

TITLE: Problematizing the concept of ‘sustainability’ in the supply chain through systematic literature review.

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TITLE: Problematising the concept of ‘sustainability’ in the supply chain through systematic literature review.

SUMMARY: The authors contend that there are two broad ‘senses’ in which ‘sustainability’ is currently understood in supply chain research and practice – responsibility (in terms of environmental and social practices) and continuity (in the face of twenty-first century uncertainty and disruption). Systematic review is used to illustrate the predominance of the responsibility ‘sense’ of sustainability in academic literature labelled ‘sustainable supply chain.’ The authors propose that parallel research into strategies for supply chain continuity (e.g. agility and resilience) be brought within the fold of the ‘sustainable supply chain’ research label for the sake of clarity of the ‘sustainability’ concept and the development of a truly sustainable supply chain, because a responsible supply chain might not necessarily be a resilient supply chain in the twenty-first century global environment.

WORD COUNT: 6,255

INTRODUCTION

There is an emerging body of research literature known as ‘sustainable supply chain (management)’ (SSC/M). Studies situated within this body of work largely posit late twentieth- and early twenty-first century macro trends as key drivers of the increasing need to consider ‘sustainability’-related risks and opportunities in supply chain management activity. Such trends are highly interconnected and include: globe-spanning chains of increasing complexity; increasingly informed and conscientious consumers; motivated and powerful non-governmental organisations (NGO); and the effects of global environmental, social and political change (and turmoil) on the successful management of global supply chains. Along with other business and organisational management disciplines, the supply chain field has similarly adopted the ‘sustainability’ ‘buzzword’ (Carter and Easton, 2011) and the concept of a ‘sustainable supply chain’ is increasingly explored.

Evidencing the growth of this field, a number of systematic reviews have already been published in an effort to map, consolidate and steer the SSC/M research agenda (e.g. Seuring and Muller, 2008; Carter and Easton, 2011; Ashby et al, 2012; Touboulic and Walker, 2015). The present study seeks to contribute to that effort by highlighting through systematic review how ‘sustainability’ is currently applied to supply chains in ‘sustainable supply chain’ literature. The need for such clarification is assumed on the basis of the authors’ collaboration with supply chain academics and practitioners, which have highlighted different ‘senses’ in which the term ‘sustainability’ is used and understood. It has been the authors’ experiences that there remains a persistent need to clarify what is meant by ‘sustainability’ of a supply chain before conversations can continue. In particular, the authors have found that mention of the term ‘sustainability’ is usually followed by the question, ‘when you say, ‘sustainability’, do you mean supply chain continuity or environmental issues?’

The present study therefore takes as its starting point the assumption that the term ‘sustainability’ has broadly assumed two key meanings in the context of supply chain management. In the first instance, a ‘sustainable supply chain’ is a supply chain which considers its social and environmental impacts (or goals) at the same time as its economic goals (Carter and Rogers, 2008; Seuring and Muller, 2008). This may therefore be seen to be in line with the essence of the well-cited Brundtland definition which states: ‘sustainable development is development which meets the needs of the present without compromising the ability of future generations to meet their needs’ (WCED, 1987). The ‘Brundtland Report’ foregrounds social, environmental and economic responsibility in the name of inter- and intra- generational equity and underpins a ‘sense’ of ‘sustainability’ which draws on the broad ideas of ethics and responsibility.

In the second instance, a ‘sustainable supply chain’ is a supply chain which can survive indefinitely. This sense of ‘sustainability’ reflects a more colloquial understanding which is based on the everyday verb, ‘sustain’ and foregrounds concerns of permanence and survivability. It manifests itself in a supply chain context in terms of ensuring the continuity of supply chain flows, activity and competitiveness through strength and adaptability – to be flexible in the face of uncertainty, to respond quickly, and to bounce back when disrupted. This may be seen as reflecting longstanding concerns of supply chain practitioners and researchers: over the years, the academic literature has proffered numerous supply chain strategies for sustainable competitive advantage (for example, lean supply chains, robust supply chains, agile supply chains, leagile supply chains and resilient supply chains). However, twenty-first century shifts in the macro-environment, including notable high-impact disruption events caused by economic, environmental and political incidents, have

highlighted the shortcomings of certain supply chain strategies within the new global environment. The idea of agile and 'leagile' supply chains have emerged to counter a unilaterally lean strategy which is seen as risky in increasingly turbulent and uncertain supply chain environments (Christopher, 2000). Based on similar discourses around the changing nature of uncertainty in twenty-first century supply chains, resilience is similarly gaining ground as a necessary strategy for supply chain survivability (sustainability). Sheffi and Rice (2005) cite the September 2001 attacks and the bombings in Madrid in 2004 and London in 2005 to illustrate that supply chains no longer have only to deal with the risks associated with the uncertainty of demand or supply variability, but '*on top of all that*' (p.48) also now have to deal with global terror events. In the decade since their work was published, numerous more examples of terrorist, economic and environmental disruption events can be added to the list to bolster their argument.

It is clear therefore that twenty-first century supply chain research and practice is highly concerned with 'sustainability' issues. What is less clear however, is whether the burgeoning body of 'sustainable supply chain' literature is adequately reflecting and encompassing the co-existence and complementarities of both of these 'senses' of sustainability for supply chains. To what extent do capabilities for supply chain agility or resilience depend on or support those capabilities which are required for environmental and social supply chain responsibility? Is a responsible supply chain also an agile or a resilient supply chain? To what extent do responsible practices fall away in times of volatility or supply chain flex? If so, can this be prevented? Consideration of questions such as these is deemed underrepresented in extant 'sustainable supply chain' literature which reflects the authors' assumption that these two 'senses' of sustainability are unequally reflected in the specific and growing body of work that is known as 'sustainable supply chain.'

The second assumption on which the present study rests, therefore, is that research published under the title 'sustainable supply chain' predominantly applies the former 'sense' of sustainability (responsibility). New researchers to the field who are researching, for example, supply chains which are prone to disruption by natural disaster, might keyword search the literature for 'sustainable supply chain' and be sorely disappointed. This is because it seems that a separate body of supply chain research explores the latter 'sense' of 'sustainability' (business continuity) beneath article titles which do not bear the title 'sustainable supply chain.' On the assumption that a responsible supply chain is not necessarily an agile/resilient supply chain (or vice versa) the authors believe greater unification of the two 'senses' of 'sustainability' behind the common label 'sustainable supply chain' would significantly aid understanding of and communication around the contentious and multi-faceted concept of 'sustainability', while simultaneously bolstering the exploration and requirements surrounding the development of a truly 'sustainable supply chain'. The present study therefore aims to problematise the meaning of 'sustainability' as it is applied within extant 'sustainable supply chain' literature in order to better illustrate the 'sense' in which the term 'sustainable supply chain' is currently being used.

The authors recognise that to reduce the idea of the 'sustainable supply chain' in terms of only these two broad 'senses' of 'sustainability' may be seen to be over-simplifying or stunting the complex nature of the emergent concept. These two 'senses' of sustainability constitute large bodies of supply chain literature which have established themselves over a number of years. However the authors hope that this study exposes the separation of the 'senses' of 'sustainability' as a means of enabling greater recognition and exploration of their interconnectedness for a 'sustainable supply chain'. Similarly, the separate articulation of the two 'senses' may be seen as implying that the narratives are pitted against one another and/or

are mutually exclusive. On the contrary, the authors are sensitive to the need to consider the relationship between these two senses for a truly sustainable supply chain and propose the need for research which explores the assumption that a truly sustainable supply chain is both responsible and agile/resilient. This significantly adds to the complexity of defining what a truly ‘sustainable supply chain’ really is and how it can be achieved, and therefore represents a fruitful avenue for future research surrounding the practical development of sustainable supply chains. This however, is beyond the scope of the present study.

For now, in achieving the aim of the present study, the authors hope to provide a useful illustration of the current ‘sustainable supply chain’ literature regarding how ‘sustainability’ is currently understood and applied in the development of the ‘sustainable supply chain’ concept. It is believed that this represents a first step towards the development of a more unified and more robust, if more complex, understanding of what a ‘sustainable supply chain’ is, or should be. This is an essential foundation from which to clarify the multifarious goals and therefore appropriate management strategies through which a truly ‘sustainable supply chain’ can be developed.

The remainder of the article is structured as follows. First a background to the study is provided by a look at existing literature around these two ‘senses’ of ‘sustainable supply chains.’ Next, the methodology for systematic literature review and the details of its application to achieve the aim of this study is outlined. The results of the review are then outlined, followed by a discussion of the implications and opportunities for future research in to ‘sustainable supply chain/ management.’ The limitations of the study as well as plans for future research are then discussed before the paper concludes with a final summary of the paper’s key contribution.

BACKGROUND

In order to contextualise this study within the wider sustainable supply chain management research agenda, the following review aims to outline the characteristics and findings of the literature published relating to the two ‘senses’ of ‘sustainability’ that have been defined for this study - namely environmental and social considerations within responsible supply chain management, and agile and resilient supply chain strategies for supply chain continuity. As a starting point however, we lay out the literature’s current definitional approaches to sustainable supply chains.

Definitions of ‘sustainable supply chain’

Acknowledging that a lack of definitional consensus is to be expected within an emergent topic (Gladwin et al, 1995), a number of definitions of ‘sustainable supply chain/ management’ (SSC/M) co-exist in the research literature (Carter and Rogers, 2008, Seuring and Muller, 2007, Ahi and Searcy, 2012). Carter and Rogers (2008) defined SSCM as “the strategic, transparent integration and achievement of an organisation’s social, environmental and economic goals in the systemic coordination of key inter-organisational business processes for improving the long term economic performance of the individual company and its supply chains.” They acknowledged Elkington’s ‘triple bottom line’ concept as a useful tool in helping organisations (and supply chains) to operationalise the more abstract and macro definition offered by the Brundtland definition, and incorporated it as the foundation of their conceptual framework for sustainable supply chain management (Carter and Rogers, 2008). Meanwhile, Seuring and Muller (2008a) defined SSCM 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” (p.1700). In their meta-analysis of definitions across SSC/M literature, Ahi and Searcy (2012) identified 12 co-existing definitions. Common among these definitions is the tripartite depiction of sustainability as encompassing social, environmental and economic dimensions or ‘goals.’

Environmental and social practices in supply chain management

It is increasingly recognised that a firm’s supply chain represents more than just an arena of accountability for firms whose increasingly informed and conscientious consumers react loudly to unethical supply chain practices – for example, poor labour conditions at off-shore factories or environmentally detrimental waste disposal activity. Supply chains are also becoming seen as offering opportunity for firms to make a positive social, environmental, and economic impact beyond their immediate locale while simultaneously differentiating their brand and improving their corporate reputation. Unsurprisingly, there has thus been a great deal of academic interest in explaining why organisations pursue responsible environmental and social practices in their supply chains, with the assumption that a spectrum of drivers have created a spectrum of organisational responses which can be seen as ranging from reactive to proactive.

The results of a number of empirical surveys have suggested that stakeholders play an important role (Walker and Jones, 2012). Stakeholder theory has therefore been identified as a dominant theoretical lens through which drivers of the phenomenon have been explored (Touboulis and Walker, 2015; Carter and Easton, 2011) and has led to the suggestion that organisations’ moves towards SSCM is a reactionary response to stakeholder demands. A number of high-profile sportswear and clothing manufacturing brands whose supply chains were found to be hosting poor and unethical labour and environmental practices attest to the need to assess suppliers and supply chains against an expanded set of performance criteria (economic, environmental and social) (Seuring and Muller, 2008a). Alternatively, Gold et al (2010) and Wolf (2014) have employed the resource based view (RBV) and resource-dependency theory (RDT) respectively to suggest that firms’ responsible supply chain decisions can be seen as proactive and business-opportunity oriented pursuits of innovation and strategic differentiation. Wolf (2014) showed that in the context of diminishing natural reserves, Wal-Mart implemented alternative sourcing strategies for fish supplies which ensured continuity of their supply while relieving the demand that was driving over-exploitation. Reverse logistics and closed-loop supply chains have similarly been exploited as strategies through which firms can re-integrate resources- through reuse, recycling, remanufacture – into the supply chain while taking responsibility for the disposal of its products at the end of their lifecycle. Much literature which is concerned with environmentally and socially responsible supply chain activity has thus highlighted the opportunities for economic performance that make responsible supply chain activity a strategic decision for competitive advantage – either through cost efficiency as per Porter and van der Linde (1995) or brand differentiation (Flint and Golicic, 2009) – as much as a moral duty.

The supply chain capabilities which enable these strategies have thus similarly been a topic of key concern in the extant literature. Numerous studies have identified numerous antecedents, enablers, critical success factors and capabilities as underpinning such responsible supply chain practices (e.g. Pagell and Wu, 2009; Beske and Seuring, 2014; Walker and Jones, 2012; Wolf, 2011; Wittstruck and Teuteberg, 2012; Carter and Rogers, 2008). Key among these

include: top management support and leadership; strategic orientation towards both supply chain management and the triple bottom line (Beske and Seuring, 2014); culture; internal supply chain integration; external supply chain integration; supplier selection, development and collaboration; customer collaboration; transparency; and risk management. In many ways these capabilities reflect what one might expect from *effective* supply chain management as laid out in what might be thought of as ‘traditional’ supply chain theory, and therefore reflect the perspective hinted above (e.g. Porter and van der Linde, 1995) that responsible (e.g. environmentally friendly) supply chains make ‘good business sense.’

Concern for ensuring continuity of supply is therefore central to responsible supply chains and the twenty-first century environment requires consideration of more than simply the economic viability of a direct supplier. Very real concerns about the diminution of natural reserves and structural inequality are now key to supply chain managers’ decisions to ensure a future in which ‘business as usual’ is in some way possible. However, the examples we have seen in the context of ‘responsible’ supply chains consider supply chain continuity within a longer-term horizon. A notable characteristic of twenty-first century global environment for many supply chains, by contrast, is time-sensitivity and criticality, particularly in the context of uncertain and volatile markets and disruption events. Melnyk et al (2009) identified through a Delphi study that management of supply chain disruption and risk is at the top of a list of concerns for future supply chain research. A supply chain which is leading in labour standards but which shuts down when a key upstream source dries up due to natural disaster (compromising job security) perhaps cannot be considered (in the colloquial sense of the term) ‘sustainable.’

Agile and resilient supply chains

In line with the macro-environmental context that has driven concern for environmental and social responsibility, trends towards greater interconnectivities, interdependencies, and cost-efficient philosophies such as lean and just-in-time (JIT) has increased the potential impact of supply chain disruptions. This means that supply chains are increasingly vulnerable to disruption and at risk of losses and supply chain breakdown, which compromise supply chain survivability. Thus, supply chain capabilities for agility and resilience represents an emerging supply chain concern alongside longstanding recognition of the need for supply chains to strategically develop and/or combine their capabilities (for example, lean and/or agile) to manage the risks associated with uncertainty and vulnerability in complex, global supply chains.

In their well-known study on resilient supply chains, a focus on the management of risk external to the supply chain led Christopher and Peck (2004) to cite “natural disasters, industrial disputes, terrorism, [and] ...the spectre of war in the Middle East” (p.1) as illustration of the increasing need for supply chains designed to respond effectively to the actual impacts of the external environment on supply chain activity. Aligning with the concept of agility, they proposed a sustainable supply chain as one which was designed with the capability to ‘return to its original state...after being disturbed’ (Christopher and Peck, 2004, p.2). In response to supply disruptions caused by environmental disasters, they countered efficiency discourse of lean supply chains in proposing the need for supply chain strategies to include buffer stocks in the name of supply chain continuity. Since the publication of their work, a number of significant global environmental and economic disruptions, such as the economic recession of 2007-8, and the Japanese earthquake and tsunami in 2011, have seen increasing concern for research into the antecedents of and capabilities for supply chain resilience.

Key within the concepts of both agility and resilience in supply chain management is flexibility. The concept of resilience aligns closely with and builds upon the ideas of supply chain flexibility and agility as essential capabilities for long term supply chain survival in the face of demand uncertainty and change. Importantly, the concept of resilience has been shown to be based on supply chains' abilities to adapt and flex with exogenous change. Braunscheidel and Suresh (2009) focused on the concept of agility in their study of supply chain disruption and highlighted its importance for both risk mitigation and response. Building on the evidence from a number of studies which have shown that flexibility makes supply chains more successful in responding to disruption than their non-flexible counterparts, Skipper and Hanna (2009) highlighted flexibility as an antecedent of resilience which could be better enabled through contingency planning.

Interestingly, the outcome of Ahi and Searcy's (2012) meta-study of SSC/M definitions (cited above) was the development of what they considered to be a 'more complete' definition of SSCM. They defined it as, "the creation of coordinated supply chains through the voluntary integration of economic, environmental, and social considerations with key inter-organizational business systems designed to efficiently and effectively manage the material, information, and capital flows associated with the procurement, production, and distribution of products or services in order to meet stakeholder requirements and improve the profitability, competitiveness, and resilience of the organization over the short- and long-term." (p.339). Notable in this definition is the inclusion of the concept of 'resilience' alongside the tripartite concept, profitability and competitiveness. The authors endorse this definition of SSCM as being more complete in that it goes some way towards combining the two 'senses' of sustainable supply chains that are assumed to be currently existing separately in supply chain literature.

The following section outlines the approach taken to explore the 'sustainable supply chain' literature to identify and expose the 'sense' in which 'sustainability' is currently understood on the basis that future 'sustainable supply chain' research will progress along more integrated lines.

METHODOLOGY

The systematic literature review was identified as a valid approach for this study which sought to investigate the extent to which the two 'senses' of 'sustainability' (responsibility and continuity) were represented in literature which is specifically entitled 'sustainable supply chain.' Differing from more narrative approaches to literature review, the results of which had already informally directed the authors towards the assumptions outlined above, the systematic literature review is based on a more methodical approach which follows a transparent set of steps in the identification and analysis of appropriate research literature. This increases the replicability of the study and reduces the possibility of researcher bias (Tranfield et al, 2003).

The systematic review method has been used frequently in supply chain and sustainability research. This is perhaps unsurprising given the extent to which the field has grown in a short space of time (Beske-Janssen et al, 2015). These previous reviews have provided high-level perspectives of theoretical, methodological and thematic trends (Touboulic and Walker, 2015; Carter and Easton, 2011; Seuring and Muller, 2008a; Ashby et al, 2012) as well as to more narrowly map specific topics (e.g. Gimenez and Tachizawa, 2012). The method has been used to identify trends and consolidate the literature for advancement of the SSCM field

and is used here used for similar purposes (Tranfield et al, 2003). The present review differs from previous reviews however by restricting the sample to articles with the specific phrase ‘sustainable supply chain’ in the title. As it is frequently acknowledged that a range of synonyms are employed in discussions of sustainable supply chains, for example ‘responsibility,’ ‘CSR,’ and ‘ethics,’ previous reviews have sought to include such terms in keyword searches in order to ‘cast the net’ widely enough to capture all relevant articles and ensure a viable sample (e.g. Alexander et al, 2014). The present review however is specifically interested in the way in which ‘sustainability’ is understood and applied in a supply chain context within studies to which the label ‘sustainable supply chain’ has been specifically applied. This is based upon the assumption that the burgeoning research field and associated concept of the ‘sustainable supply chain’ should proceed with clarity and unification of understanding surrounding the term ‘sustainability.’

To develop the sample, an online search was conducted for studies with the phrase ‘sustainable supply chain’ in their title (SEARCH: TI ‘sustainable supply chain’) via four leading databases – Business Source Premier, Emerald Insight, Wiley Online and Web of Science. The review focused on academic, peer-reviewed, English-language journal articles published up to January 2016. Exclusions included practitioner reports and periodicals, book reviews, book chapters, calls for papers, introductions to special issues, and conference papers. On 16.01.16, the search on TI ‘sustainable supply chain’ returned a total of 347 items (130 on BSP; 27 on Emerald Insight; 52 on Wiley Online; 138 on Web of Science). After exclusions, duplications and inaccessible articles were removed, a sample of 106 articles remained.

Analysis began with the systematic capture of standard descriptive data, including publication date, journal, authors, article title and key topics. All but one article within the sample focused on business management. This article (Kumar and Srivastava, 2005) was removed, leaving a final sample of 105. Then, each paper was quantitatively analysed for the number of times it used key terminology associated with the two ‘senses’ of sustainability. A priori codes were determined on the basis of literature review and discussion and agreement among the authors [Table 1]. In light of the prevalence of the concept of risk in both ‘senses’ as identified through an initial review of the literature, ‘risk’ was also assessed as a keyword.

‘Sustainable’ sense 1 ‘Responsibility’	‘Sustainable’ sense 2 ‘Continuity’
INCLUSIONS	INCLUSIONS
<i>Triple bottom line</i> <i>Green* (-ing, -er)</i> <i>Environment* (-al, -ally)</i> <i>Social* (-ly)</i>	<i>Agil* (-e, -ity)</i> <i>Resilien* (-t, -ce, -cy)</i> <i>Flexib* (-le, -ility)</i> <i>Adaptab* (-le, -ility)</i> <i>Robust (-ness)</i> <i>Risk* (-s)</i>
EXCLUSIONS	
<i>Greenhouse gas</i> <i>Green-7 countries</i> <i>Green-wash</i> <i>Greenpeace</i> <i>GreenSCOR</i>	
TABLE 1 - Keywords	

RESULTS AND DISCUSSION

There was a positive trend in the number of articles with ‘sustainable supply chain’ in the title in the years between 2006 (the earliest use of it in our sample) and 2015 [Figure 1]. By January 2016, there were already five articles published with ‘sustainable supply chain’ in the title indicating the strength of the continued positive trend into 2016. The articles were spread across a range of journals, both Association of Business Schools-ranked (ABS) and non-ABS ranked, ranging from 1 to 4 ratings, and within classifications including operations, marketing, supply chain, business ethics and information management. The journal with the most ‘sustainable supply chain’ articles was a supply chain journal (*Supply Chain Management: an International Journal*) but the articles were also found across non-supply chain journals including *Journal of Cleaner Production* and *Corporate Social Responsibility and Environmental Management*, thus reflecting previous findings that have suggested that the topic of sustainable supply chain management is an inter-disciplinary topic that is currently approached from both a supply chain and a non-supply chain perspective (Seuring and Muller, 2008).

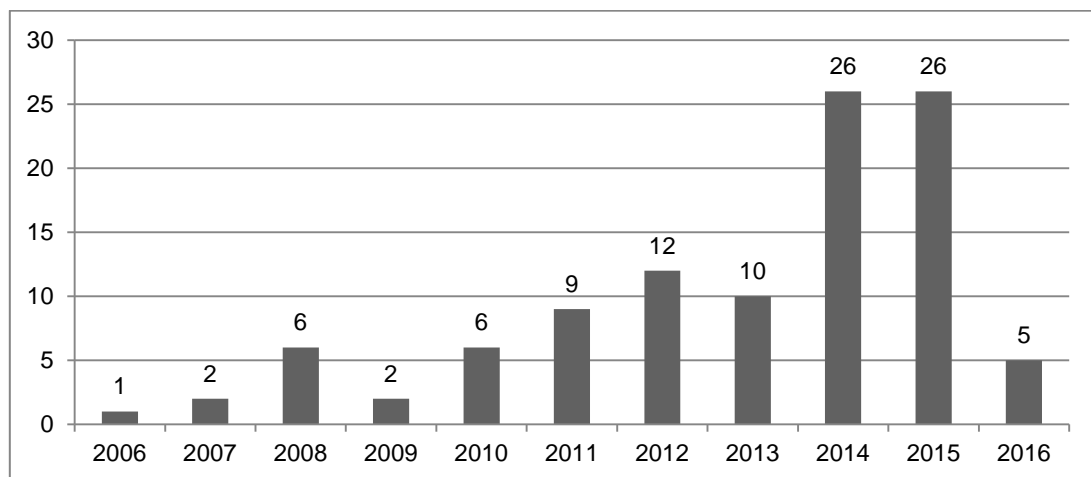


Figure 1- Distribution of TI "sustainable supply chain" articles by year (N=105)

TABLE 2- Papers classified according to journals/ABS classification

Journal Title (54)	No. of articles (N=105)	ABS (2015) rating	ABS Subject Classification
<i>Supply Chain Management: an International Journal</i>	8	3	Operations and Technology Management
<i>Business Strategy and the Environment</i>	7	3	Regional Studies, Planning and Environment
<i>International Journal of Production Economics</i>	7	3	Operations and Technology Management
<i>Journal of Cleaner Production</i>	7	-	-
<i>International Journal of Physical Distribution and Logistics</i>	6	2	Operations and Technology Management

<i>Management</i>			
<i>Journal of Supply Chain Management</i>	6	3	Operations and Technology Management
<i>Corporate Social Responsibility and Environmental Management</i>	5	1	Regional Studies and Technology Management
<i>Computers and Operations Research</i>	4	3	Operations Research and Management
<i>Supply Chain Forum: an International Journal</i>	4	1	Operations and Technology Management
<i>Journal of Business Ethics</i>	3	3	General Management, Ethics and Social Responsibility
<i>Industrial Marketing Management</i>	2	3	Marketing
<i>International Journal of Operations and Production Management</i>	2	4	Operations and Technology Management
<i>Transportation Research</i>	2	3	Sector Studies
<i>Annals of Operations Research</i>	1	3	Operations Research and Management Science
<i>Applied Soft Computing</i>	1	-	-
<i>Benchmarking: An International Journal</i>	1	1	Operations and Technology Management
<i>Business and Society Review</i>	1	-	-
<i>Clean Technologies and Environmental Policy</i>	1	-	-
<i>Computers and Industrial Engineering</i>	1	2	Operations and Technology Management
<i>Cornell Hospital Quarterly</i>	1	-	-
<i>Decision Support Systems</i>	1	3	Information Management
<i>Ecological Economics</i>	1	3	Economics, Econometrics and Statistics
<i>Environmental Quality Management</i>	1	-	-
<i>European Journal of Operational Research</i>	1	4	Operations Research and Management Science
<i>European Management Journal</i>	1	2	General Management, Ethics and Social Responsibility
<i>Expert Systems with Applications</i>	1	3	Information Management
<i>Industrial and Commercial Training</i>	1	-	-
<i>Industrial Management and Data Systems</i>	1	2	Information Management
<i>Information Technology and Management</i>	1	-	-
<i>International Business Review</i>	1	3	International Business and Area Studies
<i>International Journal of Business Insights and Transformation</i>	1	-	-
<i>International Journal of Logistics Management</i>	1	1	Operations and Technology Management
<i>International Journal of Systems Science</i>	1	-	-
<i>International Journal of Managing</i>	1	1	General Management, Ethics

<i>Projects in Business</i>			and Social Responsibility
<i>International Journal of Productivity and Performance Management</i>	1	1	Operations and Technology Management
<i>International Journal of Sustainable Transportation</i>	1	-	-
<i>International Management Review</i>	1	-	-
<i>IUP Journal of Operations Management</i>	1	-	-
<i>IUP Journal of Supply Chain Management</i>	1	-	-
<i>Journal of Applied Logic</i>	1	-	
<i>Journal of Business Logistics</i>	1	2	Operations and Technology Management
<i>Journal of Environmental Management</i>	1	3	Regional Studies, Planning and Environment
<i>Journal of Fashion Marketing and Management</i>	1	1	Marketing
<i>Journal of Manufacturing Technology Management</i>	1	1	Operations and Technology Management
<i>Journal of Operations Management</i>	1	4*	Operations and Technology Management
<i>Journal of Purchasing and Supply Management</i>	1	2	Operations and Technology Management
<i>Journal of Simulation</i>	1	1	Operations Research and Management Science
<i>Journal of Sustainable Tourism</i>	1	3	Sector Studies
<i>Management of Environmental Quality: an International Journal</i>	1	-	-
<i>Management Research Review</i>	1	1	General Management, Ethics and Social Responsibility
<i>Omega-international Journal of Management Science</i>	1	3	Operations Research and Management Science
<i>Scientific World Journal</i>	1	-	-
<i>Simulation – Transactions of the Society for Modeling and Simulation International</i>	1	-	-
<i>Sustainability</i>	1	-	-

The frequency with which the keywords (Table 1) related to the two ‘senses’ of sustainability were employed in TI ‘sustainable supply chain’ articles highlights a key fracture. The following sections outline the frequency with which the related terms were employed within the articles in our sample.

‘Sustainability’ sense 1: Responsibility

100% of the articles in the sample (105) make reference to the ‘environment’, with 85% using the term ‘green’ and 95% using terms related to ‘social’ (Figure 2). Although the difference is small, the relative frequency of environmental keywords to social keywords reflects a widely recognised characteristic of research output on this topic, which is that there is an imbalance of consideration given to environmental and social dimensions, with more

attention being given to the environment (Ashby et al, 2012). Only 17 articles made use of the term ‘social’ more frequently than that of the term ‘environmental.’ Terms relating to the environment were used more frequently than those relating to the term social across the remaining 88 articles. The difference in the frequency of ‘social’ and ‘environmental’ within each article ranged between 1 and 216. Explanations for these characteristics have been suggested by other authors, including the evolution of sustainable supply chain management from literature on environmental concerns within operations management (Linton et al, 2007), and the extent to which the ‘softer’ nature of the social dimensions inhibits quantifiable targets and measures (Ashby et al, 2012; Beske-Janssen et al, 2015). This has resulted in calls for ‘more’ research on the social dimension, as well as for more research on supply chain activities which sit at the intersection of the three dimensions (Carter and Rogers, 2008).

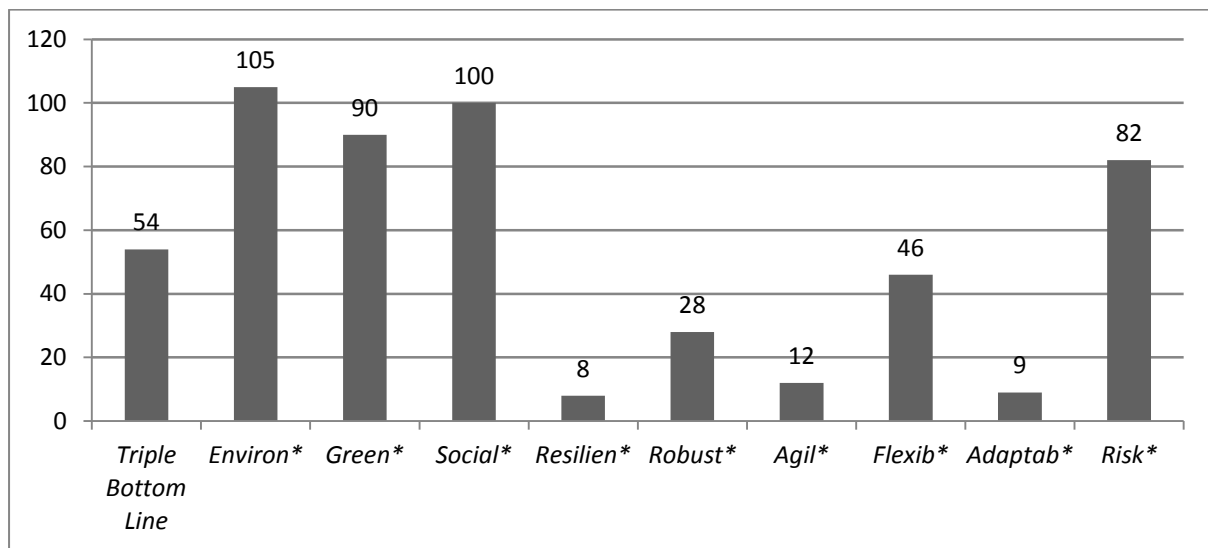


Figure 2- Key word frequency (N=105)

The term ‘triple bottom line’ was used less frequently than expected. The concept was designed to emphasise parity between the three dimensions and is perhaps the most well known popular conceptualisation of the tripartite depiction of sustainability (Elkington, 1997). Carter and Rogers (2008) built on this concept in their conceptual framework of SSCM by emphasising the requisite importance of economic responsibility on the basis that a supply chain which is not financially viable cannot be socially or environmentally responsible. Nonetheless, there have been criticisms of the concept, not least because of the challenge regarding quantifying or monetising the value associated with improved social or environmental performance in the same way as can be done for economic performance.

‘Sustainability’ sense 2: Continuity

As was expected, the results showed that the frequency with which terms relating to discourses of supply chain continuity (including agility and resilience) was significantly lower than the frequencies found for terms relating to ‘responsible’ supply chain practice. Only 8 of the 105 articles in our sample (7.6%) employed the term (or variations on the term) ‘resilient’ at least once. These were: Ahi and Searcy, 2013 (18), Longo (2012) (8); Alexander et al (2014) (3); Carter and Rogers (2008) (2); Wang and Sarkis (2013) (1); Kashmanian (2015) (1); Zhang et al (2014) (1); Bai et al (2010) (1). Of the related keywords in the ‘resilience’ discourse: ‘flexibility’ is the most frequently used across the sample with

46 articles employing the term at least once, followed by 'robust' (28), 'agile' (12) and 'adaptable' (9). The use of 'flexibility' may be due to reference to or comparison with 'traditional' SCM economic goals outlined by Gunesakaran et al (2005) of cost, speed, quality, flexibility, dependability (e.g. Beske-Janssen et al, 2015), however the protocol adopted in this particular systematic review did not allow for further investigation of the contexts in which these terms were used. This will form the basis of subsequent research efforts. Unsurprisingly given the prevalence of concerns regarding corporate reputational risk, the term 'risk' appeared at least once in 82 (78%) of the 105 'sustainable supply chain' articles in our sample. However, once again, the protocol for this particular study did not call for the qualitative exploration of the context in which the term was used and therefore we were not able to distinguish the nature of the risks that were being discussed.

The previous sections have outlined the results of the quantitative content analysis of keywords associated with two 'senses' of 'sustainability' within a supply chain context. The results of the study suggest that the body of work entitled 'sustainable supply chain/management' predominantly understands 'sustainability' as meaning environmental and social responsibility and performance which reflects the tripartite concept of sustainability. The alternative 'sense' of supply chain sustainability which aligns more colloquially with the dictionary definition regarding the 'ability to be upheld, maintained or defended at a certain level' (supply chain continuity) is not well-reflected in work which is specifically labelled 'sustainable supply chain/management.' The authors contend that this is a shortcoming for the emerging field of sustainable supply chain management (as our results showed an increasing trend towards the use of that specific phrase) and the associated 'sustainable supply chain' concept, for two key reasons.

Firstly, taking Carter and Rogers (2008) view that financial viability is a pre-requisite for environmental and social responsibility, it cannot be assumed that socially and environmentally responsible supply chains activity supersedes or precludes the ongoing need to be agile to changing demands and external circumstances and resilient to supply disruptions. Contingency theory suggests that supply chain management strategies should reflect the needs of the environment, and much work has explored how to identify the right supply chain strategy for the market (Lee, 2002; Sun et al, 2009). The authors propose that a more complete conceptualisation of 'sustainable supply chain' moving forward would include both 'senses' of 'sustainability' – responsibility and continuity. It is proposed that this would 'close the loop' of creating sustainable supply chains in terms of giving consideration to what happens *after* a supply disruption event in order to 'keep going' as well as giving consideration to how risks of supply chain disruption (supply disruption, reputational damage, consumer boycotts, NGO campaigns, dwindling input resources) can be mitigated before they turn into issues.

The second reason why the authors contend that 'sustainable supply chain' literature needs to better integrate the two senses of 'sustainability' in sustainable supply chains is related to concern with the status of the supply chain field as an academic discipline (Harland et al, 2006). This topic has been well-discussed, and the call for more unique supply chain theory, as opposed to 'imports' from other disciplines is frequently made (Touboulis and Walker, 2015; Carter and Easton, 2011). Against this backdrop, an apparent distinction between 'conventional' and 'sustainable' supply chain research as identified by some sustainable supply chain researchers (Pagell and Wu, 2009; Pagell et al, 2010) risks proliferation rather than unification of understanding and ideas about 'sustainability' within the supply chain field. Pagell and Shevchenko (2014) argued that in the future all supply chain research will be sustainable supply chain research because sustainability will no longer be an option. They

represent a line of enquiry within sustainable supply chain literature that examines how 'sustainable supply chains' require a re-think of dominant supply chain theory. For example, Pagell and Wu's (2010) study of exemplary sustainable supply chains found organisations to be conducting non-traditional supply chain activity in the form of paying above market prices for commodity items or developing suppliers for the benefit of other buyers. This suggests that sustainable supply chain research agenda should represent an evolution of supply chain research rather than simply a trend within supply chain research. A continued distinction between 'conventional' and 'sustainable' supply chain research therefore arguably precludes the development of a united frontier with which to move forward the body of supply chain knowledge in a 'sustainability' era.

While we have shown that 'sustainable supply chain' articles are limited in their consideration of what we have defined as two broad 'senses' of sustainability by predominantly considering only the 'responsibility' sense and inadequately considering the 'continuity', so too does the Melnyk et al (2009) Delphi study highlight a comparable absence of the responsibility 'sense' within what might be called the 'conventional' camp of supply chain research. Greater consideration of supply chain agility and supply chain resilience within 'sustainable supply chain' literature may therefore present one opportunity through which to meld the fracture between 'sustainable' and 'conventional' supply chain research(ers) in a way that accommodates both imperatives for a truly twenty first century 'sustainable supply chain.' Opportunities for the integration of these discourses may be considered ample given the apparent overlap that exists in terms of the enabling and facilitating factors. Facilitating factors such as transparency and accuracy of data and information, collaboration with customers and suppliers, supplier development for diversity, and the lifecycle approach to product design, have been identified in literature concerned with supply chain agility and resilience as well as literature looking at environmental and social responsibility (Lee, 2004; Scholten et al, 2014; Pagell and Wu, 2009). This suggests that there exists fertile ground on which to unite these two 'senses' of sustainability as it is applied to supply chains. Possible areas of further exploration may include the application of resilience principles in the area of stakeholder management (for example reputational resilience) which is a key theme of social/ environmental responsibility literature: can resilience ideas and capabilities be employed to manage the fallout from the sort of reputational disruption experienced by Nike in the 1990s? Likewise, there may be opportunities to explore the ways in which supplier diversity (such as SMEs, minority-owned organisations) may have an impact upon resilience capabilities: evidence from ecological resilience has been applied in economic systems to suggest that diversity enables resilience by ensuring that exogenous changes affect some but not all entities which are producing the same output but by different means (Perrings, 2006).

While some supply chain research has only begun to make connections between resilience and social- / environmental- responsibility (for example, Mari et al (2014) who have explored an optimisation model in recognition of the fact that environmental- responsibility is often difficult to maintain during states of supply chain disruption), outside supply chain literature the relationship has been well-explored (Perrings, 2006; Derissen et al, 2009). In the context of ecological-economic systems, Derissen et al (2009) highlighted the former as a normative concept and the latter as a descriptive concept and showed that there can exist multiple manifestations of the relationship between the two regarding the necessity and/or sufficiency of one sense for the other. In line with the work of Derissen et al (2009) the level of sufficiency and necessity of one 'sense' of sustainability for the other in sustainable supply chain management may represent a fruitful and important area for greater supply chain enquiry.

LIMITATIONS AND FUTURE RESEARCH

The present study consisted of a quantitative data analysis of published articles which contained within their title the phrase, 'sustainable supply chain.' By limiting our sample in this way, the study offered an opportunity to assess the specific use of the term 'sustainability' as it is used in a 'sustainable supply chain' context. In doing so, it highlighted the absence of the more colloquial sense of 'sustainability' as meaning continuity. As with all studies, however, this one is not without some limitations.

The sample searched for the specific phrase 'sustainable supply chain' and therefore excluded articles with titles which included variations on that phrase: for example, 'sustainable supply chains,' 'supply chain sustainability' and 'sustainability and supply chain management.' To have included such articles would have helped to expand coverage and to confirm or challenge the findings within the present sample. Additionally, a purely quantitative content analysis has been conducted meaning the keywords analysed were not systematically explored for their specific contexts - for example, if terms were used as part of the paper's research questions or simply as reference to other authors' work. Future research therefore aims to better understand the specific contexts in which the key words associated with each 'sense' of sustainability were used in order to build a clearer picture. Subsequent research aims to hypothesise the implications of integrating the two 'senses' of sustainability within a supply chain context, with a view to supporting the development of a unified concept of a 'sustainable supply chain' on which future research around its development and management might build.

CONCLUSION

In presenting the findings of a quantitative content analysis of 105 English-language peer-reviewed academic journal articles entitled 'sustainable supply chain' this paper has shown that key words associated with supply chain responsibility are more frequently used than keywords associated with supply chain continuity – namely, resilience, agility, flexibility, adaptability, and robustness. This has been interpreted as suggesting that the emerging research field surrounding the concept of the 'sustainable supply chain' does not adequately address the more colloquial understanding of sustainability as meaning continuity, and thus does not yet explore the development of supply chains which are both responsible *and* agile/resilient. Concern for greater consideration and development of supply chain strategies which enable supply chains to survive within an increasingly turbulent macro-environment highlights an informal concern with a 'sense' of 'sustainability' that must be included within the developing concept of 'sustainable supply chain.' It is proposed that by giving greater and integrative consideration to both 'senses' of sustainability, the concept of the 'sustainable supply chain' will be more robust and will contribute towards the unification and clarification of the term 'sustainability' as it is applied within a supply chain context to the benefit of the advancement of the (sustainable) supply chain field.

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