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Ali Niknejad, Dobrila Petrovic



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A Fuzzy Dynamic Inoperability Input-Output Model for Strategic Risk Management in Global Production Networks

Authors

Ali Niknejad

Faculty of Engineering and Computing, Coventry University, Coventry, CV1 5FB, UK

Dobriła Petrovic¹

Faculty of Engineering and Computing, Coventry University, Coventry, CV1 5FB, UK

Abstract

Strategic decision making in Global Production Networks (GPNs) is quite challenging, especially due to the unavailability of precise quantitative knowledge, variety of relevant risk factors that need to be considered and the interdependencies that can exist between multiple partners across the globe. In this paper, a risk evaluation method for GPNs based on a novel Fuzzy Dynamic Inoperability Input Output Model (Fuzzy DIIM) is proposed. A fuzzy multi-criteria approach is developed to determine interdependencies between nodes in a GPN using experts' knowledge. An efficient and accurate method based on fuzzy interval calculus in the Fuzzy DIIM is proposed. The risk evaluation method takes into account various risk scenarios relevant to the GPN and likelihoods of their occurrences. A case of beverage production from food industry is used to showcase the application of the proposed risk evaluation method. It is demonstrated how it can be used for GPN strategic decision making.

¹ Corresponding author. Telephone: +44 24 77659181

Email addresses: aliniknejad@gmail.com (A. Niknejad), d.petrovic@coventry.ac.uk (D. Petrovic)

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