STRATEGIC CONSTRUCTION MODELING AND DELIVERY
INDUSTRIAL RESEARCH CHAIR

FUZZY CONTINGENCY DETERMINATOR©

A FUZZY ARITHMETIC-BASED RISK ANALYSIS TOOL FOR CONSTRUCTION PROJECTS

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

Capital Power

NSERC CRSNG

UNIVERSITY OF ALBERTA

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Dr. ElBarkouky is a postdoctoral fellow and researcher with the IRC in Strategic Construction Modeling and Delivery in the University of Alberta's Hole School of Construction Engineering, where Nasir is a PhD student and researcher. To learn more about this project, email the researchers at the addresses above or visit the IRC's website at:

► strategic-construction.ualberta.ca

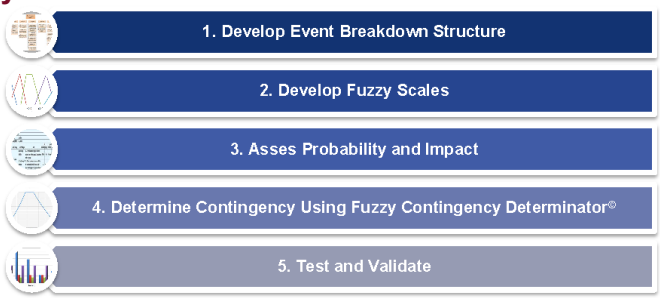
Background

- The complex and dynamic nature of construction projects impose considerable uncertainties and subjectivities in risk analysis and contingency determination.
- Traditional risk analysis approaches rely heavily on historical data and fail to capture uncertainties.
- Fuzzy logic helps to linguistically define the probability and impact of risks and opportunities and to determine the work packages' and project's overall contingency using natural language, which suits human expert judgement.

Objectives

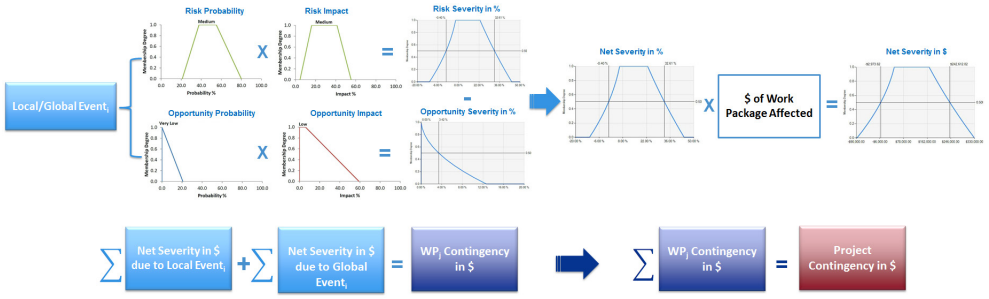
- Introduce a contingency determination procedure based on fuzzy arithmetic, which is capable of handling the subjective uncertainty of experts and does not require historical data.
- Address both critical risk and opportunity events in determining work package and project contingencies.
- Develop a software tool—Fuzzy Contingency Determinator©—capable of implementing the procedure in an automated manner.

Methodology



Industry Applications

- The procedure addresses risk uncertainty and inaccuracy in determining contingency by using linguistic terms and fuzzy numbers to assess probability and impact of critical events.
- A simple, transparent, and user-friendly software tool (Fuzzy Contingency Determinator©) considers both risks and opportunities in determining work package and project contingencies.
- Addresses key limitations of the deterministic and probabilistic risk assessment approaches.



Contingency Determination Procedure

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