STRATEGIC CONSTRUCTION MODELING AND DELIVERY
INDUSTRIAL RESEARCH CHAIR

CONTEXT-SPECIFIC & GENERALIZED SYSTEM-BASED CONSTRUCTION LABOUR PRODUCTIVITY MODELING

ABOUT THE CHAIR

Established in January 2012 under the leadership of Dr. Aminah Robinson Fayek, the IRC in Strategic Construction Modeling and Delivery operates within the Hole School of Construction Engineering in the Department of Civil and Environmental Engineering at the University of Alberta.

The Chair brings together construction industry owners, contractors, and labour groups working in Alberta and across Canada to develop comprehensive, research-based solutions to key industry problems. Giving particular attention to Canada's oil and gas, utilities, industrial, and commercial construction sectors, the Chair focuses on strategic concerns related to construction management—such as construction industry productivity, project delivery, and performance. Research undertaken includes improvements to labour productivity, structuring projects and teams, assessing owner and contractor competencies, and reducing project execution risk.

The Chair's research program takes advantage of fuzzy logic's ability to capture and quantify the many subjective uncertainties that challenge construction projects. Researchers combine fuzzy logic with other forms of uncertainty modeling, artificial intelligence, and simulation techniques to develop advanced decision-support tools and approaches.

PROJECT PARTNERS

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► strategic-construction.ualberta.ca

Background

Construction labour productivity (CLP) significantly influences the success of projects, making it an ideal target for modeling. However, model development poses numerous challenges. Inherent in construction labour productivity modeling is the need to deal with numerous, complex, and continuous variable factors and practices. In addition, any developed model needs to address objective and subjective factors and practices in an integrated approach, as well as to provide flexibility that enables adaptation of the model to suit different project contexts. Finally, the model must rely on large data sets for model development, testing, and training.

Objectives

- Develop a hierarchy of key labour productivity factors and practices at different project levels and for varying project contexts
- Develop a reliable and efficient productivity data collection methodology using work study methods
- Develop a context-specific, activity-level labour productivity model and a generalized prediction/analysis model addressing varying project contexts using fuzzy logic techniques

Methodology

1. Factor Surveys

- To identify most significant factors for project and company
- Project management level
- Foremen and craftspeople level

2. Efficiency Measures

- Work sampling (direct, material, travel, personal, etc. proportions)
- Direct observation
- Foreman Delay and Craftsman questionnaire surveys

3. Crew Productivity Data

- Craft daily labour productivity (per crew)
- Daily record of level of factors affecting crew productivity

4. Modeling and Analysis

- Develop context-specific and generalized models addressing varying project contexts
- Analyse and optimize to develop improvement strategies

Industry Applications

As its final outcomes, this project will:

- Establish critical factors and practices for improved construction planning and execution
- Provide industry with (1) an innovative database to facilitate comprehensive data collection and analysis in labour productivity improvement studies and (2) an advanced prediction tool for use in construction planning and project control.

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