2019

13th International Conference on Industrial

Engineering and Industrial Management

XXIII Congreso de Ingeniería de Organización

Organizational Engineering in Industry 4.0

BOOK OF ABSTRACTS

Gijón, 11th-12th July 2019

Book of Abstracts

"13th International Conference on Industrial Engineering and Industrial Management" and "XXIII Congreso de Ingeniería de Organización (CIO2019)"

Book of Abstracts

"13th International Conference on Industrial Engineering and Industrial Management" and "XXIII Congreso de Ingeniería de Organización (CIO2019)"

COORDINADORES

DAVID DE LA FUENTE GARCÍA

RAÚL PINO DIEZ

PAOLO PRIORE

FCO. JAVIER PUENTE GARCÍA

ALBERTO GÓMEZ GÓMEZ

JOSÉ PARREÑO FERNANDEZ

ISABEL FERNÁNDEZ QUESADA

NAZARIO GARCÍA FERNÁNDEZ

RAFAEL ROSILLO CAMBLOR

BORJA PONTE BLANCO

Dependency perspective in Supply Chain Risk Assessment

Díaz-Curbelo A[85], Gento A[86]

Keywords: supply chain; risk assessment; dependency; quantitative methods

1 Introduction

Risk management is one of the main research topics in the literature on Operations Management and Supply Chain Management (SCM) (Fahimnia, et al., 2015). The interdependence of SC elements and events requires that risk systems must be assessed as an interrelated framework to optimise their management and integrate with other decision-making systems (Qazi et al., 2018). According to Aqlan and Mustafa (2014) a risk event can be caused by a set of risk factors (interconnected or not) and can lead to different impacts throughout the supply network. Reliably management must therefore consider the risks in event form so they can be modelled, analysed, mitigated and monitored. In addition, due to the highly subjective nature and the lack of information, it is often difficult to quantify risk parameters. So, it is necessary capturing the interdependencies between risk events associated with the epistemic uncertainty. We have therefore addressed the following research question: How can the relationships between risk events be treated to quantify the risk level to manage mitigation strategies effectively in uncertain supply chain environment?

2 Objectives

To develop a systematic literature review in the period 2008-2018 of the main supply chain risk assessment methods considering dependency as key perspective.

[85]Alina Díaz-Curbelo (e-mail: alina.diaz@uva.es)
Escuela de Ingenierías Industriales. Universidad de Valladolid. Paseo del Cauce 59, 47011 Valladolid (Spain).

[86]Angel Gento (✉e-mail: gento@eii.uva.es)
Dpto. de Organización de Empresas y CIM. Escuela de Ingenierías Industriales. Universidad de Valladolid. Paseo del Cauce 59, 47011 Valladolid (Spain).

3 Methods

A systematic literature review methodology adapted from Barbosa Póvoa et al., 2018 has been used to the study. The time period of the analysis was 2008-2018. The analysis focused on papers that explicitly model and assess risk in SC with emphasis on dependency analysis. We focused on those published in high impact academic and professional journals (SCOPUS and WOS), mostly in the areas of Operations Research and SCM. At the end, 77 papers were obtained as basis for the analysis.

4 Results

The main qualitative/quantitative, simple/integrated methods focusing on dependency perspective in SCRM were identified. We analyzed the main strengths and weaknesses of these methods. Bayesian networks and Petri nets provide useful frameworks for capturing probabilistic interdependence with common causes and solve many limitations of other dependency tools. Furthermore, there is an increasing trend in the use of integrated approaches. The 46.8% of the papers used integrated methods. In this sense, integrated approaches with Artificial Intelligence tools (47.2%) show interesting trends. From this techniques group, fuzzy sets (82.4%) play a relevant role in obtaining more effective risk assessments in environments under uncertainty.

5 Conclusion

The analysis of common cause failures and the joint impact of risk events can contribute to the optimization of risk mitigation strategies. Bayesian and Petri nets combined with fuzzy theory are considered robust approaches to represent and express the risk level more reliably. Interdependencies and uncertainties are relevant issues to effective risk management, therefore integrated methods will continue to play a vital role to support SCRM and decision-making.

References

Aqlan, F. and Mustafa, E. (2014). Integrating lean principles and fuzzy bow-tie analysis for risk assessment in chemical industry. *Journal of Loss Prevention in the Process Industries*, 29(1), 39-48.

Barbosa-Póvoa, A. P. Da Silva, C. and Carvalho, A. (2018). Opportunities and challenges in sustainable supply chain: An operations research perspective. *European Journal of Operational Research*, 268, 399–431.

Fahimnia, B., Tang, C. S., Davarzani, H. and Sarkis, J. (2015). Quantitative models for managing supply chain risks: A review. *European Journal of Operational Research*, 247, 1–15.

Qazi A., Dickson A., Quigley J. and Gaudenzi, B. (2018). Supply chain risk network management: A Bayesian belief network and expected utility based approach for managing supply chain risks. *International Journal of Production Economics* 196, 24–42.