1. Introduction
The COVID-19 outbreak has threatened and caused unprecedented disruptions to supply chains showing the supply chain management’s inability to deal with black swan events. The unexpected COVID-19 event has deeply impacted the world in terms of health systems as well as the business environment. Supply chains have been challenged to avoid imminent disruptions in their upstream and downstream flows. Both practitioners and researchers have engaged in discussions to exchange knowledge and explore strategies to enhance the robustness and resilience of supply chains to minimise disruptions when subjected to events like that. According to Kumar et al. (2018), unprecedented supply chain disruptions are low-frequency, high-impact events that result in the severance of one or more nodes of the supply chain, leading to the unavailability of services or goods. Supply chain disruptions represent an opportunity to learn from their effects (Bode et al., 2011), and, in particular, learning from the COVID-19 event can improve future decision-making during disruptive situations (Van Hoek, 2020). That is relevant because disruption events cause a significant impact on both financial and operational performances (Macdonald and Corsi, 2013). The challenge is to improve or design new performance measurement systems (PMSs) to provide warnings regarding the risks of disruptions to better support decision-making processes during situations such as the COVID-19 pandemic. Furthermore, PMSs should also provide the impacts of decision-making to managers during unpredictable events.

PMSs provide meaningful information about past actions to decision-makers to help them make informed decisions regarding future performance (Neely et al., 1995; Lebas and Euske, 2002; Rouse and Putterill, 2003). Furthermore, a supply chain PMS is “a set of metrics used to quantify the efficiency and effectiveness of supply chain processes and relationships, spanning multiple organisational functions and multiple firms and enabling SC orchestration” (Maestrini et al., 2017). Besides, the supply chain PMS encompasses both the internal and the external supply chain that includes the immediate supply chain (customers and first-tier suppliers) and other supply chain tiers (the entire supply chain) (Maestrini et al., 2017). Considering the environmental transformation due to the pandemic occurrence, some authors argue the importance of adapting PMS according to the environmental dynamics and changes of the business environment (Bititci et al., 2000; Kennerley and Neely, 2003). Yet, in the supply chain context, some authors also point out that performance measurement (PM) must be adapted according to the organisational context and stakeholders’ requirements as well as to the dynamic of the environment where the supply chain is inserted (Cuthbertson and Piotrowicz, 2011; Mishra et al., 2018). Hence, it becomes essential to understand the PM aspects in the face of emergency situations such as COVID-19.

Since the seminal article by Benita Beamon proposing new performance measures for evaluating supply chain performance, the literature has evolved. Many authors proposed many frameworks, changing the focus from performance measures to PMS
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(e.g. Van Hoek, 1998; Beamon, 1999; Holmberg, 2000; Brewer and Speh, 2000; Gunasekaran et al., 2001; Chan and Qi, 2003; Park et al., 2005; Bhagwat and Sharma, 2007; Reefke and Trocchi, 2013; Beske-Janssen et al., 2015; Liang, 2015; Laihonen and Pekkola, 2016; Dweekat et al., 2017; Nouri et al., 2019). More recently, following the context of the Fourth Industrial Revolution, Frederico et al. (2021) proposed a PM framework for Supply Chain 4.0.

However, some proposals in the literature focus on risk dimensions and disruption management in supply chains (e.g. Kleindorfer and Saad, 2005; Macdonald and Corsi, 2013; Durach et al., 2017). A relevant gap for a predictive PMS remains in the face of the COVID-19 occurrence when supply chains have been challenged to keep the continuity of their upstream and downstream flows.

2. Contributions to the special issue

Considering the huge impact of the COVID-19 outbreak on supply chains, significant lessons learnt and the opportunity to better prepare organisations for the post-pandemic period, this SI aimed to identify papers that would bring relevant theoretical and practical contributions in terms of deeply exploring how to effectively measure the supply chains performance in disruption situations. Some suggestions of research themes that were proposed during the call for papers to be considered by the authors, but were not limited, included.

(1) What performance measurement systems (PMSs) can be used to evaluate supply chain performance during unexpected events;

(2) What performance measures should be considered to assess supply chains during emergency situations;

(3) How to effectively use supply chain performance measurement during emergency situations;

(4) How to effectively measure contingency strategies in supply chains amidst the occurrence of emergency risks;

(5) How performance measurement contributes to the success of supply chain responses and relief amidst pandemic situations;

(6) What is the contribution of Industry 4.0 disruptive technologies (e.g. big data analytics, cloud computing) to performance measurement of supply chains during black swan events;

(7) How to measure resilience to better prepare supply chains before unexpected situations occur and to recover immediately;

(8) How to measure the maturity of supply chains’ risk management in emergency events;

(9) How PMSs can be effectively and rapidly deployed as an initial strategy to counter significant disruption in supply chains due to emergency events.

After following a rigorous peer-review process, ten articles have been finally accepted to be published in this special issue. These manuscripts bring different approaches regarding the theme of performance measurement in supply chains during disruption situations, especially in the COVID-19 context. The titles of these ten articles as well as their purposes are listed in Table 1. They are available to the readers in this special issue titled Performance Measurement in Supply Chains During Disruptions: Lessons from COVID-19 Pandemic, which is published on the journal’s website.
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<th>Article</th>
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<td>1</td>
<td>Airline catering supply chain performance during pandemic disruption: a Bayesian network modelling approach</td>
<td>This study aims to consider the impact of implementing Bayesian network (BN) modelling to measure SC performance in the airline catering during the pandemic context.</td>
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<td>2</td>
<td>The role of Industry 4.0 technologies on performance measurement systems of supply chains during global pandemics: an interval-valued intuitionistic hesitant fuzzy approach</td>
<td>This study aims to investigate supply chain performance measurement systems (SCPMs) that are suitable and applicable to evaluate SC performance during unexpected events such as global pandemics. Also, it considers the contribution of Industry 4.0 Disruptive Technologies (IDTs) to implement SCPMSs during such black swan events.</td>
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<td>3</td>
<td>A systematic literature review on supply chain resilience in SMEs: learnings from COVID-19 pandemic</td>
<td>This paper presents the state-of-art literature on supply chain resilience in SMEs in the context of the coronavirus (COVID-19) pandemic and provides a comprehensive view of insights gained and gaps identified and suggests potential areas of future research.</td>
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<td>4</td>
<td>A proposed circular-SCOR model for supply chain performance measurement in the manufacturing industry during COVID-19</td>
<td>This study aims to determine which supply chain performance criteria come to the fore for the company under consideration to accelerate the transformation into high performance and circularity in supply chains, considering that the ability to analyse supply chain performances and ensure circularity in supply chains has become one of the factors whose importance has increased rapidly with COVID-19.</td>
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<tr>
<td>5</td>
<td>How do food supply chain performance measures contribute to sustainable corporate performance during disruptions from the COVID-19 pandemic emergency?</td>
<td>This study aims to the development of the scale of supply chain performance measures (SCPMs), food supply chain resilience (FSCS) and sustainable corporate performance (SCP) in small- and medium-sized enterprises (SMEs) in an emerging market, considering the COVID-19 context.</td>
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<td>6</td>
<td>Performance measurement of e-commerce supply chains using BWM and fuzzy TOPSIS</td>
<td>The purpose of this paper is to persuade a hybrid framework, which can be used to assess the performance of various supply chains and can be further used to segregate supply chains concerning critical KPMs. The KPMs have been selected in the COVID-19 pandemic condition.</td>
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<td>7</td>
<td>Lean performance measurement system for an Indian automotive supply chain</td>
<td>This paper aims to present a simple and innovative fuzzy methodology-based lean performance measurement system (LPMS) for an Indian automotive supply chain. The paper also enlightens the influence of coronavirus disease 2019 (COVID-19) on supply chains and the practical implications of the unprecedented disruptions on the performance measurement systems.</td>
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<td>8</td>
<td>Barriers to supply chain performance measurement during disruptions such as the COVID-19 pandemic: A balanced scorecard-based analysis</td>
<td>This study explores barriers to supply chain performance measurement during disruptions such as COVID-19. It uses the DEMATEL fuzzy VIKOR method to analyse barriers in the balanced scorecard framework basis.</td>
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Acknowledgments

The guest editors are extremely grateful to those who contributed to publishing this special issue, including the anonymous reviewers who have provided constructive feedback and expert guidance through the rigorous peer-review process to select the best papers for the issue. Also, the guest editors would like to especially thank the editors of the International Journal of Quality and Reliability Management, Prof. Ton van der Wiele (former editor) and Prof. Jiju Antony (editor-in-chief), the IJQRM editorial office and Emerald Group Publishing for their full support given during all steps of the special issue, since the call for papers design until the publication of the issue. Finally, the guest editors would also like to thank the authors for their contributions and for choosing our special issue as a relevant platform to communicate their research works.

The guest editors hope that this special issue brings a real impact on both research and practice. In terms of impacts on research, the guest editors hope that the research findings published in this special issue stimulate and encourage new research deployments related to performance measurement in supply chains during disruptive events. This is mainly because supply chains are constantly being challenged with newer disturbing events besides the pandemic (e.g. the Russia–Ukraine war, geopolitical conflicts, climate-change events and economic disturbances). From a practical standpoint, the content of the articles published in this special issue may support supply chain decision-makers involved in different industrial sectors. The insights drawn from this SI will provide them with effective guidance to help them design, implement and improve performance measurement systems capable of effectively measuring different supply chain processes and issues during unexpected and disruptive events.

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<td>9</td>
<td>The Social Role of Supply Chain firms during the Pandemic Period</td>
<td>This study aims to investigate the social risk shift in supply chain management during the coronavirus disease 2019 (COVID-19) pandemic. For every organisation, social risk management is a vital component of its development that offers an advantage in the marketplace.</td>
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<tr>
<td>10</td>
<td>Empirical Benchmarking of Virtual Service Centers’ Service Quality: A case of a large Telecom Service Provider in India</td>
<td>This paper aims to present a hybrid approach to measure the efficiency of virtual contact centres (VCCs) started during the pandemic and benchmark them for service performance. The results are used to plot the VCC’s efficiency score (performance) and customer perception (importance) to propose appropriate strategies.</td>
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Table 1.
References


