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IDENTIFICATION AND RISK ASSESSMENT OF PUBLIC BUILDING PROJECTS

Jakub Stuchlík\*1

1Czech Technical University in Prague, Faculty of Civil Engineering, Thákurova 7, Praha 6, 166 29, Czech Republic, stuchlik.js@gmail.com

Abstract

The article deals with the identification and evaluation of risks of public construction projects from the Contractor's point of view. The study presents a methodology of risk identification as well as a proposal of measures to eliminate these risks. Risks are divided according to their severity and financially assessed. The basis for risk identification was an analysis of 205 public construction projects, divided into five categories - transport constructions (roads, highways, etc.), water management constructions (ponds, watercourses, etc.), technological constructions (power plants, sewage treatment plants, etc.), other building construction (apartment buildings, schools, etc.) and listed buildings (churches, historical facades, etc.). From the Contractor's point of view, the most serious risks identified include: the date of completion of the construction, preparation and formulation of the contract for work or subcontracting, climatic effects and contractual budget of the construction.

Keywords

public construction project; risk assessment; contractor

Introduction

 Construction projects are a specific area where there are many risks that can cause considerable damage to the contractor. To be able to compare possible risks, we must express the risk in a specific unit of measure, eg as finance. [1]

 For our needs, we assessed the risks arising during the construction process, defined as the process from the start of construction to its completion, ie from handover / takeover of the site to handover / takeover of the contracted work under the contract for work. The construction process does not include the warranty period, maintenance, rebuilding or demolition of building. [2]

 Several methods can be used to assess the impact and likelihood of individual risks occurring. In this paper, the aim was to describe and apply, on a theoretical example, a qualitative analysis using the "Risk Matrix", which assesses the probability of occurrence and the intensity of the impact of risks on a particular construction process. [3]

Risks are generally divided into groups according to their nature, namely:

* Constructional and technological
* Manufacturing
* Economic and financial
* Market
* Credit
* Legislative
* Political
* Enviromental
* Information and human
* Force majeure
* Strategic [4]

**Methods of a risk analysis of public construction contracts**

 For the purpose of this analysis, risks were identified in 205 public construction projects implemented in the Czech Republic between 2008 and 2019, in the financial range from CZK 220,000 to CZK 38 billion. Samples of analyzed public contracts consist of 5 categories of constructions - transport constructions (roads, highways, etc.), water management constructions (ponds, watercourses, etc.), technological constructions (power plants, sewage treatment plants, etc.), other building constructions (residential buildings, schools, etc.) and listed buildings (churches, historic facades, etc.).

Firstly, a probability of occurrence of risk was expressed in a numerical scale, Table 1 [3].

***Table 1: Probability of risk – scale. Source: author.***

|  |
| --- |
| **Likelihood of risk** |
| **In words** | **Numerically** |
| Almost excluded | 1 |
| Unlikely | 2 |
| Possible | 3 |
| Very likely | 4 |
| Almost certain | 5 |

  The magnitude of the impact of a particular risk on the construction process, incl. scale shown in Table 2.

***Table 2: Impact of risk on the construction process. Source: author.***

|  |
| --- |
| **Impact of risk on the construction process** |
| **In words** | **Numerically** |
| Unimportant | 1 |
| Low | 2 |
| Medium | 3 |
| High | 4 |
| Catastrophic | 5 |

Results

Based on the risk analysis, a list of risks to the construction process in its various phases was created for specific types of public buildings. These risks were assessed and divided into ten groups (Table 3)

***Table 3: Identification and rating of public construction project´s risks. Source: author.***

|  |
| --- |
| **LIST OF RISKS OF THE CONSTRUCTION PROCESS** |
| **No.** | **TYPE OF A RISK** | **RISK SCENARIO** | **CONSEQUENCES OF RISK IMPLEMENTATION** | **LIKELIHOOD OF RISK** | **RISK IMPACT** |
| **1** | **CONSTRUCTION TECHNICAL AND TECHNOLOGICAL RISKS** |
| 1.1 | PROJECT DOCUMENTATION (PD) | Incompleteness and non-fulfillment of claims on PD. | Changes in PD. Financial loss and failure to meet the deadline. | 4 | 3 |
| 1.2 | BUILDING PROCESS TECHNOLOGY | Change of technology during construction realization due to newly discovered facts or eg shift of wet processes to winter (eg use of admixtures in concrete, protection of building against freezing, etc.). | Failure to comply with the contract price of the construction and the date of completion of the construction. | 2 | 2 |
| 1.3 | BUILDING PROCESS IMPLEMENTATION TECHNOLOGY | Failure to comply with technological procedures of work and breaks. | Financial loss related to the removal of defects and failure to meet the deadline for completion of construction. | 2 | 3 |
| 1.4 | CULTURAL AND ARCHEOLOGICAL HERITAGE | Insufficient archaeological survey. Possible damage to cultural and archaeological monuments located near the implemented project. | PD change required. Performing archaeological research. Possible financial loss and completion date. | 3 | 4 |
| **2** | **PRODUCTION RISKS** |
| 2.1 | CHARACTERISTICS AND QUALITY OF MATERIAL | Failure to meet the required quality and material properties. | Financial loss related to the removal of defects. Failure to meet the deadline. | 2 | 4 |
| 2.2 | QUANTITY OF MATERIAL | Insufficient amount of building material due to faulty bill of quantities (BOQ). Incorrectly placed orders. | Failure to meet the deadline for completion of the construction due to the time delay for the delivery of material. Possible financial loss. | 2 | 2 |
| **3** | **ECONOMIC AND FINANCIAL RISKS** |
| 3.1 | YEAR-ON-YEAR GROWTH RATES OF MATERIAL AND WORK | Increase in construction costs due to year-on-year growth in construction material and works prices. | Possible financial loss. | 2 | 2 |
| 3.2 | BUILDING BUDGET | Incorrectly processed BOQ. Underestimation of work in the budget according to PD. | Failure to meet the deadline for completion of the construction. Possible financial loss. | 3 | 4 |
| 3.3 | BUILDING DATE | Failure to meet the deadline for completion of individual building units carried out by subcontractors. Failure to fulfill the conditions for granting the subsidy program, partial or total recovery of public funds. | Failure to meet the deadline for completion of the construction. Possible financial loss. | 4 | 5 |
| **4** | **MARKET RISKS** |
| 4.1 | INFLATION | Excluding the effect of inflation in the contractual budget of the construction. | Possible financial loss. | 2 | 3 |
| 4.2 | CREDIT MARKET | Failure to include possible changes in the credit market in the contractual budget of the construction. | Possible financial loss. | 2 | 3 |
| 4.3 | MONETARY MARKET | Failure to include possible changes in the currency market in the contractual budget of the construction. | Possible financial loss. | 2 | 3 |
| **5** | **CREDIT RISKS** |
| 5.1 | INSOLVENCY | Bankruptcy of subcontractors. | Possible financial loss and failure to meet the deadline. | 2 | 5 |
| 5.2 | LIQUIDITY | Inability of a subcontractor to meet its obligations. | Possible financial loss and failure to meet the deadline. | 2 | 5 |
| **6** | **LEGISLATIVE RISKS** |
| 6.1 | VALUE ADDED TAX | Amendment to tax legislation. | Possible financial loss and failure to meet the deadline. | 2 | 2 |
| 6.2 | LEGISLATION | Amendment to the construction legislation (Building Act; Public Procurement Act; etc.). | Possible financial loss and failure to meet the deadline. | 2 | 2 |
| 6.3 | ADDITIONAL AUTHORIZATIONS | Necessity to obtain additional permits related to the realization of the work (restoration plans; binding opinions; etc.). | Possible financial loss and failure to meet the deadline. | 3 | 3 |
| **7** | **ENVIRONMENTAL RISKS** |
| 7.1 | ECOLOGICAL BURDEN | Environmental pollution and non-compliance. | Possible financial loss and failure to meet the deadline. | 2 | 3 |
| 7.2 | ANIMAL / PLANT SPECIES | Occurrence of protected animal or plant species in the direct vicinity of the construction process. Suspension of construction. | Possible financial loss and failure to meet the deadline. | 2 | 3 |
| **8** | **INFORMATION RISKS AND HUMAN ERRORS** |
| 8.1 | QUALIFICATION OF WORKERS AND SUBCONTRACTORS | Untrained and unskilled workers / subcontractors carrying out professional construction work. | Additional costs related to removal of defects. Failure to meet the deadline. | 3 | 5 |
| 8.2 | OFFICE FOR PROTECTION OF COMPETITION | Detection of irregularities and deficiencies in the framework of a public tender. Detection of suspected corruption environment. Suspension of the construction process. | Failure to comply with the contract price of the construction and the date of completion of the construction. | 2 | 2 |
| 8.3 | LABOR LEGAL RELATIONSHIPS | Failure to comply with obligations arising from employment or work contracts. | Failure to comply with the contract price of the construction and the date of completion of the construction. | 2 | 3 |
| 8.4 | CONSTRUCTION PROJECT MANAGEMENT | Wrong or no communication between employees and building sections. Confusing delegation of rights and obligations. Unprofessional project management. | Failure to comply with the contract price of the construction and the date of completion of the construction. | 2 | 2 |
| 8.5 | INTERNAL INFORMATION SYSTEMS AND DATA | Unlawful and fraudulent conduct by employees, subcontractors, the investor and other entities involved in the construction process. | Failure to comply with the contract price of the construction. | 2 | 2 |
| **9** | **FORCE MAJEURE** |
| 9.1 | CLIMATIC EFFECTS | Negative influence of the building process by climatic influences (floods, landslides, heavy rains, earthquakes, etc.). Suspension of construction. | Failure to comply with the contract price of the construction and the date of completion of the construction. | 3 | 4 |
| 9.2 | WAR CONFLICT | Negative influence of the construction process by war conflict. Suspension of construction. | Failure to comply with the contract price of the construction and the date of completion of the construction. | 1 | 5 |
| 9.3 | TERRORISM | Negative influence of the construction process by terrorism. Suspension of construction. | Failure to comply with the contract price of the construction and the date of completion of the construction. | 2 | 5 |
| **10** | **STRATEGIC** |
| 10.1 | CONTRACTS | Poorly compiled contracts. Contract changes caused by any party involved in the construction process. | Failure to comply with the contract price of the construction and the date of completion of the construction. | 4 | 5 |
| 10.2 | GENERAL BINDING REGULATIONS | Non-compliance and violation of generally binding regulations. | Failure to comply with the contract price of the construction and the date of completion of the construction. | 2 | 3 |
| 10.3 | STRATEGIC DECISIONS | Wrong strategic decisions made. | Failure to comply with the contract price of the construction and the date of completion of the construction. | 2 | 3 |

 To assess the significance of risks, we use the “Risk Matrix”. This is an expert assessment of the significance of risks, the essence of which is to assess the likelihood of occurrence and impact of risk. The particular risk is the more serious the more likely it is to be and the greater its impact on the construction process - Table 4.

***Table 4: Risk matrix. Source: author.***





Based on the compiled Risk Matrix presented in Table 4, it follows that there are three risks in the construction process that fall into the „very high“ risk category and ten risks fall into the „high risk“ category. Risks in these categories should be eliminated. The risks were ranked in descending order and managed according to their severity, which is calculated as the product of the probability of occurrence and impact of risk on the construction process - Table 5.

***Table 5: Risk Severity Rate. Source: author.***

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| **RISK SEVERITY RATE** |
| **RISK** | **LIKELIHOOD OF RISK** | **RISK IMPACT** | **PRODUCT** |
| BUILDING DATE/ DEADLINE FOR COMPLETION | 4 | 5 | 20 |
| CONTRACTS | 4 | 5 | 20 |
| QUALIFICATION OF WORKERS AND SUBCONTRACTORS | 3 | 5 | 15 |
| PROJECT DOCUMENTATION | 4 | 3 | 12 |
| CULTURAL AND ARCHEOLOGICAL HERITAGE | 3 | 4 | 12 |
| BUILDING BUDGET | 3 | 4 | 12 |
| CLIMATIC EFFECTS | 3 | 4 | 12 |
| INSOLVENCY | 2 | 5 | 10 |
| LIQUIDITY | 2 | 5 | 10 |
| TERRORISM | 2 | 5 | 10 |
| ADDITIONAL AUTHORIZATIONS | 3 | 3 | 9 |
| CHARACTERISTICS AND QUALITY OF MATERIAL | 2 | 4 | 8 |
| WAR CONFLICT | 1 | 5 | 5 |

Risk management possibilities

The Contractor can eliminate the above risks in several ways, for example:

1. To refuse to participate in the selection procedure in case of a high-risk contract - complicated implementation technology, slow flexibility of the National Heritage Institute and the investor's technical communication (TDI), poor quality project, poor quality budget, undervalued tender price, etc.
2. Determine the risks and include them in the bid price, but there is a risk that the contractor's bid will not be competitive.
3. Be insured and include the cost of insurance comprehensively in all quotations processed in public procurement.
4. Perform a risk analysis in advance and then (at least partially) eliminate them - described later in the article.
5. Combination of the options above - b) to d)*. [4]*

Following paragraphs present risk management of selected risks, with the highest probability of occurence.

**Risk: DEADLINE FOR COMPLETION (Risk Severity Rate: 20)**

The contractor is obliged to keep the contractual date of completion of the construction. It is advisable for the contractor to eliminate the failure to meet the deadline for completion of the construction, eg by drawing up a quality construction schedule, selecting quality subcontractors, materials, qualified personnel, etc. Furthermore, it is appropriate that the contractor is insured against unforeseeable risks (eg unforeseen climatic effects, war conflict, terrorism, theft, etc.).

**Risk CONTRACTS (Risk Severity Rate: 20)**

The contract for work implies to the contractor obligations that must be fullfiled. The draft contract must be properly studied and commented before it is signed. Where possible, it is good to quantify the contractor's obligations, such as the extent of the salinity survey (number of probes), the extent of the mycological survey (description of the structures and / or location where it is to be carried out) elements of the building, etc.

**Risk: QUALIFICATION OF WORKERS AND SUB-CONTRACTORS (Risk Severity Rate: 15)**

      It is advisable that the contractor invests time and money to train the staff and not to select subcontractors only at the lowest bid price, but also on the basis of past experience (eg reference buildings, client satisfaction, financial analysis, etc.). Consequently, the Contractor may eliminate the aforementioned risk of financial loss and failure to comply with the contractual completion of the works.

**Risk: PROJECT DOCUMENTATION (Risk Severity Rate: 12)**

The contractor confirms the accuracy and completeness of PD by signing the Contract for Work. It may be the case that the client does not have to acknowledge to the contractor future work resulting from the discovered new facts during construction, which were not mentioned in the original PD. The transferred risk from the PD processor to the contractor must be properly contracted in advance. One way is, for example, to ensure that the processor of the PD will be obliged to submit to the contractor a new technical solution by a certain date, on the basis of which the contractor shall prepare a change sheet. Should this not be the case, the contractor shall not be obliged to commence the aforementioned works and shall not be responsible for any failure to meet the deadline for completion of the construction.

**Risk: CULTURAL AND ARCHEOLOGICAL HERITAGE (Risk Severity Rate: 12)**

The contract for work implies to the contractor obligations that must be fulfilled by the contractor. The draft contract must be properly studied and commented before it is signed. It is necessary to pay attention, for example, to the delegated responsibility from the client to the contractor in the framework of archaeological research in case of positive findings. Furthermore, it is necessary to ensure that if a positive finding of archaeological elements is found, the contractor is not responsible for any failure to meet the deadline for completion of the construction.

**Risk: BUILDING BUDGET (Risk Severity Rate: 12)**

The Contractor confirms within the conclusion of the Contract for Work that the budget together with the PD has been studied and it is correct and complete. It may be the case that the client does not have to accept the contractor´s future works resulting from a poorly prepared budget (BOQ). A risk delegated from the designer of project to the contractor must be properly contracted. One way is to ensure that the designer will be obliged to submit to the contractor a properly processed BOQ by a certain date, on the basis of which the contractor prepares a change sheet, which the client is obliged to confirm and accept. Should this not be the case, the Contractor shall not be obliged to commence the aforementioned work and shall not be responsible for any failure to meet the deadline for completion of the construction.

**Risk: CLIMATIC EFFECTS (Risk Severity Rate: 12)**

The contractor draws up a construction schedule, which is usually a necessary annex to the contract for work. It is advisable for the contractor, when drawing up the construction schedule, to include a time reserve to cover suspended construction work due to adverse climatic effects (long-term frosts, heavy rains, floods, etc.). If the construction schedule is correctly designed so that the individual construction phases and professions are smoothly connected, the late completion date due to adverse climatic effects is eliminated. Furthermore, the contractor may be insured against adverse weather conditions.

**Risk: LIQUIDITY AND INSOLVENCE (Risk Severity Rate: 10)**

      It is advisable for the contractor to draw up an in-house cash flow of the construction for which the tender is being applied. It is necessary that the contractor, in particular at the beginning of the construction, is able to finance the pay-off from own funds and to meet its obligations. If it is found that the contractor does not have sufficient funds, it is necessary to arrange a loan with a banking institution. Furthermore, emphasis is placed on the selection of quality subcontractors who are able to meet contractual deadlines and did not get insolvent during construction. This risk can be eliminated by selecting subcontractors with a long tradition in the market and smooth cooperation in the past.

**Risk: TERRORISM (Risk Severity Rate: 10)**

Terrorism is an unpredictable risk that cannot be directly influenced, managed or even eliminated. The likelihood of risk is not high, but the impact of the risk on the construction process is catastrophic. The Contractor may be insured against the risk.

**Risk: ADDITIONAL AUTHORIZATIONS (Risk Severity Rate: 9)**

      It is necessary for the contractor to elaborate a good construction schedule, which will include dates for processing eg restoration plans and subsequent deadlines for submitting and obtaining binding opinions, etc.

**Risk: CHARACTERISTICS AND QUALITY OF MATERIAL (Risk Severity Rate: 8)**

      The contractor avoids complaints and reworking parts of the construction work by selecting high-quality and durable material meeting the necessary standards and certificates. It is advisable that the contractor draws up the technological procedures and a list of used material before commencing the construction, which he would send and have approved by the client or the inspection body (for example, the employees of the monument conservation institute).

**Risk: WAR CONFLICT (Risk Severity Rate: 5)**

War conflict is an unpredictable risk that cannot be directly influenced, managed or even eliminated. This risk can only be influenced by selecting the location where the construction will be carried out. The likelihood of risk is not high, but the impact of the risk on the construction process is catastrophic. The Contractor may be insured against the risk.

Based on the above recommendations to eliminate the likelihood of risk occurrence and risk impact, a new risk severity rate has been counted (Table 6), taking into account the proposed risk management recommendations. Accordingly, the „Risk Matrix“ was adjusted likewise (Table 7).

***Table 6: Risk severity rate after risk management. Source: author.***

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| --- |
| **RISK SEVERITY RATE after RISK MANAGEMENT**  |
| **RISK** | **LIKELIHOOD OF RISK** | **RISK IMPACT** | **PRODUCT** |
| BUILDING DATE/ DEADLINE FOR COMPLETION | 3 | 4 | 12 |
| CONTRACTS | 3 | 4 | 12 |
| QUALIFICATION OF WORKERS AND SUBCONTRACTORS | 2 | 3 | 6 |
| PROJECT DOCUMENTATION | 3 | 3 | 9 |
| CULTURAL AND ARCHEOLOGICAL HERITAGE | 2 | 2 | 4 |
| BUILDING BUDGET | 3 | 3 | 9 |
| CLIMATIC EFFECTS | 3 | 3 | 9 |
| INSOLVENCY | 2 | 2 | 4 |
| LIQUIDITY | 2 | 3 | 6 |
| TERRORISM | 1 | 2 | 2 |
| ADDITIONAL AUTHORIZATIONS | 2 | 2 | 4 |
| CHARACTERISTICS AND QUALITY OF MATERIAL | 2 | 2 | 4 |
| WAR CONFLICT | 1 | 2 | 2 |

The updated Risk Matrix (Table 7) considers the elimination of risks from the very high and high categories. For all serious risks, the product of probability of occurrence and impact was in the interval <5; 20> a correction was proposed considering reducing the probability of occurrence of risks and the impact of risks on the construction process.

***Table 7: Adjusted Risk Matrix after risk management. Source: author.***





 For the financial evaluation of the impact of risks on the construction process, the probability of the occurrence of risk must be expressed as a decimal number and the impact of the occurrence of risk by a financial amount. The estimate is based on the total price of the work. For the presentation of the results, we consider that the contractor won the tender with the submitted bid of CZK 25,000,000 excluding VAT. The probability of occurrence, including numerical expression, is shown in Table 8. The assessment of the magnitude of the risk impact is subsequently shown in Table 9.

**Table 8: Risk probability assessment. Source: author.**

|  |
| --- |
| **RISK PROBABILITY ASSESSMENT** |
| **LIKELIHOOD OF RISK** | **OCCURRENCE** | **RISK VALUE** |
| Almost excluded | 1 | 0,00 – 0,20 |
| Unlikely | 2 | 0,21 – 0,40 |
| Possible | 3 | 0,41 – 0,60 |
| Very likely | 4 | 0,61 – 0,80 |
| Almost certain | 5 | 0,81 – 1,00 |

**Table 9: Risk impact assessment. Source author.**

|  |
| --- |
| **RISK IMPACT ASSESSMENT** |
| **LIKELIHOOD OF RISK IMPACT** | **OCCURRENCE** | **RISK VALUE** |
| Negligible | 1 | 0,00 |
| Small | 2 | 25.000,00 |
| Significant | 3 | 250.000,00 |
| Very significant | 4 | 2.500.000,00 |
| Unacceptable | 5 | 25.000.000,00 |

 The financial expression of the magnitude of the impact of the risk varies from CZK 0 to the considered total costs of the construction, ie CZK 25,000,000 excluding VAT. The resulting risk value is calculated as the product of the probability of the occurrence of the risk and the impact of the occurrence of the risk. Table 10 shows the value of risks before accepting the correction. Table 11 shows the risk value after the correction is accepted.

***Table 10: Value of risks before acceptance of the correction. Source: author.***

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| --- |
| **LIST OF VERY HIGH AND HIGH RISKS****(BEFORE TAKING ACTION)** |
| **No.** | **RISK** | **LIKELIHOOD OF RISK** | **RISK IMPACT** | **RISK VALUE** |
| 1.1 | PROJECT DOCUMENTATION | 0,70 | 250.000,00 | 175.000,00 |
| 1.4 | CULTURAL AND ARCHEOLOGICAL HERITAGE | 0,55 | 2.500.000,00 | 1.375.000,00 |
| 2.1 | CHARACTERISTICS AND QUALITY OF MATERIAL | 0,40 | 2.500.000,00 | 1.000.000,00 |
| 3.2 | BUILDING BUDGET | 0,45 | 2.500.000,00 | 1.125.000,00 |
| 3.3 | BUILDING DATE | 0,70 | 25.000.000,00 | 17.500.000,00 |
| 5.1 | INSOLVENCE | 0,25 | 25.000.000,00 | 6.250.000,00 |
| 5.2 | LIQUIDITY | 0,25 | 25.000.000,00 | 6.250.000,00 |
| 6.3 | ADDITIONAL AUTHORIZATIONS | 0,55 | 250.000,00 | 137.500,00 |
| 9.1 | QUALIFICATION OF WORKERS AND SUBCONTRACTORS | 0,50 | 25.000.000,00 | 12.500.000,00 |
| 10.1 | CLIMATIC EFFECTS | 0,49 | 2.500.000,00 | 1.225.000,00 |
| 10.2 | WAR CONFLICT | 0,05 | 25.000.000,00 | 1.250.000,00 |
| 10.3 | TERRORISM | 0,05 | 25.000.000,00 | 1.250.000,00 |
| 11.1 | CONTRACTS | 0,69 | 25.000.000,00 | 17.250.000,00 |
| **TOTAL RISK VALUE BEFORE TAKING MEASURES** | 67.287.500,00 |

**Table 11: Value of risks after acceptance of the correction. Source: author.**

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| --- |
| **LIST OF VERY HIGH AND HIGH RISKS****(AFTER TAKING MEASURES)** |
| **No.** | **RISK** | **LIKELIHOOD OF RISK** | **RISK IMPACT** | **RISK VALUE** |
| 1.1 | PROJECT DOCUMENTATION | 0,43 | 250.000,00 | 107.500,00 |
| 1.4 | CULTURAL AND ARCHEOLOGICAL HERITAGE | 0,35 | 25.000,00 | 8.750,00 |
| 2.1 | CHARACTERISTICS AND QUALITY OF MATERIAL | 0,25 | 25.000,00 | 6.250,00 |
| 3.2 | BUILDING BUDGET | 0,45 | 250.000,00 | 112.500,00 |
| 3.3 | BUILDING DATE | 0,50 | 2.500.000,00 | 1.250.000,00 |
| 5.1 | INSOLVENCE | 0,21 | 25.000,00 | 5.250,00 |
| 5.2 | LIQUIDITY | 0,21 | 250.000,00 | 52.500,00 |
| 6.3 | ADDITIONAL AUTHORIZATIONS | 0,35 | 25.000,00 | 8.750,00 |
| 9.1 | QUALIFICATION OF WORKERS AND SUBCONTRACTORS | 0,30 | 250.000,00 | 75.000,00 |
| 10.1 | CLIMATIC EFFECTS | 0,39 | 250.000,00 | 97.500,00 |
| 10.2 | WAR CONFLICT | 0,05 | 25.000,00 | 1.250,00 |
| 10.3 | TERRORISM | 0,05 | 25.000,00 | 1.250,00 |
| 11.1 | CONTRACTS | 0,45 | 2.500.000,00 | 1.125.000,00 |
| **TOTAL RISK VALUE AFTER ADOPTION OF MEASURES** | **2.849.000,00** |

 The data above present the total risk value financially expressed prior to the design of risk mitigation measures and after the adoption of risk mitigation proposals. Before the measure, the risk amounts to CZK 67,112,500.00 net of VAT, after the risk elimination measure is taken, the total value is CZK 2,849,000 excluding VAT.

CONCLUSION

Risks of construction projects were identified and evaluated from the contractor's point of view in order to draw attention to the most serious possible risks in the construction of public (but possibly also non-public) construction. In the past, the author prepared an analysis of 205 public construction projects based on risk identification. Samples of analyzed public contracts consisted of 5 categories of constructions - transport constructions (roads, highways, etc.), water management constructions (ponds, watercourses, etc.), technological constructions (power plants, sewage treatment plants, etc.), other building constructions (residential buildings, schools, etc.) and listed buildings (churches, historic facades, etc.).

 For the financial evaluation of the risk impact, a construction project with a financial value of CZK 25,000,000 excluding VAT was considered. Before the risk measure, the sum of the risk amounts to CZK 67,112,500.00 excluding VAT, after the risk elimination measures are taken, the total value is CZK 2,849,000 excluding VAT.

For each construction project it is necessary to identify the required risks, determine their significance, size, assess them and take steps to eliminate them. The most serious risks include, for example, the date of completion of construction, contracts (contract for work, subcontracting), climatic effects, or contractual budget of the construction. These risks can to a certain extent be eliminated and managed, which can lead to a successful project realization. However, there may be risks that cannot be predicted and thus eliminated. Examples of such risks can be war conflict, terrorism, change of legislation, etc.

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