CB buffer will be added to the costs of a particular summary task. Unfortunately, this kind of solution has two significant drawbacks. Firstly, the calculation of the time of the summary task would be looped, because one of the tasks included in these calculations would be the CB buffer task, and it copies the time from the summary task. Secondly, due to the reasons presented above, the percentage advancement of accomplishing a particular summary task would be falsified during monitoring of the project accomplishment. In this case, the best solution is to create cost buffers as separate tasks, with their own accomplishment time and cost. Simultaneously, it is proposed to locate these newly created buffer tasks at the same level in the WBS structure as the summary task comprised of real tasks protected by the CB buffer.

The resulting task schedule is presented in Figs 1 and 2. Figure 1 illustrates three tasks of cost buffers, i.e. in the same quantity as that of the summary tasks at the second level of the WBS structure. In Figure 2, where there are four levels in the work breakdown structure, four CB tasks have been introduced; they are also correlated with all summary tasks at the secondlast level of the work breakdown structure (in this case at the third level).

Regardless the number of the applied levels in the work breakdown structure, in this method of locating CB buffers, all cost buffers have been located at the same level, which is the lowest level of summary tasks, i.e. one level above the real tasks.



	Nazwa zadania	Duration	WBS	Predecessors	Start	Finish
1	**All project**	**21 days**	**1**		**Fri 14-06-06**	**Fri 14-07-04**
2	*Cost buffer 1*	7 days	1.1	3SS	Fri 14-06-06	Mon 14-06-16
3	**Summary task 1**	**7 days**	**1.2**		**Fri 14-06-06**	**Mon 14-06-16**
4	task A	5 days	1.2.1		Fri 14-06-06	Thu 14-06-12
5	task B	2 days	1.2.2	4	Fri 14-06-13	Mon 14-06-16
6	*Cost buffer 2*	9 days	1.3	7SS	Tue 14-06-17	Fri 14-06-27
7	**Summary task 2**	**9 days**	**1.4**	**3**	**Tue 14-06-17**	**Fri 14-06-27**
8	task C	5 days	1.4.1		Tue 14-06-17	Mon 14-06-23
9	task D	4 days	1.4.2	8	Tue 14-06-24	Fri 14-06-27
10	*Cost buffer 3*	5 days	1.5	11SS	Mon 14-06-30	Fri 14-07-04
11	**Summary task 3**	**5 days**	**1.6**	**7**	**Mon 14-06-30**	**Fri 14-07-04**
12	task E	2 days	1.6.1		Mon 14-06-30	Tue 14-07-01
13	task F	3 days	1.6.2	12	Wed 14-07-02	Fri 14-07-04

Fig. 1. Example of schedule structure with location of three cost buffers at the second level of the work breakdown structure

	Nazwa zadania	Duration	WBS	Predecessors	Start	Finish
1	**All project**	**25 days**	**1**		**Fri 14-06-06**	**Thu 14-07-10**
2	**Stage 1**	**16 days**	**1.1**		**Fri 14-06-06**	**Fri 14-06-27**
3	*Cost buffer 1.1*	7 days	1.1.1	4SS	Fri 14-06-06	Mon 14-06-16
4	**Summary task 1.1**	**7 days**	**1.1.2**		**Fri 14-06-06**	**Mon 14-06-16**
5	task A	5 days	1.1.2.1		Fri 14-06-06	Thu 14-06-12
6	task B	2 days	1.1.2.2	5	Fri 14-06-13	Mon 14-06-16
7	*Cost buffer 1.2*	9 days	1.1.3	8SS	Tue 14-06-17	Fri 14-06-27
8	**Summary task 1.2**	**9 days**	**1.1.4**	**4**	**Tue 14-06-17**	**Fri 14-06-27**
9	task C	5 days	1.1.4.1		Tue 14-06-17	Mon 14-06-23
10	task D	4 days	1.1.4.2	9	Tue 14-06-24	Fri 14-06-27
11	**Stage 2**	**9 days**	**1.2**		**Mon 14-06-30**	**Thu 14-07-10**
12	*Cost buffer 2.1*	5 days	1.2.1	13SS	Mon 14-06-30	Fri 14-07-04
13	**Summary task 2.1**	**5 days**	**1.2.2**	**8**	**Mon 14-06-30**	**Fri 14-07-04**
14	task E	2 days	1.2.2.1		Mon 14-06-30	Tue 14-07-01
15	task F	3 days	1.2.2.2	14	Wed 14-07-02	Fri 14-07-04
16	*Cost buffer 2.2*	4 days	1.2.3	17SS	Mon 14-07-07	Thu 14-07-10
17	**Summary task 2.2**	**4 days**	**1.2.4**	**13**	**Mon 14-07-07**	**Thu 14-07-10**
18	task G	1 day	1.2.4.1		Mon 14-07-07	Mon 14-07-07
19	task H	3 days	1.2.4.2	18	Tue 14-07-08	Thu 14-07-10

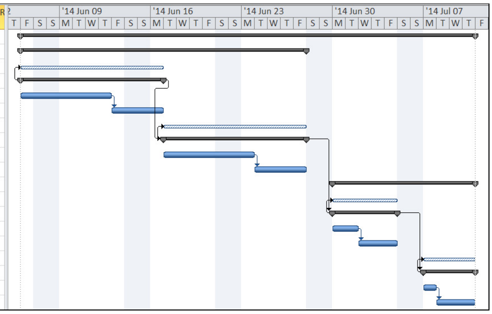


Fig. 2. Example of schedule structure with location of four cost buffers at the third level of the work breakdown structure

In the case when particular fragments of the schedule are constructed with consideration of a different number of levels of the WBS structure, the applicable rule recommends locating buffer tasks at the same level as the summary tasks most deeply implanted within the WBS structure. In the case when the work breakdown structure of the schedule is more expansive (i.e. has more than four levels), the location of all cost buffers in the second-last level would result in excessive fragmentation of the reserve measures and creation of an excessive number of buffers. Therefore, it is possible to locate the buffers higher than the second-last level. Such a decision requires analysing whether the group of activities protected by a particular buffer and assigned to several summary tasks is uniform in terms of technology and what influence it will have on the method of calculating costs for a particular CB buffer. Due to various risk factors influencing particular task groups, it is favourable to introduce more than one buffer, though this does not mean that each summary task should have its own cost buffer. It should be seen to, however, that the buffers are not duplicated at various levels of the WBS structure. Generally, each real task at the lowest level of the WBS structure should be protected by only one cost buffer. Fulfilling this rule will allow simple determination of the costs of these buffers.

An example of locating CB buffers at various levels of the WBS structure has been presented in Figure 3. In this case, for the first stage tasks three cost buffers CB were established at the fourth level of the WBS structure, connected with particular summary tasks. In the second stage, one cost buffer was established ("Cost buffer 2.1") at the third level of the WBS structure. Because the range of the last buffer encompasses two summary tasks ("Part I – Stage 2" and "Part II – Stage 2"), "Summary task 2" was additionally established at the same level of the WBS structure as "Cost buffer 2.1".

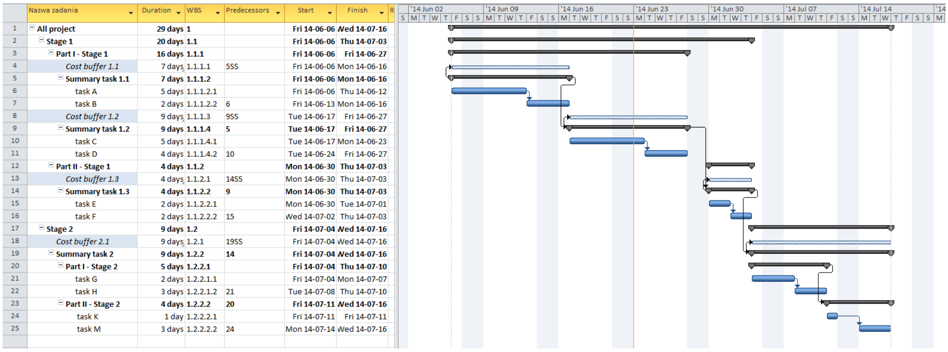


Fig. 3. Example of schedule structure with location of three cost buffers at the fourth level of the WBS structure and one at the third level of the WBS structure

Connection of the buffer task with the schedule structure can be accomplished in two ways. The first method includes creating a connection between the date of beginning the summary task and the buffer task. However, creating a start–to–start relation (SS) seems more natural, because the preceding task is the real activity as first among the tasks subordinate to a particular summary task and the CB buffer is the succeeding task. In this relationship, the summary task may also be in the headmost position. (Fig. 4). In this solution, any changes during the accomplishment of a facility will result in the synchronization of beginning the CB buffer task with starting tasks within a particular summary task.

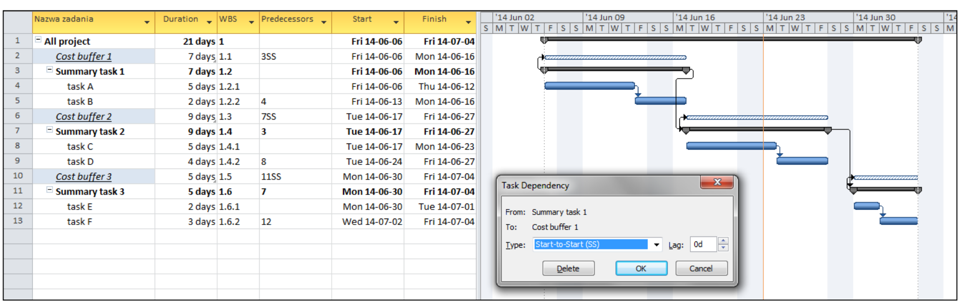


Fig. 4. Defining a start–to–start relation between the summary task and the cost buffer linked with this task

4. BUFFER TIME DETERMINATION

The introduced CB buffers will have their own parameters, i.e. time and cost. CB buffer tasks will not include any real technological activities, therefore the assigned time should encompass the time from the beginning of the earliest task protected by the buffer until the completion of the last task. It should be taken into account that as work progresses, particular tasks may undergo changes, becoming either longer or shorter. The times of the summary tasks are automatically calculated by the software, depending on the scheduled dates of accomplished tasks that comprise a particular summary task. This would indicate the need to assign reserve costs directly to summary tasks. Unfortunately, this is not a viable solution as the cost of these tasks (similar to time) is calculated automatically as the sum of costs of the subordinate tasks. On the other hand, it is favourable for the time of such a cost buffer task to be calculated automatically as in the case of summary tasks. MS Project allows a solution by establishing a dynamic connection between the selected fields. In this case a connection could be established between the time of the summary task (calculated automatically) and the time of the task which is the cost buffer protecting real tasks within a particular summary task. The connection is established by copying the cell values with the time of the summary task and pasting this value in the time field of the buffer task, not as a value but as a connection (Fig. 5). From this time on, each time change of the summary tasks will be automatically updated in the time field of the CB buffer task. The number of established connections is unrestricted and does not limit the number of the introduced buffers. However, it should be taken into account that when the schedule file will be saved with these established connections, when opening the file, the program will note the established connections and ask the user if they should be updated. Of course, the update should be confirmed.

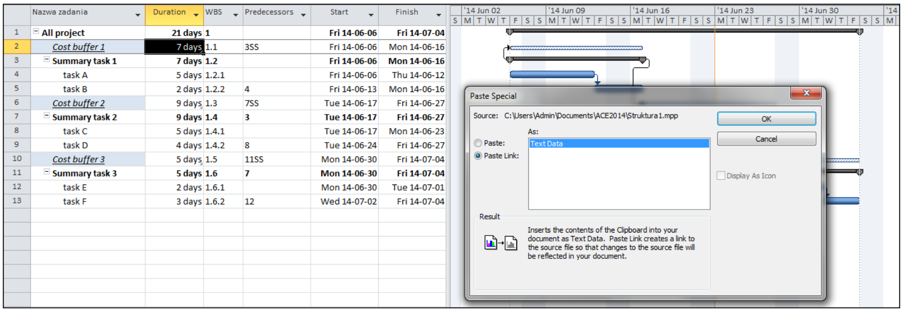


Fig. 5. Establishment of a dynamic connection between the time of the summary task and the time of the cost buffer task

5. BUFFER COST DETERMINATION

After establishing the location of all CB buffers in a particular schedule and creating a dynamic relationship with their time and the time of the relevant summary task, the remaining concern is linked with determining the costs that will be assigned to particular buffers and the mode of their definition for a particular task, i.e. each buffer in the schedule.

A CB buffer cost includes prepared and scheduled financial measures which should assure the accomplishment of all tasks covered by a particular CB buffer within a scheduled time. As mentioned above, a contingency cost calculated for particular CB buffers should function as a representation of all real tasks protected by a particular buffer (contrary to the cost buffer value which is determined based only on a protected critical sequence). The exact calculation mode may vary with assessment and data the planner has at his disposal [22]. Possession of data on the dispersion of probability of each task cost and its variance allows for calculating the costs of particular buffers as a specific quantile (or difference between two quantiles) calculated from the distribution function of the sum of dispersions of particular tasks. However, such data are rarely at the disposal of the planner. More commonly, buffer contingency costs are calculated based on the costs of protected tasks, potentially connected with an additional factor which is the magnitude of the influence of a particular task on the entire buffer. Such a factor may be the indicator of the overrunning of costs for a single task in a task group (e.g. technologically uniform), determined through a separate analysis, or the value of time float. The planner may also consider whether the preliminarily determined costs of particular tasks be left unchanged and the buffer magnitudes be determined as reserve costs, or the scheduled task costs (all or selected) be decreased and the saved surplus transferred to the buffers, where they will be combined with reserve measures. Regardless the accepted methodology of cost determination for particular CB buffers, it is worth remembering that the contingency cost of the entire enterprise is calculated as the sum of contingency costs for all CB buffers.

Regardless of the assumed contingency cost of each CB buffer, the distribution of these costs during the duration of the entire buffer should be determined. Usually three options are possible: total costs are charged on the first day of buffer duration; they are proportionally distributed throughout the entire duration of a buffer period; or are calculated in total on the last day of a buffer period. Due to the fact that the reserve measures should be accessible at any time during a particular buffer period, it is most favourable to apply the first or second solution. The first solution (costs charged on the first day of the buffer period) is safer, but causes earlier and rapid charging of reserve costs, thus the need of their earlier gathering and blocking, which may result in unfavourable influence on the necessary floating assets. Proportional calculation of CB buffer costs does not bear these disadvantages (particularly in the case of planning a larger number of buffers within the schedule). However, in this case there are no financial reserve measures at the beginning of the works, whereas it is common that by then some preparatory works should have been conducted, which have been omitted or underestimated in the schedule. The problem may be easily solved by introducing an additional cost buffer as a task in the beginning of the whole schedule (project cost buffer PCB). In this case, the time of this apparent task equals zero. Such a task is usually included in the network structure where there is more than one beginning task (without any preceding tasks). A defined PCB buffer may be an independent reserve encompassing the whole work period, regardless of the buffers connected with particular tasks. It may also, after the beginning of the scheduled works, serve to absorb the unused financial measures from the terminated CB buffers.

There are several ways to define financial reserve measures for the CB buffer task in MS Project [23,24]. The selection of an appropriate solution should be synchronized with the applied methods of cost definition in the entire schedule, though the most favourable will usually be the assignment of the reserve costs as fixed costs. Such costs are calculated for the task proportionally in the beginning, and the only restriction is the lack of the possibility to manually edit the cost distribution during the task period (it is always calculated automatically). It should be noted that the value of fixed costs in a task may also be declared as a negative value, which allows for inclusion of unused financial measures in the cost balance of the entire enterprise.

After assigning reserve costs to all CB buffers, use of standard tools in MS Project allows graphic or analytic presentation of the sum of scheduled costs for -+the planned project, i.e. BCWS (Budgeted Cost of Work Scheduled).

6. CALCULATION EXAMPLE

An example showing the application of cost buffers, and determining their location and costs as well as preparation of a BCWS curve have been conducted based on the construction schedule of an office building with a storing house [25]. The task time was determined in working days. Scheduled costs have been assigned to all tasks as fixed costs, distributed proportionally during the duration of each task. The schedule had one beginning and one completion task. The entire schedule comprised of 51 real tasks was presented as one summary task (WBS level at zero), resulting in easy to read collective data on the project, e.g. total working time, costs, etc.

The schedule tasks have been sub-divided according to a three-level WBS structure into three stages. The first, top-most WBS level is comprised of three stages. The first is comprised of preliminary works, earthworks and construction of foundations; the second is linked with the construction of the office building with garage, and the third is linked with the construction of the storing house. Two summary tasks located at the same level, the second WBS level, have been distinguished in each stage. All six summary tasks at the second WBS level have been connected by a start–to–start relation with the newly established CB buffer tasks. The time of the CB buffers has been dynamically connected with the time of relevant summary tasks. The preliminary task of the project with time equalling zero has been assigned as the cost buffer of the PCB project. Figure 6 shows the schedule structure at the second level of the WBS, indicating the summary tasks and the established cost buffers.

Knowledge of the number and location of particular cost buffers has enabled the calculation of contingency costs for particular buffers. The procedure was conducted by several methods that enabled comparison of the total costs of the schedule and the distribution of the scheduled costs in time depending on the applied technique of determining costs of particular buffers. In all discussed variants, the base of calculating contingency costs were deterministic values of the task costs. Cost buffers have been defined as fixed costs with proportional distribution in time. Because the time of the PCB buffer was accepted as zero, the type of cost distribution in this buffer was insignificant. The results of the calculations have been presented in Table 1, followed by a brief description of the assumptions of particular calculation variants.

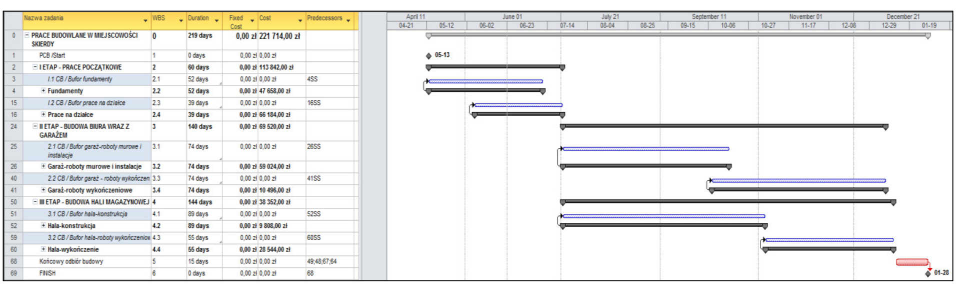


Fig. 6. Structure of exemplary schedule at the second level of the WBS structure with distinguished cost buffers CB and PCB, as well as data of the basal plan

Table 1. Contingency cost in PLN for particular buffers and the entire enterprise

Variant	BUFFER/ NUMBER OF PROTECTED TASKS							Buffer cost [PLN]	Project cost [PLN]	Cost increase [%]
	CB1.1	CB1.2	CB2.1	CB2.2	CB3.1	CB3.2	PCB			
	10	7	13	8	6	7	51			
0	0	0	0	0	0	0	0	0	221714	0
1	4766	6618	5902	1050	981	2854	0	22171	243885	10.0
2	7008	6849	11805	1050	1471	3480	0	31662	253376	14.3
3	7008	6849	11805	1050	1471	3480	11086	42748	264462	19.3
4	9391	10158	14756	1574	1962	4907	11086	53834	253376	14.3
5	14015	13698	11805	2099	2942	6960	11086	62605	262148	18.2

- Variant 0. Contingency of all buffers equals zero. Scheduled accomplishment not including reserve costs.
- Variant 1. Contingency of all buffers equals 10% of protected task costs. PCB buffer cost equals 0.
- Variant 2. Contingency of all buffers equals 10% of protected task costs for non-critical tasks and 15% for critical tasks. PCB buffer cost equals 0.
- Variant 3. Contingency of all buffers equals 10% of protected task costs for non-critical tasks and 15% for critical tasks. PCB buffer cost equals 5% of the total costs.
- Variant 4. Cost of all tasks decreased by 10%. Half of the amount saved from the tasks covered by the CB buffer is transferred to that buffer; the remaining half (a total of 5% of the total costs) is relocated to the PCB buffer. Moreover, contingency of all CB buffers is increased by 10% of the costs of protected tasks (calculated before decreasing the task cost by 10%) for non-critical tasks and 15% for critical tasks. PCB buffer cost equals 5% of total costs.
- Variant 5. Cost of all tasks decreased by 10%. Half of the amount saved from the tasks covered by the CB buffer is relocated to that buffer, the remaining half (a total of 5% of the total costs) is relocated to the PCB buffer. Moreover, the contingency of all CB buffers is increased by 15% of the costs of protected tasks (calculated before decreasing the task cost by 10%) for non-critical tasks and 25% for critical tasks. PCB buffer cost equals 5% of total costs.

Figure 7 presents the course of increasing project costs with regard to the applied method of determining the costs of particular buffers.

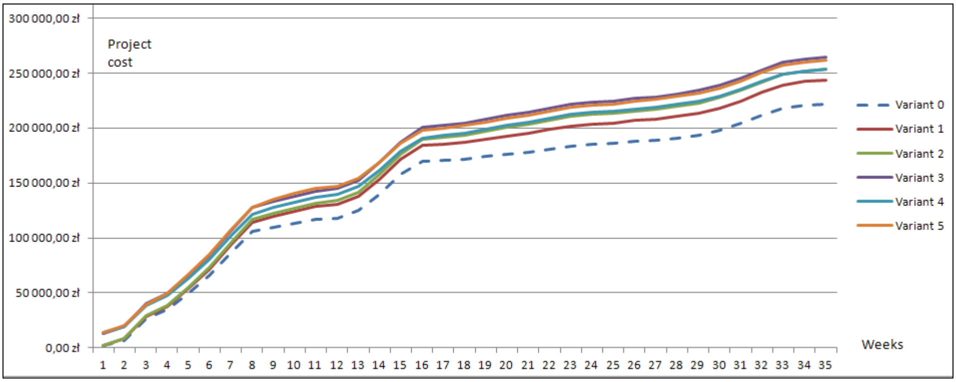


Fig. 7. Summary curves of the budgeted costs of work scheduled (BCWS) determined by the described variants of cost calculations for CB and PCB buffers

Analysis of the obtained results (Table 1) shows that depending on the applied method, the increase of project costs vary between 22,271 and 62,605 PLN, i.e. 10.0% to 18.2% of the total project cost. Figure 7 presents the course of the summary curve reflecting cost increase during the scheduled works, i.e. the BCWS curve. The lower curve (marked by a dashed line) indicates the course of costs without the buffer contingency costs. In variants 1–3, the PCB buffer equals zero, therefore the curves for these variants gradually increase from zero. In variants 4 and 5, the PCB equals 5% of the project costs and these costs are calculated from the first day of works, which is visible in the charts as a rapid increase of the scheduled costs in the beginning of the chart. Further courses of particular curves are similar and gradually reach the scheduled cost of the entire project BAC. It should be taken into account that all variants of determining buffer costs have been based on deterministic task costs and a simplified percentage determination of contingency costs of particular buffers.

The obtained results are in accordance with the data from other reports [26,27], whereas the variant selected for application in specific conditions should be chosen by the manager responsible for project planning and accomplishment.

7. SUMMARY

The proposed method of planning the costs of enterprise accomplishment including contingencies has indicated the possibility of using correctly located cost buffers and one project cost buffer. Adding contingency costs to the calculations made during the planning stage is important from a practical perspective and meets the expectations of investors, who are aware of increasing scheduled investment costs without reserve costs. In the case when the schedule is enriched with cost buffers without time buffers, the application of the WBS structure to determine the location of these buffers is fully justified and presents a simple and effective method from the planners' point of view. The calculation procedure is relatively simple and mainly requires the knowledge of the scheduled costs of particular tasks, even in a deterministic form. The proposed method is much more precise than simple contingency determination using only one percentage indicator related to the total costs, which is the most common practice in the engineering field. The proposed solution also has the following advantages:

- the necessary financial reserve measures increase gradually with the proceeding works scheduled, due to which their total value does not have to be blocked at the beginning of works;
- potential activation of the scheduled reserve assigned to a specific task group is simple and fast and does not require separate procedures because it is part of the scheduled budget and the person authorized to unblock the measures is selected from the beginning;
- after completion of the works protected by a specific cost buffer, the unused financial measures from this buffer can supply the project cost buffer, assigned to the primary task of the schedule;
- due to introduction of reserve measures to the schedule, the course of the BCWS curve is known from the beginning, allowing for determining the financial measures in subsequent work stages including reserve measures;
- analysis of the use of contingency costs in particular buffers with proceeding works allows a more detailed analysis of the cash flow in the enterprise and the financial state of the entire project;
- the proposed method of locating cost buffers CB as specific tasks connected by SS relations with all or selected summary tasks of the schedule allows for including them in current monitoring of the work course by the EVM method;

- the determined contingency costs in particular buffers do not by any means increase the costs of the scheduled enterprise because when they are not be used, they are entirely reimbursed to the party financing the works;
- use of reserve measures (in total or in part) indicates that the scheduled work course had required engaging additional funding, without which the work course would be disturbed and generate losses linked e.g. with prolongation of contract accomplishment; earlier assurance of such measures would prevent or restrict such losses;
- the post-accomplishment analysis of the use of reserve measures gathered in particular buffers linked with specific tasks allows for better identification of the location of cost overruns; determining their causes and avoiding similar mistakes in the future.

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