

# Performance Measurement System for a Sustainable and Resilient Supply Chain

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## Project Description

Several challenges govern the development of a performance measurement system within an organisation, and they further extend when approaching this task from a supply chain perspective. Understanding the scope, the various components that need to be considered when designing a measure, including the mathematical formulae to be used in developing this, as well as the data available to populate this measure are just starting points in developing a performance measurement system (Tipi, 2021). In the past, performance measures had more of a financial focus (Neely et al., 1995). However, we see an increased attention to develop measures that incorporate additional functions (e.g. responsiveness, reliability, flexibility, assets) within an organisation (El-Gazzar et al., 2019) and capture more aspects from a supply chain perspective.

Initiatives are put in place by organisations to respond to sustainability requirements. To understand if a level of sustainability is being reached, it needs to be reflected into a measurement system designed to capture these aspects. Well established Supply Chain Performance Measurement (SCPM) models (such as, Balanced scorecard, Supply Chain Operations Reference model, Global Supply Chain Forum model and others) are currently being evaluated and challenged (Tipi, 2021) with work on incorporating measures that capture aspects of sustainability (Tamazin et al., 2021). More recently, with the emphasis on industry 4.0 and data analytics, organisations and their supply chain started to focus their attention more and more on aspects of digitisation. In 2020, supply chains have been challenged with the unprecedented event caused by the global pandemic, where supply chains were being disrupted in a new and very different way that has not been seen or previously researched. As Ivanov (2020) indicates, it is relevant to understand if digital technologies help mitigate the effects of severe risks generated during the global pandemic. It is also pertinent to understand if the well-established supply chain resilience measures helped organisations survive and recover through the pandemic. Therefore, we note a need to understand how supply chains can build competencies in incorporating aspects of resilience, sustainability with considerations given to digitisation and have these characteristics captured by a performance measurement system.

Therefore, this research is set to explore the characteristics that need to be put in place when designing a SCPM system that takes into consideration not only aspects already characterised by well-established SCPM models, but they build on by incorporating sustainability and resilience measures.

## Proposed Methodology

The proposed methodology for this type of work allows the researcher to explore design characteristics from a practical setting by considering various industries facing case studies. Proposals may focus on any sector, geographic region and country. The data collection can follow a quantitative, qualitative or mixed methods approach.

This work will also allow the application of simulation methodology (examples in Chilmon and Tipi, 2020; Gittins et al., 2020) with the use of big data capabilities that capture aspects of the supply chain and their complexities.

Proposals should provide a justification regarding the selected methodological approach.

### **Research Impact**

This work has the potential to generate a significant impact on organisations aiming to design or update their current performance measurement system by generating knowledge on how various categories of measures could be incorporated and evaluated to improve overall performance.

By aiming to explore ways to incorporate performance measures that capture aspects of supply chain resilience and sustainability, it is envisaged that this work will influence theories in the area of operations management such as supply chain performance measurement, supply chain management, supply chain design, sustainability and resilience, and at the same time can incorporate operational research approaches with the use of simulation and big data.

Proposals should provide a justification on how and if impact is to be achieved and what considerations give the researcher the confidence that there is potential to make a significant contribution to the body of knowledge in this area.

### **About the Supervisors**

Dr Nicoleta S. Tipi is an experienced supervisor having supervised to completion 17 PhD researchers studying full and part-time and has examined over 10 PhD theses. Her area of supervision includes topics in supply chain analytics, sustainability in product and process design, development of performance measurement systems, the use of simulation as a tool in modelling complex supply chain systems and others.

Dr Khadija Tahera researches product development, manufacturing and operation management, focusing on improving processes in collaboration with industries to establish best practices. Her recent publications and doctoral supervision concentrate on new product development and production process improvement through case studies, modelling and simulation.

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