

Information Technology for Enhanced Construction Performance

Research Report

May 2023



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Research Summary

The construction industry is facing numerous challenges that have hindered its growth and resulted in significantly lower levels of productivity when compared to other industries. These challenges can be attributed to several factors, including the inherently risky nature of the industry where completing projects on time and within budget is the exception rather than the norm. Recent studies have revealed that incorporating Information Technology (IT) and artificial intelligence (AI) applications in construction projects can significantly enhance efficiency, boost productivity, increase quality, reduce health and safety issues, and eventually improve schedule and cost performance. Consequently, the adoption of AI is progressively increasing in construction projects. Despite this, the construction sector is often viewed as lagging in terms of digitalization when compared to other industries.

As the adoption of IT and AI in construction projects is still in its infancy and facing several challenges, including the lack of understanding regarding its capabilities and limitations, it is vital to incorporate appropriate IT while managing any possible adverse effects. Moreover, it is crucial to comprehend the barriers and challenges to IT adoption to ensure seamless digital transformation. Furthermore, there is a demand for tailored IT applications and solutions that can support construction companies and practitioners in their project delivery efforts. To this end, this report provides a comprehensive overview of the research conducted by the Missouri S&T research team. The report presents a decision-making framework and performance metrics that consider potential improvements and opportunities brought about by implementing IT and AI in construction projects.

The research team outlined 17 technologies as well as 25 applications, as well as 20 barriers to the adoption of those technologies in construction projects. The technologies, applications, and barriers were identified based on a systematic literature review of previous research studies addressing the use of IT in the construction industry. Subsequently, a survey was developed and distributed to gauge



the adoption of these identified technologies in construction projects, as well as their impacts on the cost and schedule performance of the project considering the aforementioned barriers.

Based on the data collected from the distributed survey, the research team developed a comprehensive tool that helps project stakeholders to (1) assess the state of IT adoption at the corporate level while highlighting commonly used IT applications in the industry, and (2) quantify the impact of IT at the project level to determine cost and schedule savings or overruns while taking perceived barriers into account. The decision support tool was reviewed by industry experts and adjusted accordingly to provide the most beneficial experience for the tool user. The ultimate goal of this report is to enhance decision-making and improve the implementation of IT in construction projects.

If you are interested in more information about this research, you can contact Dr. Islam El-adaway by phone at 573-341-4030 and/or by e-mail at eladaway@mst.edu