

## **An Investigation on Opportunities and Obstacles on Implementation of Building Information Modelling for Pre-fabrication in Small and Medium Sized Construction Companies in Germany: A Practical Approach**

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**Abstract :** The conventional method used in the construction industries often resulted in significant rework since most of the decisions were taken onsite under the pressure of project deadlines and also due to the improper information flow, which results in ineffective coordination. However, today's architecture, engineering, and construction (AEC) stakeholders demand faster and accurate deliverables, efficient buildings, and smart processes, which turns out to be a tall order. Hence, the building information modelling (BIM) concept was developed as a solution to fulfill the above-mentioned necessities. Even though BIM is successfully implemented in most of the world, it is still in the early stages in Germany, since the stakeholders are sceptical of its reliability and efficiency. Due to the huge capital requirement, the small and medium-sized construction companies are still reluctant to implement BIM workflow in their projects. The purpose of this paper is to analyse the opportunities and obstacles to implementing BIM for prefabrication. Among all other advantages of BIM, pre-fabrication is chosen for this paper because it plays a vital role in creating an impact on time as well as cost factors of a construction project. The positive impact of prefabrication can be explicitly observed by the project stakeholders and participants, which enables the breakthrough of the skepticism factor among the small scale construction companies. The analysis consists of the development of a process workflow for implementing prefabrication in building construction, followed by a practical approach, which was executed with two case studies. The first case study represents on-site prefabrication, and the second was done for off-site prefabrication. It was planned in such a way that the first case study gives a first-hand experience for the workers at the site on the BIM model so that they can make much use of the created BIM model, which is a better representation compared to the traditional 2D plan. The main aim of the first case study is to create a belief in the implementation of BIM models, which was succeeded by the execution of offshore prefabrication in the second case study. Based on the case studies, the cost and time analysis was made, and it is inferred that the implementation of BIM for prefabrication can reduce construction time, ensures minimal or no wastes, better accuracy, less problem-solving at the construction site. It is also observed that this process requires more planning time, better communication, and coordination between different disciplines such as mechanical, electrical, plumbing, architecture, etc., which was the major obstacle for successful implementation. This paper was carried out in the perspective of small and medium-sized mechanical contracting companies for the private building sector in Germany.

**Keywords :** building information modelling, construction wastes, pre-fabrication, small and medium sized company

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