

ANALYSIS OF THE POSSIBILITIES OF IMPLEMENTING BIM FROM THE VIEWPOINT OF ENGINEERING

Jiří Hrouda¹, Petr Matějka²

¹*CTU in Prague, Faculty of Civil Engineering, Department of Construction Management and Economics, Thakurova 7, Prague, 166 29, Czech Republic, jiri.hrouda@fsv.cvut.cz*

²*CTU in Prague, Faculty of Civil Engineering, Department of Construction Management and Economics, Thakurova 7, Prague, 166 29, Czech Republic, petr.matejka@fsv.cvut.cz*

Abstract

The object of the research is what the process of obtaining building permits for projects that use BIM looks like in these countries. Above all, the research is focused on examining how the projects are submitted for the building permit procedures – whether it's possible to submit the projects in a digital form and use the advantages that the BIM model offers or if it's necessary to convert the BIM models into 2D. To achieve this objective, short questionnaire was made and will be presented to relevant respondents in Czech Republic. This results is testing of the following statement: *"The public administration employees in the Czech Republic don't know anything about BIM"*. A suitable follow-up to this research would be an analysis of the willingness to implement BIM in the local administration.

Keywords

BIM; Engineering; public administration

Introduction

In this research, I deal with the analysis of the possibilities of implementing BIM (Building Information Modelling) from the viewpoint of engineering. The main points of the research are: analyzing the use of BIM worldwide and analyzing the environment in the Czech Republic in terms of the possible implementation of BIM. At the present time, BIM is a modern topic, but most of the subjects involved in the Czech construction industry are not informed enough about it, which is one of the main reasons why BIM hasn't been implemented more frequently in construction projects in the Czech Republic. The aim of this research is to provide new, interesting information which would be useful when implementing BIM in the Czech Republic. Real-life experience with engineering is confronted with the demands to include BIM in the Czech legislation.

Since throughout the world, the concept of BIM is evolving at a high pace, the aim of this research is to capture the current state of how BIM is used when designing and administering buildings. Even more specifically, explaining the possible use of the BIM model when obtaining building permits at the public authorities is among the most important aims of this work. The countries that are often considered to be the pioneers of implementing BIM are, among others, Singapore, the United States and Finland. That is why these countries in particular will be analyzed and the output will be used to reach a conclusion which should postulate how to contribute to a higher rate of implementing BIM in the Czech Republic. A case study about attitudes of the Czech civil servants towards this issue is also going to be one of the outputs of this research.

Methodology

The key phrases defined within the scope of this research are: *BIM* and *engineering*. Also, the current situation of the legislature regarding building permits in the Czech Republic is elaborated here. In order to obtain information about how BIM works abroad, relevant universities and institutions in countries considered to be the pioneers of BIM, will be contacted. Singapore, the United States and Finland were chosen as the relevant countries. The object of the research is what the process of obtaining building permits for projects that use BIM looks like in these countries. Above all, the research is focused on examining how the projects are submitted for the building permit procedures – whether it's possible to submit the projects in a digital form and use the advantages that the BIM model offers or if it's necessary to convert the BIM models into 2D. The work aims at comparing the countries where BIM has already been – in one way or another – implemented, a comparison which could be highly instructive for the Czech Republic.

Among the Asian countries – and perhaps even worldwide – the country where the process of obtaining building permits for BIM projects is the most automated is Singapore and it is this particular country which is very interesting in terms of engineering activities. According to other research, the BIM approach was used in 10% of the Singapore construction projects in 2008 [1] and in 25 – 30% of projects in 2011 [1]. It is estimated that in 2015, BIM will be used in as much as 80% of all the construction projects in Singapore [1]. Singapore is constantly trying to create tools for automated control of projects during the process of obtaining building permits [2]. There is a possibility for engineering companies to check projects in the IFC format and make sure that it conforms to the local legislation.

Questionnaire

In the Czech Republic, the viewpoint of civil servants on BIM will be analyzed by the means of question-forms. The majority of respondents consists of employees of construction administration

and other relevant authorities of the public administration, such as the Department for the care of historic monuments. Only employees from Prague will be addressed and the following questions are part of the questionnaire.

Have you ever heard of BIM?

The first question is relevant in order to find how informed the respondents are about BIM and the answers can provide a sufficient picture about how well known BIM is. When answering *yes*, a more detailed follow-up answer should clarify where the respondents first got to know about BIM and how well informed they are.

Would you be willing to attend Education training on this topic?

This question should find out whether the public administration employees are interested in deepening their knowledge of the BIM issue. The respondents will be asked for a more detailed answer, so that the output can serve as a base for making future decisions about implementing training sessions and also as a tool to identify the potential benefits and problems that the employees associate with this issue. The answer can also say a lot about the motivation of the public administration employees to learn new things and could show how informed the employees currently are (for example when their knowledge is already on a sufficient level and there's no need for any further trainings).

Do you think it's feasible to have the documentation submitted electronically?

The question aims at finding out whether the respondents think it's possible to change the current system of submitting the documentation in paper form. If the respondent answers *no*, a further clarification is important, stating why he or she is not willing to accept the electronic communication. The potential impediments will be analyzed and a way how to reduce or completely remove them will be suggested.

Would you find it beneficial to have a possibility to generate any view of the object in the project or to make cuts through the object?

The question is asked with the aim of finding out whether the general contributions of BIM modelling would be beneficial also for the employees of the public administration. In addition, it should also induce motivation to change the current system. It is assumed that the question will spur the respondents' interest to find more information about BIM.

Would you find it beneficial to have a possibility to display a big amount of construction details?

This question is of a similar nature as the previous one. The aim is to point out the advantages of BIM and find out whether these advantages would also be beneficial for the respondents.

Would you find it beneficial to have a possibility to archive the information about the objects electronically?

The question is trying to find out if the respondents see any payoff in having the possibility to access the information immediately. A positive answer can be assumed here, since the electronization of archives is currently a big topic and it's even been already implemented in some public administration workplaces (for example the archive of the Department of construction of the Prague district 2 – Odbor výstavby ÚMČ Praha 2 – is already accessible electronically).

Is it conceivable for you that when carrying out state supervision, you will use a tablet computer or another reading device to oversee how the construction is executed?

The aim of this question is to find out whether the respondents think it's possible to change the current system of inspecting how construction works are carried out and finalized with the documentation only being on paper. If the respondent answers *no*, a further clarification will follow, stating why he or she is not willing to accept the use of electronic reading devices. The potential impediments will be analyzed and a way how to reduce or completely remove them will be suggested.

Questionnaire analysis

Based on the responses from the questionnaire, the potential obstacles to implementing BIM in the Czech Republic will be analyzed. Also, it will be stated what potential pitfalls will need to be faced when implementing the possibility to submit the BIM projects electronically. *"It will take many years before BIM is widely used in the Czech Republic, because the public administration isn't flexible and there are many people there who're simply not willing to cooperate unless they're forced to."* [3] The questionnaire should also lead to an assessment of the motivation of the respondents to cooperate and the willingness to learn new things.

The formulation of the first question is very general and it should give a clear picture about how the respondents are informed about BIM. After that, the fundamentals of the BIM projects are briefly explained in the questionnaire. The following questions are formulated in the most concrete way possible. The respondents are expected to give complex responses, not just simple *yes/no* answers. The aim is to find out whether a change of the current system is conceivable for the respondents and whether the general benefits of the BIM projects (for example the possibility to generate a large amount of different views, cuts and details in the object) would be beneficial even for the employees of the public administration.

Results

One of the outputs of this work is a recommendation on how to obtain a building permit for the BIM projects. One pitfall regarding this issue is that in the countries which I analyze, the building permit rules are completely different, which means that it is possible that applying the findings from abroad to how building permits work in the Czech Republic might prove difficult. A complete change of the current Czech system seems unrealistic. A more likely scenario is probably a gradual implementation which will also create demands on expanding the current legislation. First, the legislation would have to enable submitting projects both on paper and electronically. It can be expected that eventually, the current system will be replaced, just as it has already happened in the past in other cases, for example when electronic designs replaced the ones drawn by hand.

One of the aims of this work, regarding the Czech Republic, is to confirm or disprove the following assumption: *The public administration employees in the Czech Republic don't know anything about BIM.* Based on confirming or disproving this hypothesis, the output of this research should suggest how to raise the awareness of the civil servants and how to create an environment that would facilitate implementing the use of BIM by the public administration.

A suitable follow-up to this research would be an analysis of the willingness to implement BIM in the local administration, since it is their willingness which is essential for a further development of BIM in the Czech Republic. An interesting topic for another research would also be analyzing the viewpoint of other involved parties, i.e. investors, planners or suppliers. Another way how to reassess this research in the future would be by repeating it after some time. Since BIM is such a fast evolving

issue, it could be interesting to compare the results of the new research with the older one, as it would show in which aspects the implementing of BIM experienced progress.

References

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