

# **A Multi-Criteria Decision-making (MCDM) framework to Evaluate Information and Source Credibility: International Construction Decisions**

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## **ABSTRACT**

Increasing number of Architectural, Engineering, and Construction (AEC) firms are positioning themselves to expand operations in the international construction market. To undertake such decisions, it becomes critical for companies to analyze the risks, benefits, and future market potential of the host country. Further, companies select appropriate entry-modes and develop business strategies to navigate the complex formal and informal institutions of the host country. Board of Directors and employees in the core and upper-management committee are usually involved in undertaking such decisions. International Construction Risk Assessment Model (ICRAM) and International Project Risk Assessment (IPRA) are two of the most comprehensive models that encompass various risk factors at the country, market, and project levels. Each level requires data to be collected from various sources which could be susceptible to political agenda, biased information, inadequate data collection methodology. Research findings suggest that the results provided by such models heavily rely on the credibility of the information and credibility of the information source used in model implementation. This research has focused on addressing such credibility concerns like misinformation, disinformation, and malinformation in a systematic and quantitative manner.

First, this research provides comprehensive definitions for Information and Source Credibility from a perspective of the international construction decision-making domain. Second, this research has identified (a) 5 Criteria and 20 Metrics for Information Credibility and (b) 3 Criteria and 18 Metrics for Source Credibility. These criteria and metrics are used to propose a framework that can be used to prioritize information sources. Third, a survey was conducted with AEC professionals to determine the relevancy and relative importance of the identified criteria and metrics with respect to international construction decisions. The collected survey responses have a Cronbach's Alpha value of 0.89 which indicates that the responses

are reliable for further analysis. One-way ANOVA test was conducted to investigate the influence of prior credibility evaluation experience of the respondents on the relative weights for the framework. With limitations, results indicate that prior evaluation experience does not significantly affect the perception of the users towards selecting and weighing the criteria and metrics.

Finally, a multi-criteria decision-making (MCDM) model is proposed to incorporate the proposed credibility evaluation framework with the relative weights of the criteria and metrics. An excel-based macro-enabled tool (with a user-friendly interface) is developed to accept user inputs associated to their information and sources. A well-defined scale of measurement is developed to reduce the subjectivity and biases involved in making such abstract assessments. A final score, Cr\_Information and Cr\_Source, is calculated for every piece of information and source selected by the user. The MCDM results are expected to assist users in determining the undertaking robust decisions by incorporating one additional layer of determining the credibility of their information and prioritizing their information sources. The suggested point of application for this research is prior to Financial Investment Decision (pre-FID) stage to ensure sufficient time for all the stakeholders to reevaluate their FIDs.