

# Modular Construction: Decision-making and Performance Metrics

Prepared by

Missouri Consortium for Construction Innovation

Research Report



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## Research Summary

The construction industry has been facing a slow increase in its overall productivity as compared to other sectors such as manufacturing. In addition to poor productivity, the construction sector suffers from shortages in skilled labors. As a results of poor productivity and shortages in skilled labors, many construction projects have faced cost and schedule overruns in the industry. To overcome the challenges associated with poor productivity and shortages in skilled labors, modular construction has been introduced as an alternative to traditional stick-built construction methods.

Modular construction method has been proved by different studies to be superior over traditional construction methods in terms of various project objectives including schedule, quality, predictability, and others. However, modular approach differs from traditional construction approach in many aspects including, but not limited to, collaboration requirements, design, engineering, and logistics. To this end, this research report presents a holistic view of the research efforts conducted by the research team at Missouri S&T in developing a comprehensive decision-making framework and performance metrics that account for the unique and complex requirements of modular construction methods.

Research Outlined 50 important risk factors affecting the performance and feasibility of modularization in construction projects. These 50 factors have been identified based on a systematic literature review of previous research studies addressing modular operations in the construction industry. Consequently, a first survey has been developed and distributed to quantify the significance and importance to the performance of modular construction methods. Another survey was also distributed to quantify the characteristics of the risks associated with factor in terms of their likelihood of occurrence and their impacts on cost and schedule performance of the project.

Based on the data collected from the distributed surveys, the research team developed a comprehensive tool that help project stakeholders: (1) assess modularization feasibility in their construction projects, (2) evaluate to what extent modularization is being effectively implemented in their construction projects, and (3) predict cost and schedule savings associated with the adoption of modular construction in their projects. The tool

was reviewed by industry experts and adjusted accordingly to provide the most beneficial experience for the tool user. Ultimately, this report aims to improve better decision-making and optimal use of modular approach 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](mailto:eladaway@mst.edu)



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