Redefinition of procurement process with BIM in the Czech Republic

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Abstract. The paper is describing process of preparation of the evaluation methodology that will help public and private contracting authorities to evaluate an appropriate supplier of the BIM methodology for their projects. Such a methodology will accurately define requirements for BIM implementation for different phases of the project. It will also evaluate companies' fulfilment of these requirements from previous projects or based on the presented technologies of the company. The evaluation methodology will find its application both in the state administration and in the private sector of Czech civil engineering industry. In the current market, there is a need to quantify the level of implementation of work processes and outputs of the BIM methodology. Such a methodology assessment will help improve and make the procurement process more selective based on BIM.

1. Introduction

A number of developed countries, including the Czech Republic, have relied on the BIM methodology as a tool to help prepare the public sector and the entire construction industry for the challenges of the digital world. In the Czech Republic, the Concept for the introduction of the BIM methodology was adopted by the Czech government in the autumn of 2017. The state decided to motivate public and state administration, i.e. public contracting authorities, to work digitally first, and through them also to support the standardisation of digitalisation in the private sector.

The resolution of the Czech government from 1st January 2021 [1] and the approval of the update of the schedule of the BIM Implementation concept will make it possible to reconcile the gradual introduction of the use of building information modelling in construction contracts financed from public sector and the start of digital construction management, as stipulated by the already valid Act No. 47/2020 Sb. This act also makes use of BIM mandatory for above-limit public construction works (in the sense of procurement), financed from public budgets, including the manufacture of their preparatory and project documentation, with taking into account the conclusions of the evaluation of the pilot projects and with taking into account specificities of each type construction. This part of the law is scheduled to go into an action from July 2023. [2]

The data from the building information model can be used as one of the ways to prepare documentation for individual stages of the construction procedure very easily. Information and Digital Modelling Act envisages the creation of information models during the individual phases of the construction life cycle, which are linked to the digital procurement. [3] [4]
2. Main delivery methods used for construction projects in the Czech Republic
In current construction practice, several types of different delivery systems are used to varying degrees, depending on the suitability of their application. [5] The delivery systems applied in different countries vary slightly according to the traditional division of labour, but the main features are common and applicable in any market economy. The Czech Republic is influenced in this respect by the short history of the market economy and although it can be said that in principle all types are used, not all are respected and used to the same extent as in other advanced market economies.

This paper will focus on the following two main delivery systems used in the Czech Republic. [6]

2.1. Design-Bid-Build
The traditional supply chain system, also called Design-Bid-Build is undoubtedly the most used supply system in the Czech Republic and in other countries. The reason for its frequent use is not only its tradition, but above all its transparency in controlling project costs, which is why it is mostly used for construction contracts financed from public budgets, or its use is required by the legislation of a given country.

In the Design-Bid-Build system, the investor concludes two contracts for work. One with the independent designer and the other with the general contractor. The latter can hire subcontractors for selected works. [7]

2.2. Design-Build
In the Design-Build method, the responsibility for the development of the design of the documentation is the responsibility of the contractor. The contracting authority will award the entire project to one contractor who will carry out the project from start to finish. This contractor might not necessarily be selected based on the lowest tender price. The selection process should determine whether a particular contractor can complete the entire project.

One of the main advantages of the DB method is the openness of the procurement proposal, where the project is specified only through the requirements for the purpose and function of the building. The contractor is thus free to choose the technologies and work processes according to his capabilities and experience. Another advantage is the unification of the design and implementation of the building under one contractor, which allows for greater financial and time savings. [1]

3. Public procurement process in the Czech Republic
The procurement process and the tendering procedure vary according to the subject of the procurement and its expected cost. The award of a public contract entails an obligation to publish information in publicly accessible places such as the Public Procurement Bulletin, the contracting authority's profile and, where appropriate, the Official Journal of the EU. However, it can be generalised and divided into several steps. [8] These steps are described in the following subsections.

3.1. Defining the type of procurement
The first step is to choose the type of procurement procedure. The contracting authority may choose from several types of procurement procedures - open procedure, restricted procedure, negotiated procedure with publication, negotiated procedure without publication, competitive dialogue procedure, innovation partnership procedure, concession procedure, simplified procedure and simplified below-limit procedure. The choice of the appropriate form of procurement procedure is influenced primarily by the subject of the public contract, its expected price and the characteristics of the contracting authority (business, municipality, subsidized contracting authority, etc.).

3.2. Call for submission
Once the contracting authority has chosen the type of procurement procedure, the procedure is launched by means of a notice of initiation for publication or a call for tenders (simplified invitation to procurement). Here the contracting authority shall specify in detail the subject of the contract and the
conduct of the procurement. Often, the invitation to submit tenders is accompanied by the so-called procurement documentation, which specifies in detail the subject of the public contract within a specific procurement procedure.

3.3. Determination of the method of submission of tenders
Tenders shall be submitted in written or electronic form. The envelope must bear the name of the procurement and the address of the tenderer. In the event of receipt after the deadline for submission of tenders, the envelope containing the tender shall be returned to the tenderer. Tenders received after the deadline for submission shall not be opened. Each tenderer is limited to submitting only one tender. A variant solution shall be considered as one tender.

3.4. Defining the requirements for demonstrating qualifications
Meeting the required qualification conditions is an essential element for proper participation in the procurement procedure. The law recognizes four basic types of qualification requirements. Basic and professional qualifications must always be required by the contracting authority. The economic, financial and technical qualifications are chosen by the contracting authority according to its requirements in relation to the public contract and need not be required at all.[8]

All qualification requirements are defined by the contracting authority in the procurement documentation. Each supplier should be able to determine whether it meets the qualifications from the procurement documentation.

3.5. Determination of the deadline for submission of the tender
The time limit for receipt of the required documents proving compliance with the qualification, as well as the time limit for receipt of requests to participate in a restricted procedure, a negotiated procedure with publication or a competitive dialogue, may not be less than 37 days for public contracts above-limit public contracts. For urgent objective reasons, the time limit may be reduced to 15 days. For below-limit public contracts, the time limit shall not be less than 15 days, or at least 10 days for urgent objective reasons. [8]

The time limit for the submission of tenders may not be less than 52 days for above-limit procurement procedures, less than 40 days for restricted procurement procedures or less than 10 days for restricted procurement procedures for urgent objective reasons. [8]

For below-limit public contracts, the law provides for a minimum time limit of 22 days in an open procedure, 15 days in a restricted procedure and a simplified below-limit procedure, or at least 7 days in a restricted procedure and a simplified sub-limit procedure, unless a standard minimum time limit cannot be set for urgent objective reasons. [8]

The time limits shall begin to run on the day following the day on which the procurement procedure is opened. [8]

3.6. Determination of methods for evaluation of tenders
The contracting authority has the right to choose between two basic evaluation criteria. It may choose between the economic advantage of the tender or the lowest tender price.

3.7. Issuance of the decision of the most suitable tender
Immediately after selecting the winner of the procurement, the contracting authority issues a decision on the selection of the most suitable tender. The contracting authority must send a notification of the selection of the most advantageous tender to all tenderers concerned within 5 working days of the decision. The notification must include the details of the contracting authority and the title of the contract. It shall also identify the winner of the procurement, stating its full name. This shall be followed by a justification of the actual selection, specifying the reasons for the selection in accordance with the applicable conditions set out in the procurement documents.
3.8. Conclusion of the contract
After receiving the notification of the selection of the most advantageous tender, the contracting authority is obliged to allow each tenderer a period of time to lodge objections to the contracting authority's decision to select the most advantageous tender. Each tenderer will normally have a 15-day period to object separately from the date of receipt of the notice of selection of the most advantageous tender. The contracting authority may ask the tenderers concerned to waive their right to object in order to accelerate the time limit. If the contracting authority receives no objections during the objection period, it may proceed to sign the contract with the successful tenderer.

After concluding a contract with the selected tenderer, the contracting authority is obliged to publish a notice of the result of the procurement procedure on the Public Procurement Bulletin portal, the profile of the contracting authority and, in the case of above-limit contracts, on the Official Journal of the European Union.

4. Main challenges of implementing BIM in public procurement process
As was described in the previous part of the paper, public procurement is generally a highly formalised procedure aimed at selecting a supplier of supplies, services or works. The contracting authority must comply with a myriad of rules and obligations when awarding contracts. Where the contracting authority has a 'free hand', it must also ensure that the setting of various requirements (requirements for the subject-matter of the contract, requirements for the qualification of suppliers, etc.) does not violate the principles of public procurement non-discrimination and compliance with equal treatment, transparency and proportionality. The less innovative the approach, the safer the choice of supplier. At the same time, the less innovative the approach taken, the less likely the investor is to select with certainty a high-quality supplier and to realistically check its experience before the actual implementation phase of the public contract, i.e. before the moment of conclusion of the contract and subsequent performance of the contract.

Adoption of BIM in the Czech Republic is governed by Ministry of industry and trade and subsequently by Czech standardization agency. They oversee preparation of BIM standards and guidelines for public investors. Topic of this paper is complementing their proposed legislation, since methodology of evaluating BIM supplier have not been presented yet.

5. Proposed changes to public procurement process
This paper is focused on defining the requirements for demonstrating qualifications which are described in subsection 3.4. of this paper. It is necessary to be able to define and consequently be able to evaluate BIM related requirements. During the procurement process suppliers are asked to provide a proof of qualification in the form of previous reference. Since there have not been finished a lot of projects using BIM in the Czech Republic, it could be discriminatory for most suppliers. This paper is proposing another approach to determine supplier’s ability deliver required qualification. For the scope of the paper this requirement will be demonstrated on designers.

From the professional experience of authors of the paper, designers BIM knowledge in the Czech Republic can be divided into several categories:

- Designer team have no basic knowledge of BIM, they do not have BIM software tools and work in 2D
- Designer team have BIM software tools, but utilize it just for 3D visualization and for generating 2D documentation
- Designer team fully utilizes BIM tools, but do not have any data standards for information embedded in model
- Designer team fully utilizes BIM tools and have data standards for information embedded in model

One of the possible ways how to determine their real ability to work with BIM is to give them opportunity to demonstrate their abilities. In order to select a quality BIM contractor, this paper proposes not to take the path of least resistance, but to make the necessary effort to examine the capabilities and
capacities of the contractors during the procurement process. This procedure certainly increases the administrative and technical complexity of preparing and implementing the procurement procedure on the part of the contracting authority. It certainly adds to the complexity of the preparation of the tender by the suppliers, but in such a complex area as the use of BIM methodology is, it is worthwhile for the contracting authorities.

5.1. Defining the requirements for demonstrating BIM qualifications

The paper proposes that in order to ensure that tenderers meet investors qualification criteria, they would be asked to prepare small scale BIM model. Detailed instructions for BIM will be provided as a part of procurement documentation, in the form of Employers Information Requirements (EIR) Annex. Tenderers will be also provided with project documentation with defined sample size. Size of the sample should provide contracting authority with enough information about tenderer’s BIM skills and should not be too big and complex, so it would discourage tenderers from participating in procurement. Type of the documentation would depend on the project type, delivery method and stage of the project. Then the tenderer will deliver model sample and filled BIM execution plan (BEP) to demonstrate BIM qualifications as a part of the tender.

The key in this section is the correct compilation of the BIM sample, the completion of the BEP and the completion of the supporting documents in order to evaluate tenders against the individual evaluation criteria. Of course, it is necessary to document all other requirements for the preparation of tenders (e.g. demonstration of basic competence, professional competence, technical qualification, etc.). Here, the designer demonstrates advanced knowledge of BIM model creation and the ability to communicate detailed information about it to other project participants, i.e. the construction contractor.

![Process of BIM qualification assessment](image)

**Figure 1.** Process of BIM qualification assessment

5.2. Determination of method for evaluation of tenders from the point of BIM

The evaluation of tenders is not based on knowledge of working with BIM (this is assumed, e.g. by preparing a sample and completing the BEP). The tender with the highest score (the most economically advantageous tender) is subject to a closer examination. In addition to the assessment of the general parts of the tender (e.g. documents to demonstrate basic competence), the BEP and the sample submitted are also assessed. This process is shown in Figure 1.
The assessment of the BEP and the sample represents a key (and perhaps the most challenging) point in the selection process. In the Czech Republic, BIM model checking by the investor is virtually unknown. Perhaps because the investor needs to be equipped with advanced knowledge and tools to check the model. This step is crucial to avoiding selecting tenderer without required knowledge of BIM methodology. Only tenderers with completed BEP (that relates to presented sample) and sample (that matches required size and quality) can compete in procurement.

6. Conclusion
The paper focuses on public procurement process, because of its complexity. However, introduced principles are applicable for private sector as well. Despite of continuous effort from all interested parties, implementation of BIM into projects as a standard practice has still few major obstacles to overcome. [9,10] Presented research is focusing on technical aspect of selecting skilled and reliable supplier. Since BIM represents such a major disruption to established environment, the process of change is at some aspects painfully slow. It touches every aspect of building industry. Presented improvement of procurement process is currently being tested on pilot projects and results will be published once enough data will be gathered and processed.

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