

## The Current Application of BIM - An Empirical Study Focusing on the BIM-Maturity Level

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**Abstract :** Building Information Modelling (BIM) is one of the most promising methods in the building design process and plays an important role in the digitalization of the Architectural, Engineering, and Construction (AEC) Industry. The application of BIM is seen as the key enabler for increasing productivity in the construction industry. The model-based collaboration using the BIM method is intended to significantly reduce cost increases, schedule delays, and quality problems in the planning and construction of buildings. Numerous qualitative studies based on expert interviews support this theory and report perceived benefits from the use of BIM in terms of achieving project objectives related to cost, schedule, and quality. However, there is a large research gap in analysing quantitative data collected from real construction projects regarding the actual benefits of applying BIM based on representative sample size and different application regions as well as different project typologies. In particular, the influence of the project-related BIM maturity level is completely unexplored. This research project examines primary data from 105 construction projects worldwide using quantitative research methods. Projects from the areas of residential, commercial, and industrial construction as well as infrastructure and hydraulic engineering were examined in application regions North America, Australia, Europe, Asia, MENA region, and South America. First, a descriptive data analysis of 6 independent project variables (BIM maturity level, application region, project category, project type, project size, and BIM level) were carried out using statistical methods. With the help of statistical data analyses, the influence of the project-related BIM maturity level on 6 dependent project variables (deviation in planning time, deviation in construction time, number of planning collisions, frequency of rework, number of RFIs and number of changes) was investigated. The study revealed that most of the benefits of using BIM perceived through numerous qualitative studies have not been confirmed. The results of the examined sample show that the application of BIM did not have an improving influence on the dependent project variables, especially regarding the quality of the planning itself and the adherence to the schedule targets. The quantitative research suggests the conclusion that the BIM planning method in its current application has not (yet) become a recognizable increase in productivity within the planning and construction process. The empirical findings indicate that this is due to the overall low level of BIM maturity in the projects of the examined sample. As a quintessence, the author suggests that the further implementation of BIM should primarily focus on an application-oriented and consistent development of the project-related BIM maturity level instead of implementing BIM for its own sake. Apparently, there are still significant difficulties in the interweaving of people, processes, and technology.

**Keywords :** AEC-process, building information modeling, BIM maturity level, project results, productivity of the construction industry

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