Regular Article

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# Risk management based on the best value approach and its application in conditions of the Czech Republic

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**Abstract:** This study focuses on the issue of the best value approach (BVA) method in the public procurement and on the European experience with the implementation of the BVA method, with a focus on the use of this method in the Czech Republic. The key topic here is the effort to manage the risks of the construction project already at the stage of preparation and tender for suppliers of construction works or services, namely, for public contracts evaluated through the BVA. The findings show that public procurement tenderers often misunderstand the concept of project risk as managerial, temporal, economic, or qualitative risk. Case studies show reserves and possibilities for improvement. The goal of the study is to provide a framework for understanding and explaining the principles and methods of evaluating a qualitative criterion in the form of the risk assessment plan.

**Keywords:** best value approach, public procurement, risk analysis, public orders

## 1 Introduction

This study is focused on the prevention of crisis situations and the emergence of risks in construction projects, especially projects evaluated as public contracts for construction works, services, and supplies. The authors focus on the use of the method of qualitative evaluation of public contracts using the best value approach (BVA), which uses the so-called risk assessment plan (RA) as one of the evaluation criteria and the Weekly Risk Report (WRR) as one of the key tools for project risk management.

The BVA method makes it possible to work with potential project risks already during the preparation of the order, or during the selection of a supplier, and connects three main topics in one approach – the project management, public procurement, and risk management.

Procurement through the BVA method is still new in the Czech Republic, and no plan has been announced for its wider deployment by any of the state's organizational units yet, as has happened, for example, in the Netherlands or Norway [1]. However, the method is successfully used and developed in several institutions in the Czech Republic. These are, for example, the company 4E Consulting, which provides consulting and advisory services in the field of public procurement, or the Havel & Partners Law Company, which, with the help of Dutch experts, provides the use of the BVA method to its clients as one of the portfolios of services [2]. Last but not least is the Brno University of Technology (BUT), which since 2018 has been using BVA for selected contracts not only in the field of construction but also for the selection of suppliers of cleaning and security services or for IT.

The objective of the presented research is to use BVA considering the elements of risk management in the selection of a supplier in the framework of public contracts. The presented work is built on following basic points:

- identification of key specifics of qualitative methods for evaluation of public tenders including BVA approach,
- identification of specifics of BUT as a public contractor,
- proposal of the evaluation process of the risk assessment plan for public tenders carried out by BUT,
- verification of results on case studies, and
- recommendations of consequent steps for the research in conclusion.

The article therefore deals with the implementation of the BVA method in the Czech Republic and, on the basis of theoretical inputs and specific orders – case studies, further deals with the prevention of crisis situations

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and the emergence of risks in investment projects, evaluated as public contracts for construction works, services, and supplies.

## 2 State of the art

Compared to standard approaches in the field of public procurement, the BVA brings a new and innovative approach to supplier tenders for both the public and private sectors. It is not limited to construction work, it can also be used for IT, security and cleaning services, PR and marketing projects, and other jobs. The BVA is designed to increase the overall project value through transparency and enables better risk management and mitigation. The goal is to select a supplier, an expert who can in the best way fulfil the customer's intentions and to achieve a so-called win–win situation, i.e., a mutually beneficial relationship. The adoption and use of BVA means a paradigm shift [3].

Qualitative evaluation of public procurement is, however, an integral part of public procurement, regardless of the use of BVA.

An alternative way of using qualitative criteria is, for example, the "analytic hierarchy process" (AHP) [4], which is intended for evaluating the qualitative and quantitative part of the public tender. "The quality and cost (quantity) models allow to identify and select the bid associated with the highest quality/cost ratio" [5].

An interesting contribution in the issue is also the article [5], in which the risk of partial approaches to the implementation of public procurement is identified. Here it is necessary to consider especially the risk of cancellation of the procurement procedure, the risk that procurement procedure will not take place, the risk of appealing of the procurement, and the risk of disqualification. With these risks, it is then necessary to consider the proposal of the process of awarding the public contract.

The issue of risk management in public procurement is generally a current topic. To a certain extent, the level and nature of risks can be influenced by the specific approach to the public procurement. Blaťák [6], for example, dealt with the elimination of risks associated with the carrying out of public contracts using the design and build approach. For the risk analysis, the RIPRAN method is used here. It is based consistently on the procedural concept of risk analysis. The subject of risk assessment is the difference between the planned and the actually achieved parameters of the evaluated building. This approach is effective in deciding the process of project implementation, but it is not suitable for incorporation into evaluation criteria in the tender.

Suhonen et al. [7] also dealt with the sharing of risks associated with public contracts within the public procurement innovations. As in the case of BVA, the "cost-plus" is positively evaluated to the place of more used fixed-price access.

The complex concept of the risk evaluation of public contracts for construction works in connection with the basic principles of tendering procedures (the tendering procedure should be "efficient, effective, transparent, open, competitive, fair, and accountable") is subsequently dealt with in the paper [8]. The purpose of that paper was to identify risks that may arise in the process of public procurement; however, it was not directly focused on the process of considering a risk analysis in the selection procedure.

Five key dilemmas in carrying out public contracts are subsequently defined by the authors of the paper [9]. On the basis of these dilemmas and their possible solution, it is possible to propose an optimal way to carry out a specific public contract with regard to the effectiveness of the procurement process that can potentially be achieved. Best value is achieved here mainly by increasing the transparency of the competition and applying best practice, although the research does not bring concrete solutions for the selection procedure, the findings support the use of the BVA principle.

To ensure the effective selection of a contractor for a construction contract, an approach based on best value seems suitable, e.g., according to Tran et al. [10], who presented the application of this approach within the framework of tenders for construction projects and deliveries in the case of the preparation and implementation of the highway network in the USA. The findings mentioned in that paper place the rises on the technical expertise of the members of the evaluation committee for the possibility to consistently evaluate the proposed solution and the abilities of key persons of the project. It is also recommended to realize "Debriefing Meetings" for the final evaluation of the strengths and weaknesses of partial offers.

Other studies are also devoted to the use of the BVA approach. "To develop a systematic method to support contractor selection," Yang et al. [11] proposed using the data envelopment analysis to facilitate the criteria evaluations for each bidder during the short-listing stage. The study thus brings new opportunities to evaluate the criteria for a partial supplier.

The BVA method has been successfully used in the Netherlands since 2004, where they have also faced several cases of fraud in the public procurement. In 2002, the Dutch government therefore introduced a new public

procurement policy through the Rijkswaterstaat agency, which gradually became an experienced BVA practitioner. Rijkswaterstaat is the executive agency of the Dutch Ministry of Infrastructure and Water Management, which is concerned with promoting safety, mobility, and quality of life in the Netherlands, and is responsible for the preparation, construction, management, and maintenance of major infrastructure facilities comprising the main road network (motorways, viaducts, and road bridges), the main waterway network (rivers, canals, waterway locks, and bridges), and main water systems (flood control systems, polders, and water management) [12].

The origins of the Rijkswaterstaat agency date back to the period of French rule (1795–1813). In 1798, the Bureau voor den Waterstaat, a national organization, was created to deal with the problems caused by the poor state of waterways and dams, which led to catastrophic floods. In 1848, its name was changed to Rijkswaterstaat. A further expansion of the agency's remit was brought about by the boom in road and rail transport during the nineteenth century, when the Rijkswaterstaat was responsible for the development and construction of the Dutch railway network. Since the 1970s, Rijkswaterstaat has gradually transformed itself from a construction contractor to a contractor, manager, and administrator of the transport infrastructure [12].

The Rijkswaterstaat agency spends 3–4 thousand million Euros on new projects and services every year. As mentioned above, the agency has successfully used the BVA method since 2004.

The Netherlands can be a model for how to change the approach to the selection of suppliers of construction works, services, and supplies, for the Czech Republic. Both states build on similar social principles and on the same legal basis defined by the EU. The Czech Republic's handicap is, of course, its 40 year social and economic isolation from Western economies caused by the communist dictatorship. But now there are similar conditions as in the Netherlands in 2002.

The conclusion of contracts between public contracting authorities and suppliers, which results in the obligation of suppliers to provide supplies, services, or construction work, is governed in the Czech Republic by the Public Procurement Act of 2016 [13]. This legislation incorporates the relevant regulations of the European Union, in particular the Directive of the European Parliament and the Council No. 2014/24/EU on public procurement [14]. In the relevant part of the European directive dealing with the evaluation of tenders, some recommendations emphasizing and considering the quality of suppliers can be marked. For example, the Directive states that the most economically advantageous offer should be assessed on the basis of the best ratio between price and quality. When assessing the best ratio, public contracting authorities should establish economic and qualitative criteria associated with the subject of the public contract, and these criteria should enable their comparative assessment. The directive then directly states that contracting authorities should be encouraged to choose criteria that will enable them to procure high-quality construction works, supplies, and services that perfectly suit their needs. Finally, if the quality of the personnel involved is important for the level of performance of the public contract, the contracting authorities should be able to use as a criterion the organization, qualifications, and experience of the personnel assigned to the performance of the public contract in question, as this may have an impact on the quality of the performance of the public contract and as a result also on the economic value of the offer [14]. All cited provisions are fully in line with the ideas and principles of the BVA.

In the Czech Republic, the BVA model is still new and is used only occasionally. However, there is an effort to present the BVA approach to the wider professional public and to test its functionality on appropriate case studies. As stated in the source [6], "the basic motivation of the contracting authority for qualitative assessment should be the desire for higher quality of the supplier or its performance"; therefore, this source presents the possibilities of using the BVA principle in the conditions of the Czech Republic.

However, in order to understand the context and realities, it is necessary to explain what the Czech construction industry is still facing in 2023:

- there is no Ministry of Construction or another guarantor of the field, the agenda is divided between the Ministry of Industry and Trade, the Ministry of Labour and Social Affairs, the Ministry of Transport, and other ministries and organizations,
- there is no state-guaranteed standardization, especially in matters of contractual relations or models for public contracts,
- many public contracting authorities apply outdated ideas and procedures,
- the majority of public contracts is tendered for the lowest bid price,
- representatives of public contracting authorities often lack experience, perspective, invention, and the desire to do things better,
- there are still many identified and publicized cases where the public tender was influenced or manipulated by contracting authorities or politicians at various levels of public administration management, which in some cases concerned and still concerns the highest levels of politics.

The professional construction community has long been calling for competitions based on criteria other than price. However, public contracting authorities are cautious, and if they dare, they usually combine the bid price criterion only with simple, objectively calculable criteria. At the same time, despite the desire of suppliers to issue tenders with an evaluation other than the lowest bid price, this effort often gives rise to speculation that the contract is being manipulated through non-price criteria. Again, this is connected with the experience of the past years, when public contracts were organized, in which, in addition to the bid price, e.g., the shortening of the construction period proposed by the bidder or the determination of the number of fines for non-compliance with contractual conditions were evaluated. In an attempt to gain points, applicants often proposed meaningless or even absurd values. Which only led to an increase in project risks. The use of these criteria was apparently sometimes not motivated by an effort to gain a quality supplier and quality work, but rather by an effort to change the equal approach to applicants. The issue of the risk of corruption on a broader scale is addressed in the official webpages of Dutch Ministry of Infrastructure and Water Management, Rijkswaterstaat [12] and also in the paper [15].

However, despite these negative facts and phenomena, it must be stated that conditions in the Czech Republic are gradually improving, which is evidenced by specific efforts to use the BVA method. An approach that aims at selecting a quality supplier, eliminating extremely low prices, mitigating risks, and a mutually beneficial relationship. Similar to how it is successfully applied in the Netherlands [2].

Some of the commercial companies mentioned in Section 1 engage in the procurement of public contracts using the method derived from BVA. In Brno, the BUT develops and uses the method in its public contracts. The presented research was applied precisely to the analysis of public contracts implemented within BUT.

BUT is the largest technical university in the Czech Republic, founded during the Austro-Hungarian Empire in 1899. The university has eight faculties and several university institutes and research centres, where approximately 19,000 students study and almost 4,000 employees work. From the point of view of Czech law, the school is a public contracting authority. The university owns several dozen campuses and buildings where the so-called primary activity takes place, i.e., teaching, research, administrative, and other support processes. Repairs, reconstruction, and new construction are handled centrally through the investment department and the public procurement department under the rectorate of the university. Design work, construction work, and related services are procured through public tenders. Many large construction projects were and are subsidized from the budgets of the European Union or the state budget of the Czech Republic, especially in the programming period 2007–2017, through the Operational Program Research and Development for Innovations [16].

Modern trends and approaches are being developed at the university in the field of public investment, which are currently not common in the Czech Republic. This is, for example, the use of FIDIC international contractual conditions [17], which BUT implemented in 2018 as the first university in the Czech Republic. And the use and development of the BVA method for competitions in the field of construction, facility management services, and IT projects are also implemented.

The basis of the work so far has been research in the areas of project management, risk management, theory, and practical use of the BVA method in the Czech Republic and abroad. As for BVA, it was mainly literature and articles by the author of the method, Dean T. Kashiwagi, which provide a rich and comprehensive theoretical basis as well as a description of the application on case studies in the USA. In the Czech Republic, publishing activity is still very limited, which is due to the short time it took to implement the method and the small number of tendered, or even implemented, contracts. A similar observation is made by Wondimu et al. of expert articles from Norway [1], who at the same time suggest improving the situation in the awarding of local public contracts precisely with regard to international experience, especially from the Netherlands.

# 3 Methodology

As defined in Section 1, the objective of the research is to use BVA to consider the elements of risk management in the selection of a supplier in the framework of public contracts. The research methodology consists of the following steps:

- identification of general principles of BVA approach,
- definition of specifics related with application of BVA approach in conditions of BUT,
- risk assessment plan (RA) for BUT tenders – specification of project risks and point assessment of risks,
- verification of results on case studies.

The public procurement supplier selection system itself, based on the BVA, generally consists of four basic stages.

1. Pre-qualification – explanatory and educational phase, e.g., in the form of market consultations (not necessary).

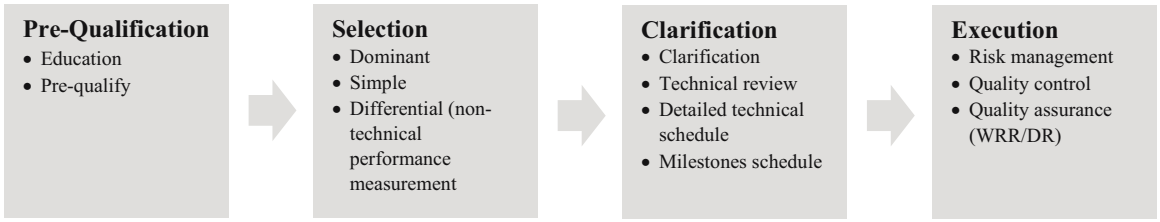


**Figure 1:** Basic principle of BVA through PIPS [18].

2. Selection – the applicant submits the level of expertise (LE), RA, value added (VA), bid price, and an interview with the applicant's key person takes place.
3. Clarification – there is a verification and detailed clarification of the offer, technical details, schedule, milestones, a risk management Plan, and a WRR are submitted.
4. Execution – the stage of setting up the environment, executives, and signing the contract [18].

A schematic overview of the so-called Performance Information Procurement System (PIPS) is shown in Figure 1.

The phase of selecting the best supplier itself contains four filters. Progressing from filter 1 to filter 4 means a higher supplier quality. The procedure is presented in Figure 2.

According to the method, the basic setting of criteria weights for selecting the best supplier can be as follows [18]:

- LE 30%
- RA 20%
- VA 10%
- Price 10%
- Interview 30%

The basis of the BVA method is Kashiwagi's Information Measurement Theory (IMT). IMT theory is defined as the logical tracing and explanation of an event so that the consideration and use of relative and related data leads to the most accurate prediction of a future outcome. IMT encourages an approach to problem solving based on the use of dominant information, minimizing subjective decision-making, minimizing the amount of data required for information transfer, and setting and optimizing processes to eliminate as much as possible the decision-making, management, and control of other stakeholders. These procedures then lead to the elimination of elements or entities that increase the risks of the project/process and have no added value for it. All events are predictable if information is available. An increased level of decision-making increases project risks [18].

## 3.1 Application of the BVA method at BUT

BUT representatives were first introduced to the BVA method in 2017 at a conference in the Netherlands. Subsequently, in 2018, an intensive workshop and seminar were organized in Brno, where the principles of IMT and BVA were presented and explained. The first pilot orders carried out using the BVA method were implemented at the BUT in 2019. These were constructions with a small budget in the order of millions of CZK/tens of thousands of €. On these pilot projects, the theoretical knowledge of the university staff as well as the reactions and readiness of the applicants were tested and

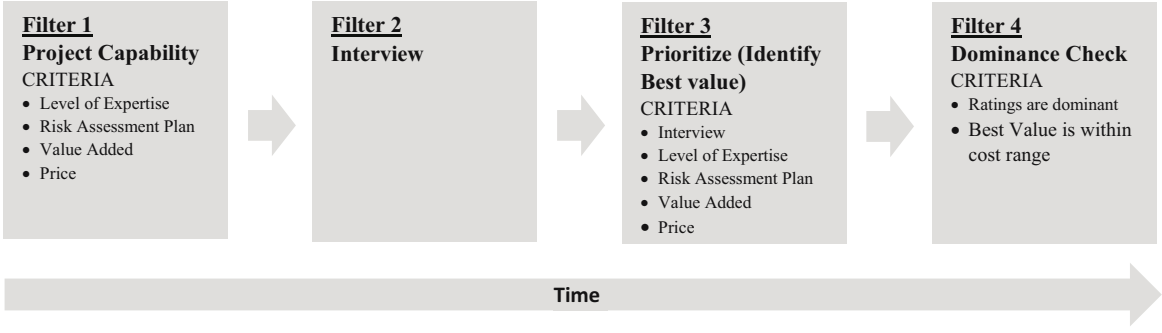


**Figure 2:** Best supplier selection phase [18].

verified. Based on the good experience of using the method, from 2020, large investment events are tendered through the BVA, thanks to the people in the university management who support the application and development of qualitative evaluation of public contracts.

The setting, content, and individual procedures of the BVA method used at the university honour the principles set by the method's author, Dean T. Kashiwagi, and follow the Dutch model, which was a significant source of inspiration. All criteria are used, the applicant's LE, RA, and VA are being evaluated anonymously. After evaluating these criteria, anonymity is cancelled and interviews are conducted with a key person (Interview). After the evaluation of the interviews, the price part of the offer (Price) is opened and an overall evaluation of the individual offers is developed. Bids are submitted through an electronic tool guaranteeing maximum transparency of the tender process and containing a qualitative part (LE, RA, and VA) and a price part (Price) so that the price part can only be opened after the evaluation of the qualitative part. Bidders are continuously informed about each partial evaluation of bids, which enables them to know their interim score. Based on the experience gained, it was determined that the VA criterion is not used for contracts for construction works that are tendered through documentation prepared by the contracting authority. This must contain detailed project documentation and a statement of dimensions, which the bidders are obliged to observe and evaluate exactly, so from the point of view of the Public Procurement Act, there is no scope for the creativity of the bidder. The use of the VA criterion in these cases appears to be counterproductive. The authors of the article see a more meaningful use of the VA criteria for contracts for construction works awarded in the form of Design and Build, which are not so much bound by the detailed processing of tender documentation and by the method of competition. However, the VA criterion is successfully used, for example, in competitions for building designers, where the university in several cases received more than required in the tender documentation. These are mainly advanced technologies and procedures such as the development of project documentation through BIM modelling, digital 3D scanning of existing spaces of reconstructed buildings or virtual tours of the existing and proposed state of the objects.

## 3.2 Project risks

Another evaluation criterion that is given a lot of attention at BUT is the RA. From the point of view of risk management, risk can be understood as the possibility that, with a certain probability, an event will occur that differs from the expected state or development. However, it includes not only the probability, but also the quantitative and qualitative extent of the event [19].

The tender participants, based on their professional knowledge and experience, identify two risks and propose appropriate measures for their elimination or mitigation. It must be true that each risk is clearly defined and specific, can make it difficult or threaten the fulfilment of the project and is a risk on the part of the contracting authority or a third party. It must not be a risk on the part of the participant and the future supplier. For these risks, it is assumed that an experienced contractor will treat and resolve them himself. The proposed measures must also be clearly defined and specific.

The work with this criterion also experienced a certain development and shift at the BUT as a reaction to gradually gained experience.

## 3.3 Point assessment of risks in the BVA method

In the Netherlands, all criteria including the RA are assessed relatively subjectively and simply using a scale of 1–6–8–10. Number 1 means the opposite effect, i.e., the applicant showed that he does not understand the contract and specific areas, and his proposal can damage the entire contract. A value of 6 means a neutral rating that can be obtained even for an unfilled form, or naming a risk and a measure that is not a risk, not relevant to the job, etc. Values 8 and 10 are assigned for identifying risks whose elimination can have a very good or excellent influence on project implementation.

In the Czech Republic, the situation is more complicated, especially in relation to the Public Procurement Act and its interpretations, but also due to the fact that a certain part of the public generally or specifically does not want the introduction of new principles. It also applies that any misconduct in the procurement and evaluation of a public contract can easily be appealed to the Office for the Protection of Economic Competition. In the realities of the Czech Republic, unfortunately, in the interpretation practice of the Public Procurement Act, it is often the case that only what can be easily compared is correct. For example, to exactly compare a larger and smaller value. That is why most contracting authorities, for reasons of caution and maximum simplification of the approach, use evaluation for the lowest bid price. The

Czech environment, even the professional construction environment, is not yet quite used to a certain amount of invention and subjectivity when evaluating bids. As stated by Dean T. Kashiwagi, the BVA is about a paradigm shift [3]. This change is also gradually taking place in the Czech construction market.

BUT's first practical experience with the BVA method showed that suppliers do not know how to work with project risks well enough, often they do not know how to grasp them at all. The term construction project risk is often referred to as risks associated with the area of work safety rather than risks associated with time, economy, or project quality management.

The author of the method, Dean T. Kashiwagi, additionally drew attention to the fact that applicants do not know how to handle the "RA" criterion well enough, they do not know how to identify or describe them well. At the same time, however, it happens that the contracting authority cannot evaluate them relevantly, because they lack the expertise. Kashiwagi therefore recommends reducing the weight of the RA criterion from the original 20–5% [20].

Based on own experience and based on Kashiwagi's recommendation, the RA criterion value for BUT construction contracts is currently set to 10%.

However, despite the weight of 10% (or 5%), this criterion is very important and significant. Applicants can gain and lose a lot from it in the overall evaluation. The previous statement can be substantiated by the following model case. The model order has an estimated value of 100 million CZK/4 million € and the Price criterion has a weight of 40%. At the same time, the maximum and minimum permissible price is determined, where the maximum is 100 million CZK/4 million € and the minimum price is set as 80% of the value of the maximum price, i.e., 80 million CZK/3.2 million €.

The number of points that can be achieved for individual criteria is given by the following formula for BUT contracts:

$$\text{Number of points} = \frac{\text{Evaluated offer}}{\text{Best offer}} \times \text{Criterion weight}. \quad (1)$$

On a 100-point scale for the entire order, a minimum of 32 and a maximum of 40 points can be obtained for the Price criterion. For the RA criterion, which has a weight of 10%, then 0–10 points can be obtained. Ultimately, therefore, each point for the risk assessment plan is worth CZK 1 million/€40,000. As already mentioned, even on the criterion with the smallest percentage weight, a lot can be gained and lost in the total points.

# 4 Results

This section is oriented on presentation of results related with considering of the elements of risk management in the selection of a supplier in the framework of public contracts at BUT, following the research methodology described in Section 3.

In view of the above, within the RA a wider and more descriptive point scale of 0–3–6–8–10 was chosen at BUT, which from the authors' point of view is more understandable for applicants and evaluators, and ultimately brings another positive effect. This consists of a greater point difference between the individual offers, and the overall point score is actually and optically more different. Thus, it does not lead to possible considerations by applicants that the final results and ranking are very close. This seemingly minor, but practical and functional change to the point scale resulted from specific feedback from applicants for the reconstruction of the "Palacký" dormitory building contract procured in 2019. The co-author of this article, Petr Marvan, together with his colleagues from the Department of Public Procurement, incorporated the modified settings in the current BVA methodologies used at BUT, not only for the RA criterion but also for other qualitative criteria. The new point scale was used for the first time in 2021 for the selection of the contractor for the reconstruction and modernization of the premises of the Faculty of Mechanical Engineering (FMI), section 1. This is a contract for construction work including the reconstruction of two educational buildings with a budget of 140 million CZK/5.6 million €.

The currently used key for allocating points for the RA criterion is shown in Table 1. The key has so far been used for four orders at BUT.

Bidders for a public contract identify and describe two risks in their bids and propose appropriate measures to eliminate or mitigate them. They use their know-how and experience for this. Bidders must perform a simple basic analysis of the identified risks and determine their rate, which is a combination of the negative impact of the risk and the probability of occurrence. If the risk is more significant, the more likely it is to occur and the higher is the intensity of the negative impact on the project. A simple five-point scale shown in Table 2 is used to express both quantities.

In the second step, the applicant describes the measures by which the identified risk can be mitigated or eliminated and determines the costs of this measure. The third step of the simple analysis is to determine the probability of the occurrence of the risk and the intensity

**Table 1:** Key for allocating points for the RA criterion

| Number of points | Sample verbal assessment |
|---|---|
| 10<br>Excellent | **The participant has identified the relevant risk. The proposed measure completely or almost eliminates the occurrence and negative impact of the risk when considering the cost of implementing the measure**<br>The elimination of the occurrence or negative impact of the risk is also confirmed by the numerical effect of the measure. It can be concluded that the mentioned effect of the measure will also be realistically achieved in the case of a public contract |
| 8<br>Very good | **The participant has identified the relevant risk. The proposed measure very well minimizes the occurrence and negative impact of risk when considering the costs of implementing the measure**<br>Very good minimization of the occurrence or negative impact of the risk is also confirmed by the numerical effect of the measure. It can be concluded that the mentioned effect of the measure will also be realistically achieved in the case of a public contract |
| 6<br>Good | **The participant has identified the relevant risk. The proposed measure well minimize the occurrence and negative impact of risk when considering the cost of implementing the measure**<br>Good minimization of the occurrence or negative impact of the risk is also confirmed by the numerical effect of the measure. It can be concluded that the mentioned effect of the measure will also be realistically achieved in the case of a public contract |
| 3<br>Sufficient | **The participant has identified the relevant risk. The proposed measure sufficiently minimizes the occurrence and negative impact of risk when considering the cost of implementing the measure**<br>Sufficient minimization of the occurrence or negative impact of the risk is also confirmed by the numerical effect of the measure. It can be concluded that the mentioned effect of the measure will also be realistically achieved in the case of a public contract |
| 0<br>Neutral | **The effect of the measure on minimizing the occurrence and negative impact of the risk is assessed as neutral compared to the cost of implementing the measure**<br>A neutral rating is also given in those cases where no other value given in this scale can be given, and in particular when:<br>– the participant did not identify the risk<br>– the risk is not relevant<br>– this is a mere danger of risk<br>– the participant did not specify the measures, or did not specify sufficiently specific measures, or the measure is of such a nature that its implementation cannot realistically be considered<br>– the costs of implementing the measure clearly do not correspond to its effect<br>– it cannot be concluded that the effect of the measure will be realistically achieved even in the case of a public contract<br>– the participant (even if only for an insignificant part) exceeded the maximum scope of the document<br>– the risk document does not contain the information required in the mandatory fields, or this information does not meet the requirements of the client; the information cannot be read from other fields of the document<br>– The measure does not coincide with the interest of the contracting authority pursued in the purpose of the public contract, and therefore its implementation cannot be considered |

of the negative impact after the implementation of the measures. In particular, the shift in the risk rate before and after the adoption of measures is monitored, as shown by the arrow in Table 2 for illustration.

The evaluation committee then examines whether the risk is relevant in relation to the subject of the order, whether it is a risk on the part of the customer or a third party, whether the individual values were meaningfully determined before and after the adoption of the measure, whether the measure is properly described and the cost of its adoption calculated. The combination of the answers to these questions and the effect of the measures on the elimination or reduction of the risk, considering the cost of the measures, determine the resulting scoring value on a scale of 0–3–6–8–10.

## 4.1 Case study

Using the proposed key and the method of identifying risks and the proposal of measures, the evaluation of the success of the applicants for the public contract "Reconstruction and modernization of the premises of the Faculty of Mechanical Engineering (FMI), section 1" was carried out. It is a total reconstruction of two seven-story educational buildings marked A3 and KH3. This is a

**Table 2:** Scale for determining the probability and intensity of the impact of risks

| Probability of risk | The negative impact of the risk, or the costs that the contracting authority would have to incur if the risk were not addressed | | | | |
|---|---|---|---|---|---|
| | Very small (≤ 4,000 €) | Small (4,000-20,000 €) | Medium (20,000-80,000 €) | High (80,000-400,000 €) | Very high (≥ 400,000 €) |
| Very small (1-5 %) | | | | | |
| Small (6-20 %) | | | | | |
| Medium (21-50) | | | | | |
| High (51-80 %) | | | | | |
| Very high (81-100 %) | | | | | |

contract worth CZK 140 million/5.6 million € excluding VAT expressed in price level in 2021. A total of seven bids were evaluated, two bids were submitted by a two-member association. Thus, seven medium-sized and large construction companies were involved in the public contract. The allocation of points in the RA criterion is shown in Table 3.

In total, applicants scored 54 points out of 140 possible, i.e., an average of 3.86 points out of 10 for each potential risk. Three bidders received zero ratings for both risks. Only one candidate scored the full 20 points.

Risks for which no points were assigned were cases where the risk should have been properly described in the project or procurement documentation, or only a hypothetical scenario of possible situations with a low probability of occurrence was described, or a non-functional system of measures was proposed at the general level claim. Alternatively, the risks were insufficiently described and explained, e.g., it was a general statement of the possible influence of force majeure on the execution of the work.

This was, for example, a risk associated with complications when carrying out repairs to existing floors after completion of the wiring of the electrical installations. However, this fact was known in advance, information about it was part of the tender and project documentation, which also included a detailed solution proposal. Before starting the design work, an extensive structural and technical survey of the existing building was carried out. The designer then took the ascertained condition of the building and individual structures into account in the design of the reconstruction and top, including the method of repairing the floors. The risk was not recognized by the commission. Similarly, another bidder identified as a risk the complexity of the technical solution of a partial part of the construction, which was properly addressed in the project documentation. In both cases, zero points were awarded. Another bidder identified the potential lack of capacity and material as a risk due to the COVID 19 pandemic. However, the bidder also stated that the probability of the risk is small, 6–20%, and the negative impact is very small, up to 4,000 €. At the same time, he also estimated the price of the measure at 4,000 € with the result of reducing the risk to a probability of 0–5 %. In this case, the risk before taking the action is equal to the cost of the action and the desired effect does not occur. At the same time, there is no significant shift in relation to the level of risk. In this case also, zero points were awarded. Another of the bidders only stated in general the possible future occurrence of force majeure that may affect the execution of the work. Such a message is too vague and general and cannot be awarded by any points. A possible risk was mentioned in one of the offers regarding the occurrence of protected animals on the roof of the building. However, this was a fact that the client was aware of, it was stated in the construction permit for the building and considered in the project documentation, including the solution. The candidate received zero points.

**Table 3:** Allocation of points within the RA criterion for individual applicants

| Applicant | Risk 1/points | Risk 2/points | Average/points |
|---|---|---|---|
| **1** | 0 | 0 | 0 |
| **2** | 0 | 8 | 4 |
| **3** | 8 | 8 | 8 |
| **4** | 10 | 0 | 5 |
| **5** | 0 | 0 | 0 |
| **6** | 10 | 10 | 10 |
| **7** | 0 | 0 | 0 |
| **Total** | **28 out of 70** | **26 out of 70** | **3.86 from 10** |

**Table 4:** Evaluation of risk scoring for BUT contracts evaluated using BVA

| Order | Order type | Value in mil. CZK/mil. € | Submitted/ evaluated | Year of assignment | Average points of the risk document |
|---|---|---|---|---|---|
| Reconstruction of FMI | Designer | 22/0.88 | 4/2 | 2020 | **2.50 of 10** |
| Reconstruction of "Palacký" dormitory | Construction works | 80/3.20 | 4/4 | 2020 | **6 of 10** |
| FMI renovation section 1 | Construction works | 140/5.60 | 7/7 | 2021 | **3.86 of 10** |
| FMI renovation section 1 | Supervision | 3/0.12 | 1/0 | 2021 | **Cancelled** |
| Upgrade BMS | IT services | 25/1.00 | 2/2 | 2021 | **6 of 10** |
| New construction of the Faculty of Chemistry (FCH) | Designer | 11/0.44 | 3/3 | 2022 | **6 of 10** |
| FMI renovation section 2 | Construction works | 190/7.60 | — | Commenced 2022 | – |
| FMI reconstruction, section 3 | Construction works | 100/4.00 | — | Assumption 2023 | – |

Another of the bidders only identified certain general dangers in the field of safety of the operation of the surrounding area and dangers connected with the administration of the project, which, however, he did not develop further and at the same time did not offer any solution. Zero points were assigned for both risks.

On the contrary, some identified risks were relevant in relation to the subject and purpose of the public contract, and the applicants received 8 or 10 points for them. One of them pointed out two of the suppliers about the possible user ignorance of working with the BIM model and CDE among the client's employees and offered to train all responsible persons. This was evaluated positively by the commission and the applicants received 8 points. Another of the bidders drew attention to the potential close proximity of construction routes and routes of students and employees, unresolved in the construction organization project, and suggested organizational and technical measures that would completely eliminate this risk, for which he received 10 points.

Furthermore, a warning was presented about the condition of the existing electrical installations and antenna systems on the roof, which are not the subject of the work, but which can hinder the progress of construction. He did not really address this project or only marginally, so the risk was assessed positively.

The customer reflected on all the relevant risks mentioned and solved them himself in advance before starting his own construction. This concerned, for example, the timely assurance of transfers of foreign operators' routes to the antenna routes on the building's roof or by changing the organization of the construction site's equipment in relation to the surrounding operation of the site. Alternatively, he prepared for them and solved them during construction with the selected contractor. This concerned in particular the training of own employees in the matter of working with advanced IT technologies.

The average point score of 3.86 out of 10 seems to indicate a certain misunderstanding of the assignment, or a lack of expertise of the applicants, either in terms of knowledge or in terms of how to describe the risk.

## 4.2 Other orders at BUT

In the last 3 years, other public contracts related to the construction or reconstruction of university infrastructure have also been implemented using the BVA qualitative assessment method. One of the orders related to the upgrade of the existing Building Management System (BMS) is from the field of IT, but also concerns the building development of the school. BMS BUT contains more than 50,000 data points and monitors and controls individual technologies and systems in the campuses and buildings of the university. The list of orders and evaluation of the risk analysis criterion are shown in Table 4.

For the contract for the designer of the reconstruction of the FMIFMI area, only two bids were evaluated out of the four submitted, because the other two failed to submit in accordance with the client's request. This consisted in the fact that the offer was divided into a qualitative and a price part. The average rating of the RA criteria for this contract was 2.5 points out of 10. The score for the construction contract for the reconstruction of the "Palacký" dormitory building was 6 points out of 10. For the already mentioned contract for reconstruction of FMI, section 1, the score was only 3.86 points out of 10. In the supervision contract for the same building, there was no evaluation at all, because the only bidder who submitted a bid again failed to meet the requirements for dividing the bid into two parts, and the contract was cancelled. For the other two contracts contested in 2022 concerning the upgrade of the BMS and the selection of a designer for designing the

new building of the FCH, the score early was equal 6 points out of 10, which may indicate some improvement.

From the given data, it can be concluded that there is a lot of things to improve in this area, even in such a fundamental matter as the proper submission of the offer according to the client's requirements.

# 5 Discussion

The BVA method is a novelty in the public procurement environment in the Czech Republic. It means a change in thinking and a change in approach on the part of the contracting authority and the applicant for a public contract. There is still a lot of things to learn and to improve on both sides. That is why, before each contract tendered through the BVA, BUT organizes the so-called preliminary market consultations, where it presents the principles of the method and evaluation, as well as the subject and scope of the work, to potential contract applicants.

While the contribution is focused on the RA used in the tender, it is also good to consider other implications related to the tender and the relationship between the contracting authority and the bidders.

BUT also pays great attention to communication with applicants for public contracts and potential suppliers of services and construction works. Within the PIPS, the first part labelled pre-qualification is always applied [20]. Before issuing any tender in which the BVA method is used, a public meeting is organized with those interested in the contract, at which the goals, purpose, and content of the contract are presented. And the principles of the BVA method and the way of evaluating offers are also explained in more detail. There is a lot of interest in these meetings among the participants.

After the selection of the contractor for the FMI reconstruction, section 1 was completed, the so-called evaluation interviews with unsuccessful applicants who expressed interest in this type of meeting were also organized beyond the scope of normal practices. From the six unsuccessful applicants, four participated. The interviews serve to provide mutual feedback between the contracting authority and the bidders and for a more detailed explanation of the contracting authority's motivations and the evaluation committee's thought processes when assigning points and evaluating bids. The outputs from these negotiations are currently in the processing phase and will be supplemented by a questionnaire survey with all applicants. Relevant comments and suggestions will be incorporated into the methodology for assigning and evaluating contracts at BUT.

After the conclusion of the selection procedure and notification of the selected candidate, the university organizes an educational meeting with the tender participants in order to obtain mutual feedback. These meetings are held individually, not collectively with all participants at the same time. Although participants receive a continuous evaluation with a detailed explanation of their point evaluation, they can ask representatives of the evaluation committee about other details that are not completely clear to them. The university, on the other hand, asks applicants for their views and opinions on the completed competition.

# 6 Conclusion

The presented work is focused on the identification and characteristics of the BVA in public contracts procurement in the Czech Republic. The main attention is paid primarily to the issue of risk assessment and evaluation within the tender process using the BVA approach. The contribution presents the theoretical basis for the use of the method, the practical application of the method in the conditions of public procurement in the Czech Republic, and the results of a case study of the real use of the proposed approach in the practice of public procurement.

The BVA method provides a unique opportunity to draw attention to potential risks unknown to the contracting authority already during the preparatory phase, and solve them even before signing the contract and starting work. At the same time, in the first plan, it enables the elimination of an extremely low bid price and a more detailed overall involvement of the bidder in the contract even before the contract is signed.

Further progress in the matter of examining the BVA method and managing construction project risks through this method will develop in the following directions:

1. Comparison of risk assessment approaches at BUT and other companies, evaluation of their advantages and disadvantages within a specific case study.
2. Survey of selected suppliers in order to find out opinions on the BVA qualitative assessment method with a focus on the RA criterion.
3. Comparison of the obtained data with the data from abroad, especially from the Netherlands and Norway, where the BVA method is also currently being implemented.
4. Evaluation of the influence of the selection procedure on the course of the project of implemented and completed orders or orders in an advanced stage of implementation.

5. Draft of practical instructions (manual) for setting, filling in, and evaluating the risk criterion with the potential for use on a specific job.

Researching the BVA method, its development and anchoring within public contracts can contribute positively to the standardization of the Czech construction industry, which the professional public has been calling for many years. At the end of the study, it can be stated that even if the case study is developed on a project implemented within the Czech Republic, the defined procedure for taking risk into account in the selection process is also applicable at the international level.

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