

## SPECIFICATION OF LOGISTIC CHAIN SUSTAINABILITY: ENVIRONMENTAL, SOCIAL AND ECONOMIC ISSUES

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### ABSTRACT:

This paper is based on the analysis of ninety-six articles published over twenty-one years, between 1991 and 2012 concerning integration of sustainable development objectives into supply chain management. Disciplinary and geographical origin of authors shows a growing interest in the integration of sustainable development in supply chain management for scientific world, but maturity of this subject remains limited and the most of these studies still exploratory. A more in-depth study of these works therefore seems relevant. Analysis of these works highlights several economic, environmental and social concepts which concern the diffusion of sustainable development in daily activities of supply chain like financial performance, productivity, environmental management systems and Human rights. This work will look at the main sustainable development issues which characterize global performance (integration of economic, environmental and social performances) of supply chain and impact of sustainable practices on performances of this chain, as they appear in studied articles.

### 1. INTRODUCTION

Financial dimension has long been the single determinant of supply chain performance. This performance was based on the achievement of profitability requested by the shareholders to perpetuate supply chain and its profit. Now, and for decades, supply chain performance has shifted from financial representation to more holistic approaches, including environmental and social dimensions. Currently, sustainability of supply chain no longer depends only on the financial aspect of their activities, but also on the way in which it is managed. Supply chains responsibility is widening to include other stakeholders (trade unions, NGOs, ...). Thus, and in these circumstances, there appears the notion of "global performance". To evaluate impacts of their supply chains on economic, environmental and social issues and to analyse how these impacts interact with each other, companies are obliged to develop appropriate approaches to sustainable development.

Traditional performance measurement issues, such as costs, are not enough for supply chains to have a clear view of environmental and social consequences of their management practices. In addition, assessing created value and progress made through sustainable development approach is an extremely delicate question. Challenge for supply chains is to be able to appreciate these created value and progress by measuring sustainable performances.

Most of currently available approaches are based on environmental dimension of sustainable development, in particular reverse logistics issues, while impacts of supply chains management practices are very numerous and extremely complex, integrating the three dimensions of sustainable development (economic, environmental and social) (Haddach et al., 2017). Thus, the question can be formulated as follows: How can we characterize supply chain global performance?

### 2. GLOBAL PERFORMANCE APPROACH

Financial performance is no longer enough to reflect global performance of supply chain. During the 20th century, performance widened to consider company social/societal responsibility vis-a-vis its stakeholders. Global performance is

emerging in Europe with the emergence of sustainable development, but its origins lie in older concepts such as societal responsibility (a concept first appeared in United States and then in Europe).

If American vision of social responsibility is limited to philanthropic actions unrelated to company economic activities, European approach tends to consider that philanthropic actions do not fall within the scope of CSR (Corporate Social Responsibility) and actions that fall under it are assessed in relation to usual activities of company (Capron and Quairel-Lanoizelee, 2007). In Europe, company job and actions under societal responsibility constitute the same set. European Commission defines precisely the European approach to CSR: "CSR is a concept that refers to voluntary integration by companies of social and environmental concerns into their business activities and their relations with their stakeholders" (COM, 2001, p.8). This Commission describes companies as socially responsible if they go beyond the minimum legal requirements and obligations imposed by collective agreements to meet societal needs. CSR allows companies of all sizes to contribute to reconciling economic, social and environmental ambitions in cooperation with their partners (COM, 2006).

European approach to CSR makes sustainable development notion more operational for companies. If sustainable development, a macroeconomic concept, challenges companies in their goals, in the design of their organizations, by providing them with the principles which determine their economic activities, societal responsibility is the way companies respond to societal challenges at the microeconomic level (Capron and Quairel-Lanoizelee, 2007).

Sustainable development principle is based on the balance of its three dimensions to prevent the pursuit of one objective to the detriment of the other two. It is in this context that the notion of global performance has emerged.

Important contributions in this area date back, in 1997, to the working group of the Commissariat General of the Plan (Capron and Quairel-Lanoizelee, 2005, p.64), in which global performance is defined "as a multidimensional aim (or goal), economic, social and societal, financial and environmental, which concerns both companies and human societies, both employees and citizens ". In the current

managerial literature, "global performance is mobilized to evaluate implementation by companies of sustainable development concept" (Capron and Quairel-Lanoizelee, 2005). This global performance of companies is defined as "the aggregation of economic, social and environmental performances"(Baret, 2006, p.2); (Reynaud, 2003, p.10) or is formed "by the meeting of financial, social and societal performances" (Germain and Trébucq, 2004).

Global performance of companies refers to "a holistic conception seeking to designate a performances integration in a synthetic approach ... this integration can imply a coherence between the three dimensions with causality models linking different factors from different dimensions" (Capron and Quairel-Lanoizelee, 2005, p.7). Thus, "evaluation systems currently used by companies do not allow a balanced integration of traditional economic and financial dimensions to environmental and social dimensions and to cover a wider scope of impacts" (Capron and Quairel-Lanoizelee, 2005).

### 3. LITERATURE ANALYSIS

Considering sustainable development in supply chain management, being new, we analyzed ninety-six contributions to

provide a comprehensive analysis framework. Different contributions are classified according to the three dimensions of sustainable development (Table 1). Based on the classification, we identify global performance issues most studied in literature as well as measurement methods and indicators most commonly used to integrate global performance in supply chain management. So:

1. Many diverse sustainable issues are presented in scientific literature;
2. Economic and environmental dimensions are more represented than social dimension;
3. There is little interest in social dimension;
4. A low number of contributions and standards encompass the three dimensions simultaneously;
5. Total number of issues per contribution is between one and thirty-two. Indeed, we find that there is a very wide range according to contributions;
6. Number of issues per dimension is between one and thirteen for economic dimension, between one and twenty-two for environmental dimension and between one and fourteen for social dimension.

Reference	Economic issues	Environmental issues	Social issues	Total issues
Azzone et al., 1991	5			5
Lynch and Cross, 1991	10			10
Fitzgerald et al., 1992	6			6
Bradley 1996	4			4
Noci, 1997	3	6		9
Ranganathan, 1998		4	4	8
Giannikos, 1998	1	2		3
Carter and Ellram, 1998		1		1
Nema and Gupta, 1999	1	1		2
Halberg, 1999		6		6
Azapagic and Perdan 2000	1	17	14	32
Jash, 2000		19		19
Lamberton, 2000		6		6
Luo et al., 2001	2	2		4
Gunasekaran et al., 2001	4			4
Jung et al., 2001		5	3	8
Olsthoorn et al., 2001	2	3		5
Veleva and Ellenbecker, 2001		3	3	6
Carter and Jennings, 2002			4	4
Warhurst, 2002		4		4
Krikke and al., 2003	1	2		3
Barbiroli and Raggi, 2003	3	9		12
Krajnc and Glavic, 2003	2	7	2	11
Färe et al., 2004		4		4
Khan et al., 2004	3	12	4	19
C. M. Tam et al., 2004		11		11
Zhu et Sarkis, 2004	3	7		10
Dotoli et al., 2005	4	2		6
Hugo et al., 2005	1	1		2
Hugo and Pistikopoulos, 2005	1	4	1	6
Gauthier, 2005		6	3	9

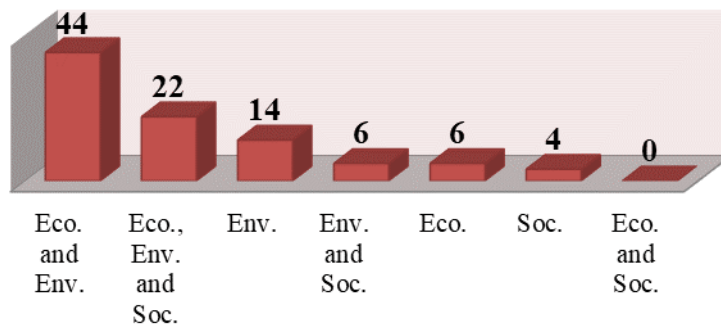
**Table 1 (1)** . Literature classification according to sustainable development issues

Reference	Economic issues	Environmental issues	Social issues	Total issues
Jung et al., 2001		5	3	8
Olsthoorn et al., 2001	2	3		5
Labuschagne et al., 2005	4	4	4	12
Krajnc and Glavic, 2005a	4	22	3	29
Krajnc and Glavic, 2005b	5	7	2	14
Dotoli et al., 2006	2	2		4
Nagurney et al., 2006	1	1		2
Darnall et al., 2006		8		8
Kainuma and Tawara, 2006	3	4	1	8
Maxime et al., 2006		5		5
Michelsen et al., 2006		9		9
Rao et al., 2006		5	1	6
Ferreti et al., 2007	1	1		2
Hermann et al., 2007		5		5
Matos and J. Hall, 2007	13	6	7	26
Zhu et al., 2007a	8	5		13
Zhu et al., 2007b	8	5		13
Pati et al., 2008	2	2		4
Pourmohammadi et al., 2008	1	2		3
Quariguasi Frota Neto et al., 2008	1	3		4
Castka and Balzarova, 2008			7	7
Henri and Journeault, 2008		12		12
Herva et al., 2008		6		6
Hutchins and Sutherland, 2008			4	4
O'Connor and Spangenberg, 2008	3	4	6	13
Vachon and Klassen, 2008	8			8
Bojarski et al., 2009	1	4	1	6
Guillén Gosálbez and Grossman, 2009	1	4	1	6
Mele et al., 2009	1	1		2
de Benedetto and Klemes, 2009		5	1	6
Nawrocka and Parker, 2009		7		7
Santos and Gonçalves, 2009	1	2		3
Tseng et al., 2009	1	2	3	6
Nagurney and Nagurney, 2010	1	1		2
Bouzemrak et al., 2010	1	1		2
Fonseca et al., 2010	1	1		2
Guillén Gosálbez and Grossman, 2010	1	4	1	6
Subramanian et al., 2010	1	2		3
Corsano et al., 2011	1	2		3
Pinto-Varela et al., 2011	1	3	1	5
Pozo et al., 2012	1	4	1	6
Wang et al., 2011	1	1		2
You et al., 2011	1	1	1	3
You and Wang, 2011	1	1		2
Chaabane et al., 2011a	1	1		2
Chaabane et al., 2011b	1	1		2
Abdallah et al., 2012	1	4	1	6
Achillas et al., 2012	1	2		3
Akgul et al., 2012	1	1		2
Bostel et al., 2012	1	1		2
Chaabane et al., 2012	1	1		2
Elhedhli and Merrick, 2012	1	1		2
Eskandarpour et al., 2012	2	2		4
Giarola et al., 2012	1	1		2
Jamshidi et al., 2012	1	1		2
Mallidis et al., 2012	1	2		3

**Table 1 (2)** . Literature classification according to sustainable development issues.

Reference	Economic issues	Environmental issues	Social issues	Total issues
Paksoy et al., 2012	1	2		3
Pérez-Fortes et al., 2012	1	4	2	7
Pishvae et Razmi, 2012	1	2	1	4
Sabio et al., 2012	1	4	1	6
Shaw et al., 2012	3	1		4
Shiue and Lin, 2012	1	1		2
Tekiner-Mogulkoc et al., 2012	1	2		3
Pishvae et al., 2012	1	1	2	4
Amin and Zhang, 2012a	1	2		3
Amin and Zhang, 2012b	3	2		5

**Table 1 (3)** . Literature classification according to sustainable development issues.



**Fig. 1.** Literature contributions by sustainable development dimensions in the ninety-six analyzed articles

Our analysis of these ninety-six contributions in relation to sustainable development in supply chains highlights fourteen main issues to comprehensively characterize sustainable performances of supply chain:

Economic issues	Environmental issues	Social issues
1. Reliability		1. Labor rights
2. Reactivity	1. Environment management	2. Work conditions
3. Flexibility	2. Resources use	3. Health and security
4. Quality	3. Pollution	4. Social commitment
5. Financial performance	4. Hazardous Materials	5. Consumers

**Table 2 .** Main issues which characterize supply chain global performance

## 4. CONCLUSION

Integrating sustainable development principles in supply chain management is, however, a difficult responsibility. Indeed, many companies have very little knowledge and tools in this area, and consulting firms are often disarmed against demands of companies which want to engage in a CSR approach. On research side, although several works have appeared in the literature in recent years, so far there are very few contributions that have addressed sustainable development with a truly integrated vision, taking into account the three dimensions of this latter: economic, environmental and social.

In addition to economic issues, supply chain must consider sustainability issues in design, supply, production, storage, distribution, return flow management, ... this is known as global

performance, including economic, environmental and social performances. It is therefore necessary to evaluate this performance qualitatively and quantitatively.

Global performance is a multidimensional concept difficult to measure technically. In fact, evaluation mechanisms currently used by companies to measure progress made through their CSR initiatives do not provide satisfactory answers. Now, challenge for companies is to measure interactions between different global performance dimensions (economic, environmental and social).

Indeed, this literature review confirms the importance of sustainable development applied in supply chain management and highlights fourteen sustainable issues which can characterize supply chain global performance.

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