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THE INTERPLAY OF BIM, AND REALITY CAPTURE TECHNOLOGIES IN IPD PROJECTS

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Abstract:

Integrated Project Delivery (IPD) is a collaborative delivery method and set of principles, which involve early involvement of project participants, risk/reward sharing, and multiparty contractual agreement (Azhar et al., 2010; Bao et al., 2013). Reality Capture (RC) is the process of collecting as-built information, using various technologies such as digital cameras, laser scanners, RFID tags, drones, and quadruped robots (Alizadehsalehi, and Yitmen, 2021). Combined with Building Information Modeling (BIM), RC technologies can create an integrated visualization environment to capture and analyze the site information (Karasu et al., 2022). Both IPD and BIM have been discussed as collaborative concepts in the construction literature (Chang et al., 2017). The purpose of this research is to enhance IPD by identifying potential application areas for combined implementation of BIM and RC technologies in IPD projects.

Following a design science research method, a comprehensive literature review is conducted to identify the application areas for BIM-based RC technologies in IPD literature. The extracted results are then verified in a public school extension building project study, located in Montreal, Quebec. The project is awarded under a hybrid delivery method which is a combination of the Design-Build (DB) and IPD. The site pictures have been taken on a daily basis, and the BIM model has been updated accordingly. Finally, the results are validated through a focus group discussion consists of ten industry experts in the construction field.

Based on the results of the literature review, focus group discussions, and lessons learned from the case study, BIM and RC processes potential application areas in IPD projects are identified as design/construction integration, automated progress monitoring, site inspection, project documentation, quality control, training, safety management, conflict avoidance and resolution, logistic management, and decision making. In addition, the study revealed that IPD contractual-regulative and organizational characteristics support application areas which require a high level of team integration such as design integration or conflict resolution. On the other hand, IPD operational-cognitive characteristics support application areas that are mostly automated and technology-dependent, such as automated progress monitoring.

The combined application of BIM and RC technologies supports IPD projects through facilitating the flow of information and helping project stakeholders to capture real-time, and accurate data during the project life-cycle. It makes data analysis easier, quicker and more precisely, and helps managers optimize decision-making process. IPD also provides a suitable environment for the full implementation of BIM and RC and supports their mutual applications through its integrative principles and characteristics.

The results of this study indicate that IPD and BIM-based RC processes have joint cornerstones. Both concepts support the implementation of each other. More importantly, this study provides a roadmap for future efforts involving the mutual implementation of IPD, BIM, and RC technologies in the construction industry.

Keywords: Integrated Project Delivery, IPD, Building information modeling, BIM, Reality capture, RC

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