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# Investigating the transfer of academic perceptions of sustainable supply chains into practice

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## **Abstract**

Sustainability is often discussed in academic literature. Recently, this topic has had an increased representation within the research area of supply chain management. The concepts within this term are sustainability and Supply Chain Management (SCM) – both well defined and researched from multi-disciplinary perspectives. In general there is agreement within the academic world regarding the triple bottom line (Elkington, 1998) of sustainability with some additional but less important characteristics.

In this research a systematic literature review was conducted to get an academic perspective of sustainable supply chain management. To compare this against the industrial perspective, an explorative questionnaire was deployed to supply chain managers and sustainability managers in the UK. The most important findings are perception gaps regarding the characteristics of SSCM as determined from an academic perspective and the status of implementation in practice along with perceptions regarding the triple bottom line. Further a discrepancy was found in the perspectives of supply chain managers and sustainability managers who were surveyed.

**Keywords:** Sustainable Supply Chain Management, Triple bottom line

## **Introduction**

In recent times, sustainability as a concept has permeated into supply chain thinking. As legislation around green and ethical practices grows it has become important for global supply chains to consider this concept. Sustainable supply chains as a concept has gathered attention within academia with a number of frameworks and models spelling out how it should be implemented. However, not all seems to be achievable at an industrial level. Hence, to understand the transfer of the Sustainable Supply Chain Management (SSCM) philosophy from academia to practice, three steps are necessary: (1) draw a big picture

what academics generally understand under the term SSCM, (2) gather information from potential adopters what they understand/apply and (3) collate the two perspectives and conclude the findings.

Sustainability is undeniable linked to the Triple Bottom Line (TBL) theory which appeared in the literature as early as 1987 in *The Green Capitalists* written by John Elkington and Tom Burke who were the directors of a think-tank named *SustainAbility* (Elkington & Burke, 1987). In later publications Elkington (1998) particularly used the established expression “Bottom Line” to develop his model which builds on the classic bottom line concept as used in the financial sector for evaluating a company’s monetary success or failure. To find out how this philosophy has evolved within academic circles and transferred to supply chain practice the literature about SSCM was assessed systematically as described in the following sections. The two guiding research questions were:

**RQ1.** Is the perception of ‘sustainability’ the same within academia and industry? Or, are both following different norms?

**RQ2.** To what extent has sustainability criteria as defined by academic literature, transferred into industrial operations and particularly into supply chains?

## **Methodology**

In order to guarantee a high reliability a systematic literature review process was obtained. The literature used for determining the usage of the term ‘Sustainable Supply Chain’ (Management) was derived from Google Scholar as well as from a Metalib search engine which browses through some of the biggest academic databases. After the elimination of duplicates the total search results for academic papers containing the words “*sustainable*”, “*supply*” and “*chain*” in their title amounted to 200 documents (149 available). Amongst the documents were PhD and Master theses, academic journal articles and conference papers.

The systematically derived literature was analysed in NVivo with the objective of finding the characteristics of SSCM as is understood by academics. This approach is analogous to the qualitative study for developing a definition of Supply Chain Management from Stock & Boyer (2009).

In the second step a survey was deployed to find out to what extent have sustainability managers and supply chain managers in the UK implemented SSCM characteristics as derived from the academic literature. The survey questionnaire was sent to respondents who were in the roles of ‘supply chain manager’ and ‘sustainability manager’. The questionnaire was created using an online service and the link to the questionnaire was sent to a data base of contacts who had been contacted for this study.

## **Literature Analysis of the academic perspective**

The 149 publications that were derived from the search were further studied. 72 of the 149 available articles and theses deliver a perspective, perception or understanding of the respective authors about sustainability in supply chains. Only these documents actually contribute to the academic understanding of SSCM. The text passages which were identified to depict the authors opinion where collected (“*copy & paste*”) and analysed further.

The documents under consideration were analysed according to the systematic literature research approach as recommended by Tranfield et al. (2003). The authors suggest analysing beforehand the systematic determined search results to find out whether a pattern

in the occurrence of the authors, the spread of the publication release dates (“*age profile*”) or anything else can be categorized. The analysis of the bibliographical data revealed a sharp increase of publications since 2005. Further the exploration of the author’s data concluded that 26 key authors contributed to 98 of the articles.

With the textmining function of NVivo the beforehand systematically chosen and hence valid sample of documents are explored for a first insight. The overview of which words were used mostly in the previously selected authors perceptions, gave an initial hint about what topics are mostly addressed. Words which were present in different grammatical forms were consolidated (“stemming”). The top 6 results of the textmining analysis can be found in Table 1. The results show that there is increased focus regarding environmental issues and Corporate Social Responsibility (CSR) than of issues dealing with economic sustainability- economic bottom line of a Supply Chain (SC). It is also clear that between the two first mentioned pillars of Elkington’s Triple Bottom Line (TBL) the environmental bottom line seems to attract more attention. Carter et al. (2011) notice the same phenomenon and ascribe this to media focus as well as raising energy prices for the emphasis on the environmental bottom line.

*Table 1: Word frequency in the chosen citations of the analyzed documents*

| <b>Word</b>   | <b>Count</b> | <b>Similar Words</b>   |
|---------------|--------------|--|
| sustaining    | 637          | sustain, sustainability, sustainability’, sustainable, sustainable’, sustained, sustaining |
| supply        | 538          | supply, 'supply  |
| chain'        | 531          | chain, chain', chain’, chains  |
| managers      | 278          | manage, managed, management, management’, manager, managers, managing                      |
| environmental | 262          | environmental, environmental’, environmentally   |
| social        | 256          | social, socially   |
| economics     | 206          | economic, economical, economically, economics  |

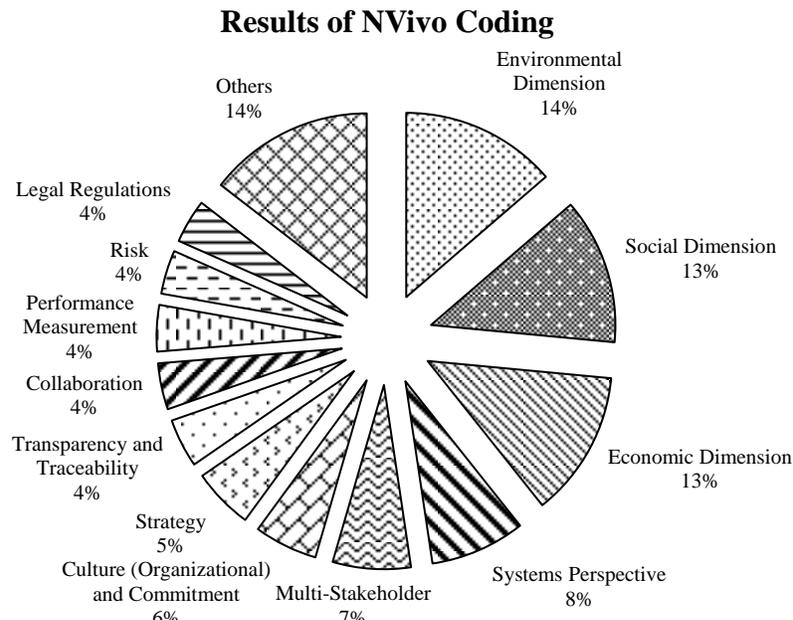
*Issues addressed by the authors*

In order to get the “perspective” of the academic authors, the text passages containing their idea about SSCM were scanned for characteristics the author(s) associate with sustainable supply chains. This exploration was done by deploying NVivo for coding and analysis. The coding scheme was developed after analysing the coding deployed by other authors in the field of SSCM (Carter & Easton, 2011, p. 52) (Pagell & Wu, 2009, p. 45) and grew throughout the exploration.

After analysing all sources which indicated to have a definition for SSCM, the overview in Figure 1 was developed. The numbers in Figure 1 indicate is that there is a consensus in the academic world on the triple bottom line. Sustainability in supply chains is understood as an integration of an environmental and social perspective to the traditional focus on financial advantage. The literature further showed that there is currently a higher focus on ecological issues as compared to social and economic sustainability (Morali, et al., 2010, p. 5). This finding is in compliance with Seuring & Müller (2008, p. 1706) who suggest that “*[s]ustainable development is often reduced to environmental improvements*”.

The keyword systems perspective was always coded when an author underscored that the supply- or value chain should be considered as a whole. It also includes the authors’

ideas about reverse supply chains, closed loop supply chains, cradle-to-grave and cradle-to-cradle approaches. The **systems thinking approach** is considered to help practitioners to identify gaps in their supply chain where sustainability initiatives would be appropriate (Fitzgerald, et al., 2007, p. 31). Further Haskins (2006, p. 10) recommends the systems dynamics modelling technique (inter alia) as a tool to determine a sustainability strategy. Aarabi et al. (2011, p. 305) suggest to consider the stages *Pre-Manufacturing*, *Manufacturing*, *Using* and *Post-Using* in order to get a holistic view of a product, and it's respective supply chain's, sustainability. Carter notice that there is a certain focus on sustainability in the industry, however most initiatives are rather *standalone* than holistic and it is time to fit these standalone pieces together to a puzzle for achieving holistic effects (Carter & Easton, 2011, p. 47).



*Figure 1: Overview of SSCM characteristics*

Particularly the newer articles and theses suggest that the **involvement of stakeholders** around the supply network is considered to play an important role on the route to a SSC. The integration of stakeholders is mentioned in social, socio-economic and environmental context. This includes community involvement of supply chain entities ( (Al-Odeh & Smallwood, 2012, p. 86), (Bai, 2011, p. 17), (Behnassi, 2008, p. 5), (Büyüközkan & Cifci, 2010, p. 2), (Chaabane, 2011, p. 109), (Dontenwill & Crespín-Mazet, 2010, p. 2), (Keating, et al., 2008, p. 177), (Mann, et al., 2010, p. 57), (Metta, 2011, p. 107)), preservation of workplaces in a specific region ( (Font, et al., 2008, p. 13), (Gopalakrishnan, et al., 2012, p. 3), (Metselaar, 2010, p. 41), (Thiengburanathum, et al., 2006, p. 155)), or environmental influences affecting some stakeholders through processes along the supply chain ( (Kundu, 2010, p. 39), (Mefford, 2011, p. 109), (Metselaar, 2010, p. 10), (Pagell & Wu, 2009, p. 39), (Vermeulen & Seuring, 2009, p. 269)). Some of the other factors are:

**Organisational culture:** Many academics are convinced that the mentality of an organization is an essential factor to achieve sustainability along the focal company's supply network. A certain culture radiating from the associates up to personal commitment in the middle management seem to be an enabler and a necessary precondition for a successful

implementation of the SSCM philosophy (Kuik, et al., 2011, p. 995). Carter & Rogers highlight that companies which are active in setting up their sustainability above average, usually show this commitment in their organizational culture and with “*core values and culture and a sense of purpose beyond the economic bottom line*” (Carter & Rogers, 2008, p. 368). This presumption is underlined by Govindasamy (2010) who identified organizational culture as a driver for sustainability in corporations (Govindasamy, 2010, p. 24). The organizational culture has even proven to influence an organizations strategy (Shrivastava, 1993). In general several authors consider SSCM to be a strategic tool with growing importance ( (Carter & Rogers, 2008, p. 368), (Hussain, 2011, p. 36), (Liu & Srari, 2011, p. 2), (Mann, et al., 2010, p. 53), (Pagell & Wu, 2009, p. 51), (Wittstruck & Teuteberg, 2010, p. 143)).

**Transparency and traceability:** Transparency and traceability is a common aspect considered widely in the field of conventional SCM under the key-issue information exchange/flow along supply chains (Barratt, 2004, p. 36). Particularly the most frequent quoted definition of SSCM emphasizes the importance of transparency in order to become sustainable along the supply chain:

*“SSCM [...] [is] the strategic, transparent integration and achievement of an organization’s social, environmental, and economic goals in the systemic coordination of key interorganizational business processes for improving the long-term economic performance of the individual company and its supply chains.” (Carter & Rogers, 2008, p. 368)*

The proposition of transparency as an important facet of SSCM is supported by other influential academics in the field ( (Seuring & Müller, 2008, p. 459) (Pagell & Wu, 2009, p. 52) (Vachon & Klassen, 2006, p. 797)). For sustainability initiatives to be holistically effective, the collaboration along the supply chain is essential ( (Li & Lehmann, 2011, p. 3) (Lopez Mantilla, 2011, p. 83) (Metta & Badurdeen, 2011, p. 438) (Ravet, 2011, p. 56) (Tsoi, 2005, p. 176)). Teuscher et al. (2006, p. 2) suggests that a solid buyer-supplier partnership improves the before mentioned traceability and therefore the sustainability in the supply chain.

**Risk management** is considered to be a part of a sustainable supply chain. Examples for risks are given in the literature, e.g. contingency planning risk (Carter & Easton, 2011, p. 49), the volatile pricing of energy and product liabilities (Hussain, 2011, p. 10), difficulties due to the geographic location of the source (Lee, et al., 2007, p. 392), long-term risk triggered by resource depletion (Shrivastava, 1995, p. 955). Walker et al. suggest proactivity in SSCM in order to prevent risk concerning the reputation of the focal company or environmental risks (Walker & Jones, 2012, p. 5).

**Performance Measures and Legal standards:** A difficult and yet to be developed part of SSCM is the measurement of the triple bottom line performance (Carter & Rogers, 2008, p. 377). Little is known which factors are to be measured and which standard is to be followed, however the importance of the quantification of is emphasized by different academics (Linton, et al., 2007, p. 1080).

**Legal regulations** are addressed by different authors. It seems to be a way to influence the adoption of the SSCM philosophy in practice without compromise. Together with standards (addressed in particular in the next paragraph) respective laws regarding environmental, social and business behavior are considered to be a foundation for the implementation of SSCM (Wittstruck & Teuteberg, 2011, p. 332). The transition of SSCM from developed countries to development countries, which are often part of global supply chains, could be

supported by legal frameworks which include a holistic view over the SC and therefore force the focal company to push the sustainability approach through until the source of its supplier network (Wagner & Svensson, 2010, p. 183). Other academics understand legal regulations as an inherent part of the definition and driver of SSCM (Tsoi, 2005, p. 176), (Ratan, et al., 2010, p. 3), (Mann, et al., 2010, p. 53), (Fornasiero, et al., 2011, p. 1), (D'Souza, et al., 2011, p. 313).

Currently there is no particular sustainability standard available. However for greenhouse gas (GHG) emissions, life-cycle assessment or environmental management systems (EMS) – which are all part of a sustainable supply chain – different standards are available. Respective to the aforementioned examples the GHG protocol, the ISO 14040/14044 and the ISO 14001 are some standards, just to name a few. The academics in the field of SSCM consider the implementation of standards, such as the ISO 14000 series, as a crucial part of become sustainable as a supply chain (Carter & Easton, 2011, p. 49). In particular the choice of suppliers depends strongly on their compliance to environmental and social standards, in order to reduce the risk they could spread onto the focal company (Seuring & Müller, 2008, p. 1706). A standard which considers sustainability in its entirety is currently not prevalent, even though there are attempts and drafts available (Chaabane, 2011, p. 7), (Kuik, et al., 2010, p. 4).

**Life-cycle assessment** is addressed by some academics in their definitions about sustainable supply chain management. Above all it is the environmental bottom line which is tackled with this powerful tool (Dehghanian & Mansour, 2008, p. 1063). Other authors highlight the importance of the holistic thinking when SSCM is discussed – this can be emphasized by pointing out the life-cycle thinking and hence the boundaries of the system under consideration (cradle-to-grave/cradle-to-cradle) (Hussain, 2011, p. 10), (Fornasiero, et al., 2011, p. 1), (Metta, 2011, p. 2), (Seuring & Müller, 2008, p. 1703).

**Environmental management systems and the respective IT infrastructure:** Enterprise Management Systems can be seen as a tool between transparency and the environmental bottom line. The necessity of environmental management systems and adequate IT periphery is frequently highlighted in the academic literature (Wittstruck & Teuteberg, 2011, p. 2), (D'Souza, et al., 2011, p. 320), (Teuteberg & Wittstruck, 2010, p. 1003).

### **Practitioners Perspective:**

To find out to what extent the academics perspective of SSCM is transferred to the practice, an explorative questionnaire for experience practitioners was deployed. This first foray was to get an initial feeling for how well the concept of SSCM is already known in practice, and where the biggest issues are. The sampling followed the approach of *judgment sampling*, also known as *snowballing*. This sampling method is used in exploratory work and preliminary investigations (Oppenheim, 1992, p. 43). In this particular case, practitioners from the (1) UK with (2) professional experience in either SCM or Sustainability were chosen and contacted via email. The email contained a short description about the project and an invitation to the online questionnaire. 125 invitations were send which resulted in 38 filled out questionnaires. This is equivalent to a 30,4% response rate which is acceptable.

### **Discussion**

The analysis of the data grouped the participants into three clusters:

- (1) SCM Professionals- All participants responsible for procurement, supplier management or with supply chain management responsibilities in their occupation. (23.7%)
- (2) Sustainability Professionals- All participants who deal on a professional basis with any kind of sustainability issue. This included “green consultants” as well as SSCM professionals. (68.4%)
- (3) Other- All respondents whose occupation was unclear due to a lack of information. It was found that (7.9%)

The analysis of the data obtained through the online survey, significantly ( $P < 0.05$ ) supported that SCM professionals were less familiar (50%) with the TBL approach ( $1.50 \pm 0.54$ ) whereas almost all sustainability managers are acquainted with the concept. After a brief description of the TBL concept the participants were asked to reflect, using a likert-scale, which aspect of the TBL was implemented. The answers to this question showed a higher degree of implementation for the economic bottom line as compared to the environmental of social bottom line (Means respective 3.66, 3.32 and 3.00). In a further question the practitioners ranked each triple bottom line according to their priority in the supply chain. The ranking of the triple bottom line items from the practitioners to the academics (derived from the NVivo coding) differs significantly as the results from the Mann-Whitney U test in *Table 2* suggest. The data show a significant difference in the ranking of the Social Bottom Line and the Economic Bottom line between the practitioners and the academics. The median ranking of the Social Bottom line was 3 from the practitioners, as compared to a median of 1 from the academics. The practitioners’ median rank for the economic prosperity was 1 opposed to a median rank of 2 from the academics. The median of the Environmental Bottom Line was in equilibrium between academics and practitioners, which is supported by the Mann-Whitney U test.

**Test Statistics<sup>a</sup>**

|                       | Env_Rank_corr | Soc_Rank_corr | Eco_Rank_corr |
|-----------------------|---------------|---------------|---------------|
| Mann-Whitney U        | 398,000       | 214,000       | 255,500       |
| Wilcoxon W            | 776,000       | 917,000       | 633,500       |
| Z                     | -1,510        | -4,149        | -3,581        |
| Exact Sig. (2-tailed) | ,146          | ,000          | ,000          |
| Point Probability     | ,010          | ,000          | ,000          |

a. Grouping Variable: Academic or Practitioner

*Table 2: Non-parametric test for independent samples*

The mean values of the rankings support the hypothesis that academics tend to rank the social dimension of the triple bottom line higher (avg. rank  $1.60 \pm 0.83$ ) whereas practitioners rank the importance of this dimension rather low (avg. rank  $2.52 \pm 0.64$ ). A similar situation is found for the ranking of the importance of the economic prosperity. Whereas the academics rank the economic dimension on an average rank of  $2.05 \pm 0.74$  the practitioners set the importance of economic prosperity significantly higher on an average of  $1.37 \pm 0.74$ .

The supply chain managers found changes to trigger sustainability in the supply chain

rather little integrated in their company's strategy, whereas the sustainability managers found sustainability to be pretty well integrated into their company's strategy.

### **Conclusion and future directions**

The analysis of the academic papers revealed the most important characteristics in the field of sustainable supply chain management. It emphasized once again that economic sustainability, represented as the economic dimension or economic bottom line, is detached from the common sustainability discussion (cf. (Carter & Easton, 2011)). The exploratory questionnaire exposed a difference in the perception of implemented sustainability characteristics in companies, between supply chain managers and sustainability managers. This disagreement derives from the different understanding of sustainability as considered whether the respondents were familiar with the concept of the triple bottom line or not. There was a gap in perception regarding the importance of TBL factors between academia and industry. This led to three findings which need to be studied further:

**F1:** Academic literature gives more importance to social dimensions than environmental and economic.

**F2:** Industry gives more importance to economic dimensions than environmental and social.

**F3:** Environmental dimension has equal importance between academia and industry.

In future research, the implementation of SSCM models from academia to industry shall be further explored.

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