

# Unit 8 Seminar: Quantitative Risk Modelling

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## Part A

1. How do Goerlandt et al. (2017) suggest that the validity of QRA approaches can be validated? What did they posit was the most effective approach?

Goerlandt et al. (2017) suggest validating QRA approaches through methods such as benchmark exercises, reality checks (comparing results with actual data), independent peer reviews, and quality assurance. They highlight peer reviews and reality checks as the most effective approaches, as these combine expert evaluation with real-world data comparison, improving the credibility of QRA

2. Which techniques did Hugo et al. (2018) should be applied to project management? What were their recommendations to increase the use of QR analysis in Projects?

The authors recommend to use quantitative risk analysis (QRA) methods, such as Monte Carlo simulations. To increase the use of QR analysis in projects, they recommend the following:

- Improve individuals' risk management competence via training, exposure, etc.
- Align the parent organisation's approach to risk management with projects, and strive to improve the organisation's maturity levels in project and risk management processes.
- Make available the required resources, both human and software, to carry out risk management, both for qualitative and quantitative risk management.

3. The last paper reviews various Multi-Criteria Decision Methods (MCDMs) and considered the relative accuracy and validity of the techniques. Which did they find was the most accurate of the methods compared? What were the failings of the general TOPSIS approach?

The authors found that AHP and MOORA provided the most accurate results. These are significantly higher compared to VIKOR and TOPSIS. The three main flaws of TOPSIS are:

- Rank reversal phenomenon: Rankings change if criteria or alternatives are added or removed.
- Ranking index: It does not consider the relative importance of distances from ideal solutions.
- Correlation between criteria: It overlooks correlations between criteria, leading to errors when data spread across multiple dimensions.

**References:**

Goerlandt, F., Khakzad, N., & Reniers, G. (2017) Validity and validation of safety-related quantitative risk analysis: A review. *Safety Science* 99: 127-139. DOI: <https://doi.org/10.1016/j.ssci.2016.08.023>

Hugo, F. D., Pretorius, L., & Benade, S. J. (2018) Some aspects of the use and usefulness of quantitative risk analysis tools in project management. *South African Journal of Industrial Engineering* 29(4): 116-128. DOI: <https://doi.org/10.7166/29-4-1821>

Çelikkbilek, Y., & Tüysüz, F. (2020) An in-depth review of theory of the TOPSIS method: An experimental analysis. *Journal of Management Analytics* 7(2): 281–300. DOI: <https://doi-org.uniessexlib.idm.oclc.org/10.1080/23270012.2020.1748528>

## **Part B**

Read chapter 5 of the course text (Olsen & Desheng (2020) and implement the inventory Monte Carlo simulation. You can use Yasai (Eckstein & Riedmuller, 2002) to replace crystal ball. If you have difficulty implementing the course text model, there is a simplified model also available. Their paper gives instructions on its use.

Be prepared to discuss your results in the seminar.

You should add your answers to your e-portfolio and be prepared to discuss them as part of this week's seminar.