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Building Information Modelling as an opportunity and risk for stakeholders involved in construction investment process

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Abstract

The requirements to apply Building Information Modelling (BIM) in public investments worldwide are currently very high. Significant interest (sometimes formulated also as a requirement) in BIM technology can be observed also among private investors. Design technology that applies BIM is supported by many private investors due to its numerous advantages. A growing group of construction designers (steel, concrete and reinforced concrete among others) and installation designers, producers of prefabricated elements (steel and reinforcements), engineers, architects, construction companies, developers, contract managers and investors in Poland and worldwide notices opportunities offered by using BIM technology in preparation and construction phase, as well as building management. At the same time experts in construction industry draw attention to the low level of competitiveness of Polish construction companies in global and European market caused, among others, by insufficient application of modern technology and innovation, as well as lack of public investor’s initiative in promoting the application of BIM. It is difficult to assess the level of BIM implementation in Polish companies (due to lack of wider research results). The goal of this paper is to present the results of initial research regarding the level of knowledge of BIM and the scope of its implementation in Polish construction companies. The goal of the research was also to establish the level of interest and ability to implement BIM by public investors, architecture and construction companies. The paper also presents the scope of actions undertaken by the state, in the context of public investments using BIM.

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1. Introduction

Organisations involved in public procurement area globally have very high requirements for designers and contractors regarding the use of Building Information Modelling (BIM) framework. Surge in interest in BIM technology can be also observed within the private sector, to a point of requiring BIM implementation. Engineering technology using BIM is supported by government and private investors due to its multiple advantages [1]. A growing group of construction designers (steel, reinforced concrete or concrete among others), installation engineers, components manufacturers (made of steel, as well as prefabricated reinforcements), engineers, architects, contractors, real estate developers, contract managers and investors in Poland and globally notices the multitude of opportunities created by using BIM during design, construction and operation of a building. Simultaneously construction industry experts raise the still low level of competitiveness of Polish construction companies in European and global market caused by insufficient use of modern technologies and innovation, as well as lack of initiative on the side of public investors in promoting BIM.

The numerous advantages of using BIM have been noticed by the authorities in many European countries. In countries where BIM application is actively developed the state acts in order to encourage its implementation and development. The most advanced in this area are the United Kingdom and Scandinavia, where BIM implementation is centrally guided by the government and its agencies (since 2016 in the UK BIM has to be implemented in all centrally financed public projects) that assign significant financial resources for this effort. Actions on the state level with regards to public investment can be recently observed in Europe. For example [2]: the 2014 directive of the European Parliament and Council on public procurement [3] encourages all member states to implement BIM in order to maximise value in public projects, in France a Directorate for Digital Construction has been created within the Ministry of Housing and a National Plan of Digitalisation promoting BIM has been announced, in Germany the Construction of Major Projects Reform Commission created a BIM Working Group in order to create a BIM strategy for Germany and increase its implementation in projects, in Austria the Austrian Standards of BIM have been published.

Recommendations regarding the use of BIM, created at EU level, convince organisations interested in this technology to start modernising their software, improve the processes and bear the cost of introducing BIM. Currently a trend can be noticed in global construction industry to use BIM at design and construction stages, as well as building maintenance. A lot of companies implements BIM to achieve competitive advantage and increase efficiency. Numerous studies confirm rapid implementation of BIM in construction projects worldwide [4].

2. General assumptions of BIM framework

According to the National Institute of Building Sciences the Building Information Modelling (BIM) is a digital representation of physical and functional characteristics of a facility. A BIM is a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle; defined as existing from earliest conception to demolition. Information is defined from the initial conceptual phase of the project all the way to demolition. The basic assumption of BIM is close cooperation of all stakeholders involved in the investment project (including the investor, architects, contractors, equipment suppliers, components manufacturers, construction materials suppliers, technology suppliers and property managers) at every stage of the project’s lifecycle. Their cooperation facilitates collection, entry and update of current information that is important for each stakeholder to support their decisions [1,5]. The main advantage of the system is digital storing of all characteristics of the building. It is based on specification of parameters of each element comprising the building. Their definition includes material and geometric parameters (size, location, scope of integration with surrounding elements and with the whole building), used in construction analysis of the building; it also includes definition of cost and time factors specific to each element (for example single reinforced concrete pillar, window, ventilation pipe, equipment) that have not been before defined in such high level of consolidation [1].

The scope of BIM possible use is strictly linked to the course of construction process. BIM framework assumes that a building is perceived as a product with its lifecycle [4].

Another concept widely used in the context of BIM is Integrated Project Delivery (IPD); its main assumption is integration of people, systems, structures and business practices in the construction process, using skills, experience
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