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Introduction

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Biographical notes: Andrea Genovese is a Lecturer in Logistics and Supply Chain Management at the Management School of the University of Sheffield (UK). He holds a PhD in Science and Technology Management from University of Naples (Italy) and a Master in Business Administration from University of New Hampshire (USA). His research interests include the design of decision support systems for complex supply chain and logistics problems. He is author of several publications in the forms of journal papers, book chapters and conference proceedings. Currently, his research is mainly devoted at the design and evaluation of green supply chains within the activity of the centre for low carbon futures, an initiative funded by the UK Government.

1 Sustainability and supply chains: an introduction

In recent years, an increasing environmental and ethical awareness has favoured the emergence of new way of conducting business and operations. Indeed, there is a growing consensus that firms should not only be managed efficiently, but also behave in a *sustainable* way. *Sustainability* is generally defined as using resources to meet the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987; Daly and Cobb, 1994). In an industrial context, sustainability components are defined coherently to objectives for sustainable development outlined by UNCSO (1998) and include: economic (including promotion of economic growth, logistic efficiency, achievement of good quality levels), environmental (including reduction of resource use and protection of natural environment) and social (including creation of productive employment, equality achievement) dimensions. Following this, a sustainable approach to business performance evaluation and development has been recently promoted, taking into account also social and environmental issues (Seuring and Müller, 2008).

At the same time, it has been understood that the above-mentioned objectives cannot be achieved just optimising the performances at a firm level. Actually, the complexity of contemporary value creation processes implies that the transition to a sustainable way of conducting business can be completed only by considering operations at a supply chain level, by utilising a systemic and holistic approach (Vachon and Klassen, 2007; Seuring and Müller, 2008).

For this reasons, academic and corporate interest in sustainable supply chain management has risen considerably in recent years (Vachon and Klassen, 2007). This can

be seen looking at the consistent increase in papers published on this topic in international journals (Seuring and Müller, 2008). Despite the relative recentness of this phenomenon, it has to be said that some common themes within the sustainable supply chain literature have started to emerge, even though the field is still in evolution.

Early contributions in the field started addressing the adaptation of environmental and social responsibility principles to single corporate functions (for instance, purchasing, logistics, product development) instead of really focusing on an entire supply chain system. Furthermore, just a subset of sustainability dimensions was incorporated.

Indeed, the seminal papers from Carter and Carter (1998), Zsidisin and Siferd (2001) introduce green purchasing as “the set of purchasing policies held, actions taken, and relationships formed in response to concerns associated with the natural environment”. In their definitions, they account, in great detail, for green and environmental issues, but completely discard social ones. Similarly, Zsidisin and Siferd (2001) also introduce the green logistics concept.

Carter and Jennings (2002a, 2004) introduce the concept of corporate socially responsible purchasing. Basically, they evaluate the impact of purchasing decisions on several dimensions, like diversity, human rights, philanthropy and safety. Interestingly, also the environmental dimension is cited, by taking into account several ‘green’ variables. Therefore, these frameworks are still just concerned with a single corporate function, but they incorporate both the social and environmental dimension of sustainability. Similarly, the same authors (2002a, 2004) also introduce the CSR logistics concept.

By broadening the scope of corporate functions being considered, Carter and Jennings (2002b) define the corporate socially responsible supply chain, focusing on CSR issues across the whole supply chain, by measuring the performance across the above-mentioned dimensions not only at the focal firm but throughout the whole value creation process. Therefore, framework is characterised by a wider scope (being concerned with the whole supply chain) and by an wider sustainability awareness (as it focused on social issues but taking into account also green and environmental ones).

Hervani et al. (2005) define green supply chain management as the “addition of the green component to supply chain management, addressing the influence and relationships of supply chain management to the natural environment. Motivated by an environmentally-conscious mindset, it can also stem from a competitiveness motive within organisation”. In particular, they introduce the following equation: “green supply chain management = green purchasing + green manufacturing + materials management + green distribution and marketing + reverse logistics”. For this reason, green supply chain management includes as subsets all the mentioned sub-disciplines; however, social dimension of sustainability is not accounted for in this framework.

The most comprehensive definition has been provided by Seuring and Müller (2008) work, that describes “sustainable supply chain management as the management of material, information and capital flows as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e., economic, environmental and social, into account which are derived from customer and stakeholder requirements”. Therefore, in sustainable supply chains, environmental and social criteria need to be fulfilled by the members to remain within the supply chain, while it is expected that competitiveness would be maintained through meeting customer needs and related economic criteria. Therefore, this definition

'includes' the ones of green supply chain management and corporate socially responsible (CSR) supply chain management.

Given this theoretical underpinning, both Linton et al. (2007) and Seuring and Müller (2008) highlight the interdisciplinary character of the field of sustainable supply chain management (involving input from traditional business and management disciplines, operational research, engineering, natural and environmental sciences and policy studies) by also providing a first attempt to classify employed methodologies (including case studies, surveys, mathematical modelling and literature review). Furthermore, Seuring and Müller (2008) highlight that, still, social implications are often neglected by the most of the researchers in the field of study. Therefore, the most of the papers that have been presented till now are more concerned with green and environmental aspects than with the whole spectrum of sustainability dimensions.

2 An overview of the papers presented in this special issue

In this context, this special issue provides an international and interdisciplinary forum to investigate and exchange novel ideas and disseminate knowledge covering this broad and emerging area. Both theoretical and practical contributions were invited. Of the 12 papers were received, four of them passed the double-blind review process. In the following, a brief overview of these papers is provided.

Addressing the very timely issue of carbon emissions management and reduction, Acquaye et al. develop the concept of supply chain carbon map which provides a visual representation of the sources, levels of emissions and hotspots at a whole supply chain level, by using a hybrid lifecycle assessment methodology (also benefiting from the use of input-output analysis). The paper also discusses how the development of a whole supply chain perspective of carbon maps ensures that collaborative supply chain networks of firms can be mapped hence firms can gain a better understanding of their supply chain impacts and therefore help its sustainable management.

Costantino et al. propose a methodology, based on the use of fuzzy logic and analytic hierarchy process, to assess the ecological profile of a supply chain, considering the alignment of a supply chain to eco-design principles and legislation requirements along the life-cycle of products. The study considers the case of a domestic dishwasher to verify the capacity and the applicability of the framework and provide a tool to support organisations with a new eco-design tool to evaluate the potential capability of ecological improvements.

At a more operational level, Klöpper et al. introduce a bi-objective evolutionary optimisation approach for the approximation of CO₂-efficient schedules in an international transportation problem. The paper proposes a method for finding solutions to transportation problems that are simultaneously efficient from economic and ecological objectives.

Syahrudin and Kalchschmidt provide an extensive literature review on the practice of supply chain management and sustainability in agriculture sectors to identify the extent of the discipline in this field and to highlight areas that need further research. Among the other findings, the paper highlights that very limited contributions can be found that adopt quantitative modelling approaches. This limitation is an indication that the literature does not provide the tools and methods that companies can directly use to improve their sustainable capabilities.

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