

# DELAYED COMPLETION OF WORKS – MANAGEMENT OF PENALTIES APPLIED TO BUILDERS

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**Abstract:** Successful projects are planned and followed at each stage of implementation so that the contingency section is as short as possible. It is better to analyze all the information at the beginning of the project than to find the responsible for failure at the end. So delivering projects on time is a concern that is widely sought in the light of the current global market conditions. Given the dynamics of the market for construction materials, the supply of raw materials has become a common problem and the matter of few skilled workers, further deepens the delivery of the projects according to the initial plans. In addition to the factors mentioned above, resource management in projects plays a key role during execution. In the end, delays affect all the involved parties, but enforcing contracts always remains an honest solution in an entrepreneurial spirit.

**Keywords:** resource management, optimization, technology, delays, contractual penalties.

## 1 INTRODUCTION

The One of the main problems facing the construction market both nationally and in Europe is the late delivery of projects. Factors influencing this are complex and diverse, so at the same time the execution time must be analyzed, scheduled and optimized along with the costs and quality of the works. These three factors should be analyzed from the tender phase depending on the complexity of the project and the ability of executors. For this reason before discussing the application of penalties in a project, I consider it necessary to highlight the factors that may affect the execution time. These factors are global in nature and may influence the execution

planning process from the time the tender materializes.

The factors with the greatest influence during execution are:

- Proposing outdated technologies without taking into account their efficiency and without taking into account the technical problems that may arise in the technological process;
- Proposing too new technologies for which not all operating parameters are yet known;
- Involvement in the project of inadequately qualified personnel: designers, engineers, project managers or workers;

- Supervision and superficial correlation of the project in all phases of implementation;
- Reducing costs without taking into account the impact they have in relation to the quality of the works and the duration of execution;
- Complexity of the project;
- The period of the year in which certain execution stages are performed;
- Choosing the lowest price during auctions;
- Global market fluctuation both in terms of material stocks and in terms of prices;
- Workforce dynamics and lack of qualified staff.

If the factors listed above were taken into account from the tender stage, the projects would be handed over in time without major legal and contractual implications.

Currently the criteria listed above should be found in a risk management plan, but most of the time this assessment is skipped in the project management process, consequently we find that we have a global problem in regarding the completion of projects in Ternen.

Finally, the one who gets to feel the impact of the delays is the owner, both from a financial point of view and from the point of view of the resources involved in the project.

## 2 CASE STUDY

### 2.1 Calculation of penalties for the entrepreneur

In the studied projects the main delays were recorded in the structural works, these delays were impossible to recover, moreover they created a disagreement in starting the other categories of works because the contracted teams had to take over other sites, and this led to the termination of several contracts. For

example, for one of the projects, the 20 days delay from the structural part led to an increase of 15 days for the whole project. This additional time was required to hire a new team.

Table 1 - Penalties for structural works

Contractual penalty	Number of days late	Total structure penalties
€ 1,000	20	€ 20,000

There were also delays in the interior finishing works. Initially, these works were roughly completed without delay, but the countless retouching led to the delay of handing over the project by 30 days. The main areas that had to be rebuilt are the common areas where the finishes were affected in a proportion of 35%.

Factors that determined these delays are:

- Improper order in which the works were executed;
- The executed works were not adequately protected;
- The executed works did not comply;
- The technology chosen in execution was insufficient or technically outdated;
- Late purchase of materials;
- Making late payments;
- Requesting additional work from subcontractors without capability.

Table 2 - Penalties for interior finishing works

Contractual penalty	Number of delayed days	Total penalties for interior finishes
€ 1,000	30	€ 30,000

Another category of works with delays are the exterior finishing works. An important role in carrying out these works is the period of the year in which they are executed. The exterior works were planned to be executed in the period August-September, but due to the delays these

works would have been executed in the period November-December, this being impossible. Exterior finishing work can be resumed after the substrate temperature and atmospheric temperature exceed +5°C, which occurs in spring.

Delays in these works are of 15 days due to the defective supplies or to the suppliers of raw materials that resumed their activity later than provided in the contract.

Table 3 - Penalties for exterior finishing works

Contractual penalty	Number of delayed days	Total penalties for exterior finishes
€ 1,000	15	€ 15,000

According to the above, the cumulative delays on the categories of structural works, interior finishes and exterior finishes reach a total of 65 days. These delays are those recorded for each category of work without taking into account the implications they have created for the logical sequence of work on site.

Table 4 - Total penalties

Name of works	Number of delayed days	Contractual penalty	Amount of penalties
Structural	20	€ 1,000	€ 20,000
Interior Finishes	30	€ 1,000	€ 30,000
Exterior Finishes	15	€ 1,000	€ 15,000
		Total penalties for the project	€ 65,000

## 2.2 Calculation of losses due to delays for the project owner

The cumulative losses of the beneficiary, for the delays quantified in table 4, are much higher in relation to the penalties collected from subcontractors, who had problems in the

execution of the works, for the following reasons:

- For each category of delayed works another 15 days are added, time necessary for the resumption of bidding procedures in order to supplement the number of teams;
- The price at which the remaining works are contracted are higher considering the fact that the price is directly proportional to the volume of works;

The direct delays quantified over the entire project are 65 days. After adding the 15 days for each category of works, we reach a delay of 110 days. The 110 days delay is equivalent to approximately 5 calendar months.

The costs for the 5 months delay are composed of:

— Direct production costs

This category includes the costs of renting equipment, space, including price increases for materials. I consider these additional costs as a percentage of approximately 0.5% of the total production costs.

ALL cp - total cost of production (10 000 000 Euro)

CS d - additional direct costs

CS d = TOT cp x 0.5% = 10 000 000 x 0.5% = 50 000 Euro

— Administrative costs

The administrative costs are directly proportional to the duration of the project. The longer the duration of the execution time, the higher the costs will be. Costs with a team can reach about 35,000 Euro per month. Reporting these costs to the 5 months of previously calculated delays leads to the following costs:

Total administrative losses = Monthly administrative costs \* total delay, that means:

35,000 Euro x 5 months = 175,000 Euro

### 2.3 *The impact of the conductor crisis and the pandemic in the completion of projects*

As the number of cases confirmed with Covid-19 increased, the problems with the timely delivery of projects became even more acute due to the multiple restrictions imposed by the authorities, but also by the number of sick workers.

Also, the mobility of workers and management teams during the pandemic was much lower in order to prevent the spread of the virus from one site to another and affect activities throughout society.

Due to the fact that several countries were quarantined, most of the export materials ended up with delivery delays of more than one month, and the delivery time for the new orders was doubled. Providers took this precautionary measure to protect themselves from possible litigations.

With the extension of the restriction period, problems appeared regarding the supply of raw materials. This led to an exaggerated fluctuation of prices with unpredictable jumps that led to the change of strategies regarding the trading of materials. In the end, it was only a matter of time before the prices for finished products accelerated.

In the current conditions, it is difficult to imagine a return to normality, and as the problem of resources is increasingly publicized, the only feasible option remains mass recycling so that some of the new finished products are made from raw materials resulting from recycling.

## 3 CONCLUSION

After analyzing the results obtained above, it can be seen that the sum of the additional costs recorded on the project reaches the amount of 225,000 Euro, and the amount of penalties accumulated from subcontractors is 65,000 Euro which covers only 29% of the beneficiary's losses.

Dividing the deficit by 160 000 Euro by 5 months of delay results in a loss of 32 000 Euro for each month of delay.

To avoid these losses it is necessary to manage the contracting side very well and to work with teams that have the potential to fit into the execution schedule. The second option to cover losses is to increase the contractual penalties from 1 000 Euro to 3 000 Euro/day of delay, this increase of penalties would have several benefits:

- attracting executors with technological potential and their own workforce;
- selection of companies participating in the tender;
- sign win-win contracts for both parties so that the owner and the entrepreneur are covered by the fluctuation of the global market;
- accountability of the future executor;
- inclusion in the contract of bank guarantee instruments.

Another alternative that must be taken into account when we talk about completion the projects on time is the use of modern technologies that have a much higher yield and productivity than the use of classical methods of execution.

I chose some works with impact during the execution and I will highlight the differences in productivity between the two methods of execution of the works.

A particularly important work for projects is the stage of pouring concrete, for this work we identify the following aspects:

- By using modern technology the execution time decreases by 52.17%, considering the fact that the cost is directly proportional to the execution time, it decreases by the same percentage. In the cost assessment, only the staff paid to perform the casting was taken into account. These costs do not include the cost of tweezers, the operator

and adjacent costs with fees. These costs are considered similar to both technologies used;

- The casting time saved in the case of horizontal elements is longer than the time saved in the case of vertical elements;
- The larger the dimensions in which the concrete is poured, the greater the time and money savings.

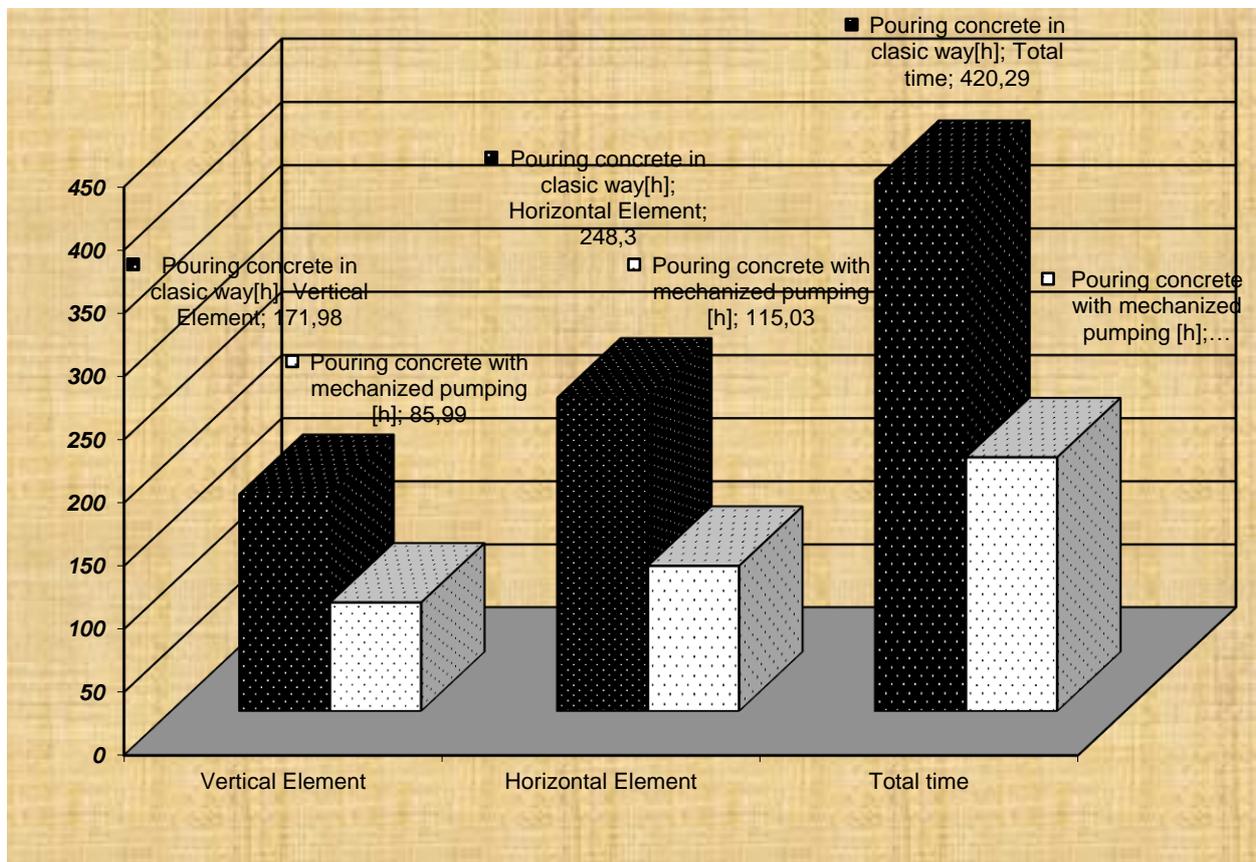


Figure 1. Concrete pouring time depending on the technology used

Another activity with impact during the execution is the plastering work. Depending on the implementation methodology, a series of indisputable advantages can be observed both from the point of view of the execution time, and from the point of view of the quality of the work

in case it is obtained for the use of modern plastering means:

- The number of workers decreases by 66.67%;
- Monthly expenses decrease by 40%;
- Execution time decreases by 56.1%;

- The overall cost decreases by 73.58%.

Analyzing the results presented above results in a series of indirect advantages that add value to entrepreneurs:

- If the number of workers involved in a technological process decreases then with those workers more construction sites can be built or productivity can be

increased so that a construction site can be completed faster;

- The monthly expenses for the administrative staff, because with the same staff you can manage several construction sites, and the distribution of costs is made in relation to the total of works executed during a month.

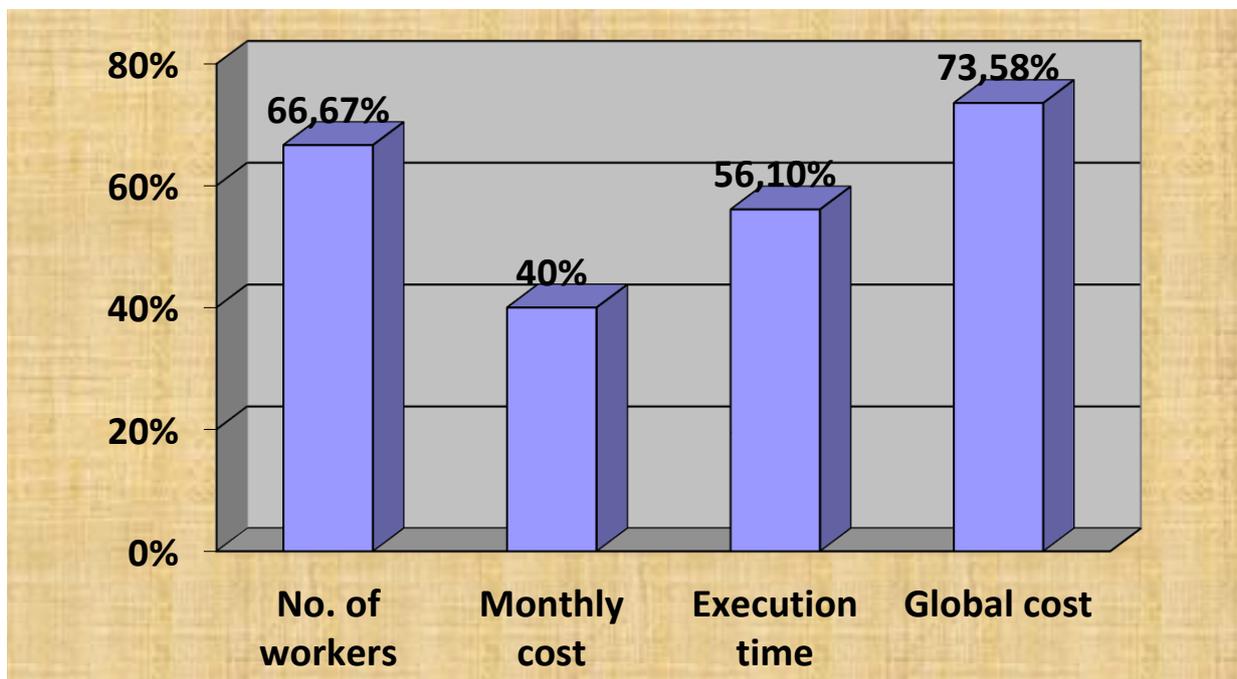


Figure 2. The advantages of using modern technology for plastering

Regarding the anticipation of possible delays due to the sanitary or conductors crisis, it is practically impossible to predict the possible implications. These global issues fall into the category of exceptions and can be treated as unforeseen as long as they are stipulated in the contract.

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