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Improving the performance of manufacturing supply chains in Industry 5.0: An analysis using fuzzy-TOPSIS approach

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Biography:

Jingyang Yan is a PhD student at Southampton Business School, the University of Southampton. She holds an MSc degree in Supply Chain Management and Logistics from the University of Southampton. Her current research interests include Industry 5.0, sustainable supply chain, sustainability and multi-criteria decision-making (MCDM).

As the latest industrial revolution, Industry 5.0 has the potential to profoundly reshape the design and management of supply chains in multiple ways, such as to make the supply chain more human-focus, sustainable, and flexible. This offers opportunities for organisations to promote their business competitiveness. While the adoption of Industry 5.0 is gaining momentum in the manufacturing sector, there exists a risk of failure and being locked into ineffective strategies during the transition. Despite this pressing need, research on Industry 5.0 remains in early stage. Particularly, there is a lack of adequate discussion on how to evaluate manufacturing supply chain performance in the context of Industry 5.0. This paper aims to enhance supply chain performance by identifying a comprehensive list of performance indicators and prioritising potential solutions and alternatives based on their levels of significance. A multistep research methodology was adopted in this study, including (1) using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) method to identify a comprehensive list of key performance indicators and alternative solutions to improve manufacturing supply chain performance in Industry 5.0; (2) collecting survey data from the industry professionals to quantify the level of significance of the identified alternatives; and (3) applying the fuzzy Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) to prioritise the identified alternatives. The study identified a total of 28 indicators and four potential alternatives for improving manufacturing supply chain performance in Industry 5.0. The findings reveal that the implementation of a real-time operational framework, the promotion of transparency and information sharing among supply chain partners, and the leveraging of advanced technologies are the most significant alternatives in this regard. This paper contributes to the existing body of knowledge by providing a foundational foothold for researchers and

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industry practitioners to make informed strategic decisions pertaining evaluation of and improvement in supply chain performance, further enhancing companies' competitiveness, profitability, and sustainability in the era of Industry 5.0.