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**Effectiveness of Operations sustainability strategies:  
the role of organizational practices**

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## **Abstract**

Eleven cases in the food industry highlight the relevant and differentiated role of bottom-up (training, involvement, bi-directional communications) and top-down (cross-functional teams, top management commitment, incentives) organizational practices in the definition and implementation of effective operations sustainability strategies and in the optimization of trade-offs between environmental, social and economical performance.

**Keywords:** Operational sustainability strategies, organizational practices, sustainability trade-off

## **1. Introduction**

Sustainability is increasingly an essential element of companies' strategies. However, the way Operations strategies embracing economical, environmental and social sustainability as a whole are defined and implemented is still an open issue. In OM literature, sustainability has been analysed especially in relation to environmental issues. Instead now authors suggest that there is the need to develop broader sustainability strategies considering environmental, social and economical issues at the same time (Bettley and Burnley, 2008; Kleindorfer et al., 2005; Burke and Gaughran, 2007). Companies aiming at sustainability are facing problems in pursuing effective results (Mohrman and Worley, 2010). This is due to the fact that sustainability issues are complex and interrelated. The literature shows that sustainability dimensions are often characterized by trade-offs (e.g. Sutcliffe et al., 2009) or synergies (e.g. Kitazawa and Sarkis, 2000). In the deployment process of sustainability strategies, advanced organizational practices related to lean or Total

Quality Management paradigms (e.g. employee involvement, teamwork, training) can be relevant. They might play a crucial role in integrating and developing sustainability strategies (Fenwick, 2007). These practices in fact can positively impact the effectiveness of sustainability improvement programs definition (Schroeder and Robinson, 2010) and implementation (Daily and Huang, 2001), also thanks to the fact that these practices help diffusing greater awareness about all sustainability dimensions (Mohrman and Worley, 2010). Despite these general beliefs, empirical contribution considering the role of advanced organizational practices in the deployment process of sustainability strategies is still lacking.

For these reasons, the aim of this research is to study how sustainability strategies can be translated in the Operations thanks to advanced organizational practices (e.g. employee involvement, training, teamwork). Eleven explanatory case studies in the food industry have been conducted to answer this question.

The rest of the paper is organized as follow. The research background is described defining the main elements of sustainability strategies deployment process and the related problems and introducing the role of organizational practices. Second the research questions are introduced and details of the research methodology are provided. Next results from case studies are discussed and conclusions are illustrated.

## **2. Literature review**

### ***2.1 Sustainability strategies in OM***

Sustainability is becoming a new priority characterizing a new area in which companies compete (Porter and Kramer, 2006; Accenture, 2010). Given the impact of operations on a companies' profit, the environment and people, sustainability has

become a priority also at the operational level (Jimenez and Lorente, 2001; Accenture, 2010). Sustainability strategies that embrace all sustainability dimensions and not only environmental issues are required (Bettley and Burnley, 2008; Kleindorfer et al., 2005; Burke and Gaughran, 2007).

Anyway, existing models in OM literature studying sustainability primarily focus on the environmental dimension. Until now social sustainability has been rather neglected, even if different authors suggest the increasing relevance of this perspective and the need of a broader set of sustainability issues (Bettley and Burnley, 2008; Vachon and Mao, 2008; Docherty et al., 2009). Now it is time to regard work systems as consisting of many different types of resources – social, economic, and ecological – and balance the development of them all (Docherty et al., 2009).

However how to develop sustainability strategies in operations is still unclear (BCG&MIT, 2009). It is its complexity and interconnectedness that makes sustainability such an important and daunting challenge for organizations. Developing operations strategies regarding all sustainability dimensions together means facing the trade-offs issue. Some authors suggested that economical, environmental and social sustainability might be in trade-off, due for example to high investments required by such initiatives (Wu and Pagell, 2010). On the other hand, some authors suggest synergies among sustainability dimensions. For example adopting environmental strategies can positive impact on quality and waste reduction (Kitazawa and Sarkis 2000); or social sustainability strategies might allow to achieve cost savings from lower absenteeism and fewer industrial accidents (Margolis and Walsh, 2003).

In order to pursue sustainability operations priorities, companies often identify specific improvement programs (Kleindorfer et al., 2005; Angell and Klassen, 1999; Sarkis, 2001) instead of an overall plan considering possible trade-offs and synergies.

So far, OM literature has been more focused in identifying programs to increase environmental performance disregarding the impact of these programs on the other dimensions of sustainability or the identification of programs to develop social sustainability. Besides, achieving sustainability does not mean just introducing program to address process efficiency from a carbon footprint perspective, or implementing isolated initiatives such as recycling programs, developing codes of conduct for suppliers, changing packaging to reduce plastic content, or establishing philanthropic foundations to sponsor socially active charities. Any single firm transformation to sustainability will be characterized by many such initiatives and projects to change its operations and impacts (Mohrman and Worley, 2010).

Even companies that are more committed to sustainability often fail in developing such strategy (Mohrman and Worley, 2010). In order to identify why these attempts are often ineffective, an interesting and rather neglected perspective is to study operations sustainability strategies from the point of view of the deployment process (Sarkis et al., 2010). Strategy deployment consists in the process through which the strategy's content is defined, that is, which are the competitive priorities to focus on and the improvement programs needed to achieve them.

To manage this deployment process effectively the company needs to develop the right capabilities. The process to deploy operations sustainability strategies is rather unknown and sustainability, as a broader issue regarding all sustainability dimensions – environmental, social and economical, is quite new at the operations level for companies worldwide (Mohrman and Worley, 2010).

## ***2.2 The role of organizational practices***

Two main approaches to the deployment of manufacturing strategies have been suggested by the literature. From one point of view, a top down approach, where manufacturing role is seen as functional to, and dependent on, the strategic decisions at business and corporate level has been proposed (Skinner, 1978; and Wheelwright, 1984). On the other side, Miller and Hayslip (1989) introduce the possibility for manufacturing not only to satisfy from a top-down perspective the strategic needs of the company, but also to develop autonomous ability to build competitive advantage in a proactive way (Hayes and Wheelwright, 1984; Ferdows and De Meyer, 1990; Hayes and Pisano, 1994). In both approaches, the role of organizational practices in aligning strategies to company needs and to build the competitive capabilities, is fundamental.

The effect of organizational practices on OM is also demonstrated by the introduction of new production paradigms, such as Just-in-Time (JIT), Lean Production, Total Quality Management (TQM), Continuous Improvement or Toyota Production System, since they all imply a change in organizational practices. Some examples are: job enlargement (Landsbergis et al., 1996; de Treville and Antonakis, 2006), development of problem solving capabilities (Landsbergis et al., 1996), reduction of hierarchical levels (Gunn, 1987; Hayes et al., 1988; Åhlström and Karlsson, 2000), and multifunctional team (Karlsson & Åhlström, 1995). Moreover, these practices have been highlighted to contribute to the successful deployment and implementation of manufacturing strategies (Kinnie and Staughton, 1991).

Following this line of reasoning, there is the need to understand how advanced organizational practices are linked to sustainability strategy deployment and implementation in operations. Conceptual contributions suggest that organic

organizational model characterized by flatter hierarchies, employee empowerment and involvement, training, and knowledge development foster organizational learning and provide an effective context to develop sustainability strategies (Mohrman and Worley, 2010; Bettley and Burnley, 2008; Wilkinson et al., 2001). The main arguments put forward by these authors to support their contention are that these practices are fundamental to build and integrate resources and systems to fully achieve sustainability (Russo and Fouts, 1997).

More in details, some authors conceptually suggest the role of such practices as enablers of the implementation of environmental sustainability strategies. Angell and Klassen (1999) suggest that it can be interesting to investigate human resource policies because they play an important role in awareness, implementation and deployment of environmental initiatives. Moreover, Daily and Huang (2001) highlight which human resource factors are key elements of the implementation process of environmental management system. The practices identified are empowerment, training, autonomy, decision making, employee involvement, rewards and teamwork. They allow to change people culture and to involve employees in the improvement of environmental performance.

Sarkis et al. (2005) focus the attention on the role of training to increase knowledge of employees that helps overcoming organizational barriers in the implementation of environmental practices. Training has been posited to be crucial for the successful implementation of TQM and TQEM techniques programs (Kaynak, 2003; Samson and Terziovski, 1999). Finally, employee involvement is claimed to be a critical element of programs that seek to improve both environmental and operational performance (Hanna et al., 2000).

Less attention has been paid in OM literature to study the direct relationship between organizational practices and social sustainability strategies. Anyway, it is possible to find some contributions. For example, practices related to empowerment and training of workers favor the adoption of health and safety programs (e.g., Barling et al., 2003; Zohar and Luria, 2005). Moreover, social sustainability programs effectiveness require a workforce that is highly involved, empowered, skilled and aligned with the companies' goals (Russo, 2009; Schroeder and Robinson, 2010). Companies must treat employees like stakeholders of the corporation, but employees must also be engaged in socially responsible programs (Googins et al., 2007) to reconfigure the system and integrate new attitudes.

To conclude, there is a need for a more systematic empirical research to study the role of organizational practices in deploying sustainability goals and implementing effective sustainability programs (Angell and Klassen, 1999; Wilkinson et al., 2001).

### **3. Research questions**

The main aim of this research is to answer to the following research question:

*Which is the role of organizational practices in the process of operations sustainability strategy development?*

In order to provide a comprehensive framework to answer this aim, two more specific research questions have been developed.

***RQ1a:** Can organizational practices support the deployment of sustainability goals, especially with the aim of overcoming trade offs among the sustainability dimensions?*

Organizational practices are relevant in the deployment process to define improvement programs starting from sustainability goals. More in detail an organic organizational structure, that allows a company to involve people, find cross-functional solutions and improve the ability to change, is fundamental (Russo and Fouts, 1997). For example, the use of teamwork enhances the range of information and expertise available; eases the coordination and overlap of manufacturing, marketing, and design tasks; and increases the effectiveness of innovative processes (Eisenhardt and Martin, 2000). Coordination practices such as flat organization, employee involvement and incentives guarantee the ability of the firm to integrate and coordinate its assets and resources such that a new resource base will emerge (Teece, 2007). Innovative ideas to manage environmental and social issues often come from the periphery of an organization and from work units deep within an organization that are confronting the day-to-day challenges related to operations processes (Schroeder and Robinson, 2010; Liebowitz, 2010).

***RQ1b:** Can organizational practices support the implementation of sustainability improvement programs, especially with the aim of overcoming trade offs among the sustainability dimensions?*

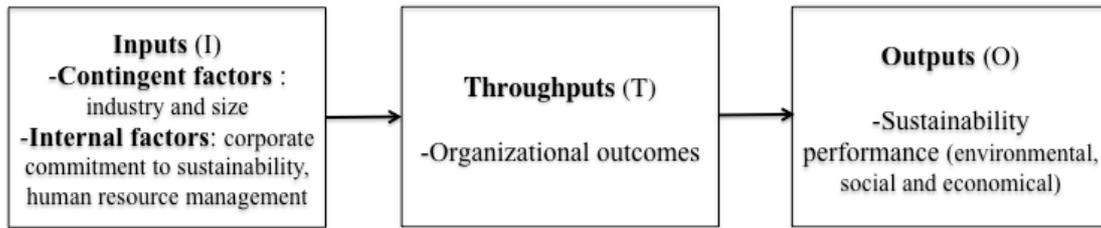
Organizational practices are relevant also in terms of improvement programs implementation. In fact, organizational practices are responsible for the alignment of the operations structure (e.g. processes, organizational structure, culture) with the company goals (Jones, 2010). The relevant organizational practices identified by the literature are empowerment, training, employee involvement, rewards and teamwork. For example, training is critical because it determines an organization's ability to make changes to its operational processes and, as a result, the ability to reconfigure

resources and skills (Ghoshal and Bartlett, 1994; Kraatz and Zajac, 2001). In addition, incentives ensure the alignment of the new resource base to the company's purpose and strategy (Eisenhardt and Martin, 2000).

Daily and Huang (2001) highlight that human resource factors are key elements of the implementation process of environmental management systems. Training and education, incentive systems and empowerment are fundamental for encouraging the adoption of improvement programs (e.g. TQEM and ISO 14000).

Also in relation to the adoption of social sustainability practices, advanced organizational practices are crucial. In fact practices such as training or employee involvement are fundamental to develop and implement health and safety, well-being and improvement programs (Zairi and Peters, 2002).

To answer to these research questions the initial theoretical model and the main elements to study have been identified in the literature. The initial theoretical model that guides this research is shown in Figure 1. This model has been adapted from Epstein (2008). The author developed a general framework to study sustainability strategies and their effects on performance achievement. The elements characterizing the framework are: inputs, throughputs and outputs. These elements have systemic interconnections among each other and with environmental, economic and social performances. Corporations can become sustainable only by simultaneously directing these variables and interconnections toward sustainability performance (Fischer and Schot, 1993; Roome, 1992). The identification of the causal relationships between these elements allows to understand the phenomenon and determine the sustainability strategy effectiveness (Epstein, 2008).



*Figure 1: General research framework (adapted from Epstein, 2008)*

Inputs (I) are defined according to the Epstein's (2008) and include contingent factors, such as business context (e.g. size, industry), and internal factors such as corporate commitment to sustainability and human resource management. More in detail business contingent factors and corporate commitment to sustainability have been controlled when selecting companies in the sample. Instead, human resource management is a key variable of the research. In particular this dimension is studied in terms of adoption of advanced organizational practices related to Lean and Total quality management paradigms (Table 1).

Table 1: Organizational practices

<b>Organizational practices</b>	<b>Definition</b>	<b>Operationalization</b>
<i>Training</i>	Adoption of training to perform operational jobs (Huselid, 1995)	Each of the following training contents have been individually assessed ( <u>Yes (formally or informally)</u> /No): <ul style="list-style-type: none"> <li>- operations</li> <li>- worker health and safety</li> <li>- product health and safety</li> <li>- environment</li> </ul>
<i>Employee involvement</i>	Workers participate in the active management of the work and continuous improvement (Cua et al., 2001)	The adoption of this practices have been assessed individually for each of this issues: <ul style="list-style-type: none"> <li>- operational</li> <li>- social</li> <li>- environmental</li> </ul> The values of the assessment are (respect to the sample): <ul style="list-style-type: none"> <li>• <u>In a great extent</u></li> <li>• <u>Above average</u></li> <li>• <u>Average</u></li> <li>• <u>Below average</u></li> <li>• <u>At the beginning</u></li> <li>• <u>Not used</u></li> </ul>
<i>Teamwork</i>	Workers perform tasks as part of formal work groups (Huselid, 1995)	The roles involved have been listed
<i>Incentives</i>	Workers are provided monetary incentives linked to performance (Kaminski, 2001)	<ul style="list-style-type: none"> <li>• Monetary incentives have been <u>used</u></li> <li>• Monetary incentives have <u>not been used</u></li> </ul>
<i>Communication flows</i>	Communication flow about sustainability issues between managers and workers are managed (Daily and Huang, 2001)	<ul style="list-style-type: none"> <li>• Informal (<u>Yes/No</u>)</li> <li>• Formal (<u>Yes/No</u>)</li> <li>• Top-down flow (<u>Yes/No</u>)</li> <li>• Bottom-up flow (<u>Yes/No</u>)</li> </ul>

Throughputs (T) are defined in terms of organizational outcomes. The specific aspects that have to be considered as organizational outcomes are drawn from the literature

about the definition and implementation of innovation projects (Sheremata, 2000), since sustainability improvement programs can be considered a form of innovation for the company (Angel and Klassen, 1999). Table 2 provides the definition and the operationalization of these constructs according to Sheremata (2000).

*Table 2: Organizational outcomes*

<b>Organizational outcomes</b>	<b>Definition</b>	<b>Operationalization</b>
Quality of the selection of sustainability improvement programs	Level of effectiveness of the selection of sustainability improvement programs (i.e., alignment for the programs with company's goals)	<ul style="list-style-type: none"> <li>•The sustainability programs identified are <u>coherent</u> to the sustainability goals</li> <li>•The sustainability programs identified are <u>not coherent</u> to the sustainability goals</li> </ul>
Quality of the implementation of the sustainability improvement programs	Level of effectiveness of the implementation of the sustainability improvement programs;	<ul style="list-style-type: none"> <li>•The sustainability programs implemented <u>provide</u> the expected advantages</li> <li>•The sustainability programs implemented <u>do not provide</u> the expected advantages</li> </ul>
Sustainability trade-off optimization	The ability to improve at least one sustainability dimension without damage to the other dimensions	<ul style="list-style-type: none"> <li>•Trade-offs among the different sustainability dimensions <u>are managed</u></li> <li>•Trade-offs among the different sustainability dimensions <u>are not managed</u></li> </ul>

Finally, according to Epstein (2008) outcomes (O) have been studied in terms of sustainability performances. Table 3 provides information and details about the operationalization of sustainability performance.

Table 3: Sustainability performance

<b>Sustainability issue</b>	<b>Description</b>	<b>Operationalization</b>
<i>Economical sustainability</i>	Assure that economic needs of the company and stakeholders are met and to guarantee at any time cashflow sufficient to ensure liquidity while producing a persistent return for the long term (Vachon and Mao, 2008; Steurer and Konrad, 2009).	<i>Return on Investment</i> (Corbett, 2009) <ul style="list-style-type: none"> <li>• Above sample average</li> <li>• As sample average</li> <li>• Below sample average</li> </ul>
<i>Environmental sustainability</i>	Use of only natural resources consumed at a rate below the natural reproduction, or at a rate below the development of substitutes, do not cause emissions and do not engage in activity that degrades ecosystem services (Vachon and Mao, 2008).	<i>% material usage reduction, energy usage reduction, % water usage reduction, % waste reduction, % CO<sub>2</sub> emission reduction</i> (Ranganathan, 1998; Corbett, 2009; GRI) <ul style="list-style-type: none"> <li>• Above sample average</li> <li>• As sample average</li> <li>• Below sample average</li> </ul>
<i>Internal social sustainability</i>	When processes, systems and structures within the organization actively support the capability to preserve and create skills and create health and safe working conditions (McKenzie, 2004), and to external social issues related to the ability to provide products preserving customer health and safety (Carter, 2004).	<i>Number of injuries, Number of working hours lost due to illness</i> (McKenzie, 2004; GRI) <ul style="list-style-type: none"> <li>• Above sample average</li> <li>• As sample average</li> <li>• Below sample average</li> </ul>
<i>External social sustainability</i>		<i>Number of articles returned due to negative impact on costumers health and safety</i> (Carter, 2004) <ul style="list-style-type: none"> <li>• Above sample average</li> <li>• As sample average</li> <li>• Below sample average</li> </ul>
<i>Overall sustainability performance</i>	Concept of the triple bottom line view - that emphasizes economical, environmental and social sustainability (Elkington, 1994)	<i>Average of the different performance achieved</i> <ul style="list-style-type: none"> <li>• Above sample average</li> <li>• As sample average</li> <li>• Below sample average</li> </ul>

## **4. Methodology**

The case study methodology is an appropriate research approach to describe and explore new phenomena or to build new OM theories (Yin, 1994). In fact while the survey helps to analyze simpler links on a large-scale, case studies might be worth to study complex relationships. These case studies have been useful to better develop research propositions and a specific research framework (Kerlinger 1986, Lee 1991).

### **4.1 Sample**

Identifying exemplars in economical, environmental and social sustainability management is complicated because rigorous metrics of social performance are absent in many industries (Specter, 2008). Given the aim to study sustainability in relation to all sustainability dimensions as a whole, the food industry has been identified as the most interesting one. In fact all sustainability issues here are very relevant and the various sustainability dimensions interact significantly among each other (e.g., Aiking and de Boer, 2004). Moreover focusing on a single industry allows to isolate industry-specific characteristics increasing the internal validity of the results even if the external validity is penalized.

The sample frame is a panel of companies inclined to develop sustainability strategies in their business process identified using a range of secondary data (e.g. companies producing sustainability reports and having GRI ranking). Among these, companies to be included in the sample have been selected by theoretical sampling focusing on the more committed and providing a heterogeneous sample in terms of companies' size.

Suggestions for the number of cases to use in multiple case study research vary, but Eisenhart (1989) suggests seven cases as the maximum that a person can mentally

process. Yin (1994) and others are more circumspect in regards to hard numbers and instead suggest that data should be collected until saturation. For these reasons the final sample is composed by eleven cases. These companies are highly committed to all dimensions of sustainability – economical, environmental and social - and have production plants in Italy where the analysis have been developed. These organizations are distinguished for the seriousness of certifications obtained (e.g. OHSAS 18001, ISO 9001, ISO 14000) and the attitude of transparency that characterizes their activities that are described in their websites, social reports and also through the mass-media channel. Table 4 shows the main features of the selected companies.

*Table 4: Sample main figures*

<b>Company</b>	<b>Sales in Italy (2010)</b>	<b>Number of employee in Italy (2010)</b>	<b>Number of plants in Italy</b>
Company A	4.171 mln€	5000	20
Company B	451 mln€	600	1
Company C	178,5 mln€	439	2
Company D	500 mln€	320	1
Company E	343 mln€	741	2
Company F	137 mln€	360	2
Company G	900 mln€	2000	5
Company H	283,4 mln€	700	1
Company I	999 mln€	1483	4
Company L	94,6 mln€	183	1
Company M	2.000 mln€	3000	4

#### **4.2 Data collection and analysis**

Given the focus of the research, the level of analysis for the study is the single organization with a specific focus on the operations function. Case studies have been developed by means of interviews conducted on the basis of a semi-structured protocol (Eisenhart 1989). However, this is an adaptive process where many questions

were formulated during the interviews, irrelevant questions were dropped, and questions were asked according to a flexible checklist and not to a formal questionnaire (Eisenhart 1989).

Because approaches to manage economical, environmental and social issues in the operations processes require the inclusion of multiple perspectives, a case-based methodology with multiple respondents has been used (Yin, 1994). In each company, at least three respondents have been interviewed, the operations manager, the CSR (or equivalent) manager, the HR manager and the communication or marketing manager.

Most of the interviews have lasted for more than 90 minutes. The interviews have been conducted on site (Yin, 1994). After each site visit, field notes have been edited, and checked for accuracy. Questions arising from the interview notes have been answered by interviewees through follow-up e-mails and phone calls.

The use of multiple respondents mitigates the single respondent bias and increases the odds of capturing the organization's view of sustainability and the development of this through the Operations (Yin, 1994). Moreover data gathered from different interviews have been triangulated. The triangulation of data aimed to mitigate biases and enhance reliability and validity (Eisenhart, 1989; Yin, 1994). In fact interview protocols for different respondents were partially overlapping. In summary, at each company:

1. The Operations manager, provided information about the sustainability strategy, operational and organizational practices adopted at this level and operations and sustainability performance achieved;
2. The HR manager, provided information about organizational practices adopted at the operations and company level;

3. The CSR (or equivalent) manager or the communication or marketing manager, provided information about the sustainability strategy, sustainability programs developed and adopted, and sustainability performance achieved.

Finally data regarding economical, environmental and social sustainability performance have been triangulated also looking to financial and/or social reports.

Once data collection has been completed, similar patterns in the role of organizational practices to achieve economical, environmental and social sustainability performance have been analyzed. Data analysis itself has had two main components: within and across case analysis. Within case analysis helps us to examine the adoption of organizational practices in a single context and their impact on sustainability strategies deployment, while the cross case analysis serves as a form of replication (Yin, 1994) where the constructs of interest in one setting are tested in other settings. In fact as suggested by Eisenhardt (1989), data analysis has started from the relevant constructs identified in the literature and then looked for within group similarities coupled with intergroup differences. Finally, a report for each firm to be validated has been provided.

Results of this phase allowed to better understand the interaction between organizational practices and sustainability improvement programs distinguishing two main roles: i) enabling the definition of improvement programs to overcome sustainability trade-offs; and ii) facilitating the adoption of these programs.

## **5. Results**

In order to understand the role of organizational practices on the effectiveness of sustainability strategies deployment process a replication approach based on the general framework proposed in Figure 1 has been adopted. The different elements of

the framework have been coded in each company defining patterns and replicating the analysis in the other companies to assess the highlighted relationships. The first element assessed has been the organizational practices adoption as shown in Table 6.

Next the different companies have been assessed in terms of sustainability performance achieved. To assess the performance achieved, information collected during the interviews has been triangulated using data from the social and financial reports when available.

*Table 5: Sustainability performance assessment*

	<b>Company I</b>	<b>Company M</b>	<b>Company D</b>	<b>Company A</b>	<b>Company E</b>	<b>Company H</b>	<b>Company C</b>	<b>Company B</b>	<b>Company L</b>	<b>Company G</b>	<b>Company F</b>
<b>Environment</b>	Average	Above the average	Above the average	Above the average	Average	Above the average	Average	Average	Below the average	Below the average	Below the average
<b>Workers health and safety</b>	Above the average	Above the average	Above the average	Average	Average	Average	Average	Below	Average	Below the average	Below the average
<b>Consumer health and safety</b>	Above the average	Above the average	Above the average	Above the average	Average	Average	Average	Average	Average	Below the average	Average
<b>Profit</b>	Average	Average	Average	Above the average	Average	Below the average	Below the average	Average	Below the average	Above the average	Average
<b>Overall performance</b>	Above the average	Above the average	Above the average	Above the average	Average	Average	Average	Average	Below the average	Below the average	Below the average

Table 6: Organizational practices adopted

Organizational practices			Company I	Company M	Company D	Company A	Company E	Company H	Company C	Company L	Company G	Company F	Company B	
Bottom – up approach	Training	Operations	Yes	Yes (formal)	Yes (formal)	Yes (formal/informal)	Yes (formal)	Yes (formal)	Yes (formal)	Yes (formal)	Yes (formal/informal)	Yes (formal)	Yes (formal)	
		Health and safety	Yes (informal)	Yes (formal)	Yes (formal)	Yes (formal/informal)	Yes (formal)	Yes (formal)	Yes (formal)	Yes (formal)	Yes (formal)	No	No	Yes (formal)
		Product health and safety	Yes (formal)	Yes (formal)	Yes (formal)	Yes (formal/informal)	Yes (formal)	Yes (formal)	Yes (formal)	Yes (formal)	Yes (formal)	Yes (formal/informal)	Yes (formal)	Yes (formal)
		Environment	Yes (informal)	Yes (formal)	Yes (formal)	Yes (formal/informal)	Yes (formal)	Yes (formal)	Yes (formal)	Yes (formal)	Yes (formal)	No	No	Yes (formal)
	Employee involvement	Operations	In a great extent	Above the average	Above the average	Average	Average	At the beginning	Below the average	Below the average	Below the average	Below the average	No	Below the average
		Social issues	In a great extent	Above the average	Above the average	Average	Average	No	No	Below the average	No	No	No	Below the average
		Environment	In a great extent	Above the average	Above the average	Average	Average	No	No	Below the average	No	No	No	Below the average
Communication flow	Informal	No	Yes	Yes	Yes	No	No	No	No	No	No	No	No	
	Bi-directional	No	Yes	No	Yes	No	No	No	No	No	No	No	No	
Top down approach	Cross-functional Sustainability structure	Corporate	Cross-functional team	Specific function	Cross-functional team	Cross-functional team	Committee and different roles	Committee	Cross-functional team and specific manager	Different manager	Cross-functional team	No	CSR manager and quality team	
		BU	Cross-functional team	Cross-functional team	Cross-functional team	Specific roles	N.A.	N.A.	No	N.A.	N.A.	No	No	
		Operations	Energy manager and Safety manager	Different roles	Carbon master footprint manager	Health and safety responsible	Different roles	Energy manager	Health and safety responsible	Different roles	Health and safety responsible	Health and safety responsible	Health and safety responsible	Health and safety responsible
	Communication flow	Formal	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
		Top down	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Incentives	Operations	Monetary	Monetary	Monetary for all	Monetary	Monetary	Monetary	Monetary	Monetary	Monetary	Monetary	Monetary	Monetary
		Social	No	No	Monetary for managers	No	No	No	No	No	No	Monetary (only specific jobs not workforce)	No	No
Environment		No	No	Monetary for managers	No	Maybe production manager	No	No	No	No	Monetary (only specific jobs not workforce)	No	No	

## 6. Discussion

When studying the operations overall sustainability strategy deployment process and the trade-off issue, aspects related to organizational practices and capabilities available have to be considered. In fact, environmental priorities are rather widespread in operations by now, compared to more holistic sustainability strategies (e.g. Kleindorfer et al., 2005). Environmental strategies are quite mature; instead, overall sustainability strategies are in the preliminary phase of their development. Companies committed to environmental, social and economical sustainability at the same time are now trying to define and reconfigure new structures, systems, resources, and skills to manage all sustainability dimensions (Mohrman and Worley, 2010). Better results in mitigating trade-offs by pursuing sustainability strategies could be obtained if companies would develop the right organizational structure and capabilities to manage both environmental and social issues and other operations strategic capabilities (Mohrman and Worley, 2010; Accenture, 2010).

The first result emerged from the analysis conducted is that the set of organizational practices adopted can be better studied if they are divided in two groups, namely practices related to a bottom-up managerial approach and others to a top-down approach. As shown in the literature review, both these approaches can be used in the deployment process of operations strategies (Skinner, 1978; Wheelwright, 1984; Miller and Hayslip, 1989):

- **Bottom-up organizational practices**, that include informal and bi-directional communication flows, extended adoption of training, extended use of employee involvement, are aimed at increasing knowledge and information available at the operations level;

- **Top-down organizational practices, that include** formal communications from the top management, presence of a sustainability cross-functional team, use of monetary incentives, are aimed at integrating dispersed ideas, knowledge, and information into collective action.

Moreover, it is possible to identify three different groups of companies characterized by the same patterns in the adoption of organizational practices: **Advanced**, **Developers** and **Beginners**. Companies classified as **Advanced** are Company M, Company D, Company A and Company I. These companies employ extensive use of practices related to both the bottom-up and top down approach. Second, companies classified as **Developers** are Company H, Company E and Company C. These companies hardly use organizational practices related to the bottom-up approach (they use training to a great extent but they do not have informal bi-directional communication flows and do a use of employee involvement for sustainability issues below average) and use some of the organizational practices related to the top-down approach (formal communication from the top management, use of a sustainability cross-functional team even if the sustainability roles and responsibility are quite unclear and monetary incentives are not adopted). Finally companies classified as **Beginners** are Company B, Company L, Company G and Company F. These companies barely use either bottom-up or top-down practice. In fact, they do not have informal bi-directional communication flows; they use training but do not involve employee to manage sustainability issues) they have formal communication from the top management but they do not use a cross-functional team to manage sustainability; roles and responsibilities related to sustainability are often unclear and no monetary incentives related to sustainability are used.

Secondly, we observed that companies characterized by different use of these two sub-sets of practices achieve different results in terms of sustainability performance. More in detail, the overall sustainability performance level achieved by Advanced companies is above average, by Developers companies is average compared to the sample and by Beginners is somewhat below average.

The analysis of the throughput (T) level allows to better understand the links between organizational practices and sustainability performance. In fact, by comparing the organizational outcomes obtained by the three groups of companies, it has been possible to identify the role of the two different sets of organizational practices. More in details organizational practices related to the bottom-up approach impact mainly on the quality of the sustainability improvement programs identified and the quality of the implementation of the sustainability improvement programs. Instead, organizational practices related to the top-down approach impact more on the on quality of the implementation of the solutions and on the sustainability trade-off optimization.

The fundamental role of bottom up organizational practices in the identification of effective solutions aligned to company goals has been proven for example by Company D and Company M. For example, Company D wanted to reduce environmental impact in terms of water consumption without increasing costs of the manufacturing process. Company D succeeded in developing a new effective way to wash machines reducing the use of water and reducing at the same time energy consumption during working time. This new way of work has been identified thanks to employee involvement and bi-directional informal communication flow. At Company M, they develop an overall plan covering all dimensions of sustainability.

To assure the coherence of the different sustainability initiatives adopted, employees are considered the engine for sustainability programs and are continuously involved through initiatives such as internal workshop called Green forum allowing to share goals and to propose new solutions.

Based on the evidence from case studies, a first research proposition has been formulated:

*P1. The quality of the solutions identified for the deployment of sustainability goals is positively affected by the adoption of bottom-up organizational practices.*

Case studies proved that bottom-up organizational practices are fundamental as well in the implementation of the solutions identified. In fact, in the project of water consumption reduction mentioned above, Company D experienced how employee involvement and training have been fundamental to adopt successfully the new way to work. Similarly, Company A shows how formal and informal training to implement programs related to worker health and safety is critical to make them effective. The same result has been showed by Company I in relation to programs aiming to increase products health and safety. Moreover, the interviews suggest that in order to enable successful implementation of the programs identified, there is the need to develop a sustainability culture inside the company that allows to share a holistic vision of sustainability and to understand the efforts put in place by the company. This culture is developed through training, employee involvement, and informal bi-directional communication flow. For example, Company A's training programs make people aware of sustainability issues and are crucial for sustainability success.

Consequently, a second research proposition has been formulated:

*P2. The implementation of the improvement programs identified for the deployment of sustainability goals is positively affected by the adoption of Bottom-up organizational practices.*

Moreover, it is possible to highlight that the successful implementation of the sustainability programs cannot be based only on the to change of the culture obtained through a bottom-up approach. Instead, a top-down approach to widely diffuse the goals and strategies is fundamental. Formal communication flow and top management commitment are key to make people aware of company goals. At Company M the sustainability plan has been presented in a formal way by the CEO to the whole organization. Moreover, incentives are fundamental to make the message even more effective as shown in Company D.

According to these results, P3 has been defined:

*P3. The implementation of the improvement programs identified for the deployment of sustainability goals is positively affected by the adoption of top-down organizational practices.*

Finally, in different case studies, a cross-functional team has been constituted to develop sustainability strategies. This cross-functional team with different competences allows to enhance synergies between sustainability dimensions and solve possible trade-offs have been shown to be crucial. The composition of a cross-functional team allows to understand immediately the impact of a program on the different sustainability dimensions and to identify if all sustainability dimensions are covered by specific programs but most important allows to define if it is possible to have positive impacts on all sustainability dimensions within a program.

To allow this process, also a high commitment of the Top Management, that defines goals and coordinates activities, is fundamental and assures the development of a holistic sustainability plan is crucial.

Moreover, incentives and formal communication flows all together allow to share the sustainability goals of the company at the operations level and, especially when the company is committed to all sustainability dimensions, to push to find solutions that avoid negative results on some aspects of sustainability.

On the basis of these observations, the next proposition has been formulated:

*P4. The ability to overcome trade-offs among sustainability dimensions is positively affected by the adoption of top-down organizational practices.*

The propositions formulated so far have been summarized in Figure 2.

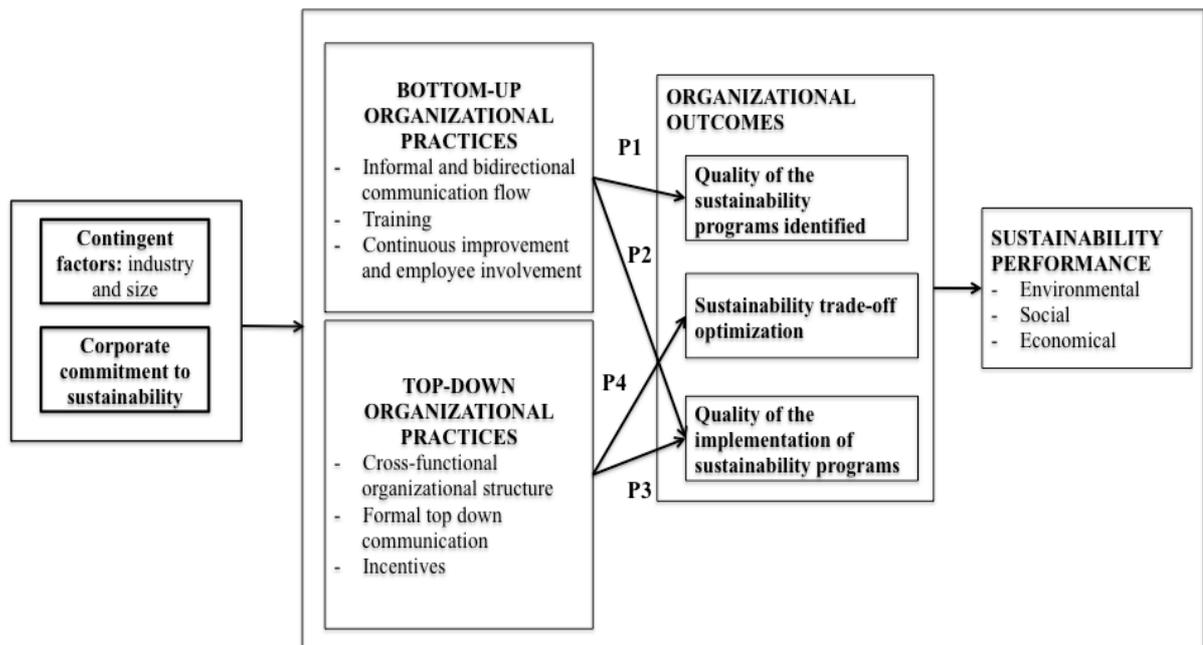


Figure 2: Bottom-up and top-down organizational practices role

## **6. Conclusion**

Results show that an organizational model balancing both a top-down and bottom-up approach is fundamental to define and implement effective sustainability operations strategies. Bottom-up organizational practices can play a powerful role identifying incremental innovations at the operations level and providing the right organizational environment to implement successfully sustainability improvement programs. At the same time, top-down organizational practices allow to share sustainability goals within the organization and to manage trade-offs. Companies with a broader view of the sustainability concept need to develop new capabilities to manage the complexity and interrelation of environmental, social and economical issues. This is a new strategy or a new “competitive weapon” that companies are developing. A mature approach to deploy this overall strategy has not been defined yet. For this reason, companies might need an extensive use of both bottom-up and top-down organizational practices to make more effective the sustainability programs identified and adopted at the operational level overcoming possible trade-offs.

A further development of this research can be to understand how companies can be more effective in developing sustainability strategies focusing on the effectiveness of the optimization of trade-off management. As suggested by the OM literature and according to this research, the optimization of sustainability trade-offs is obtained in the decision process by managers (Wu and Pagell, 2010). Managers act according to the company’s sustainability strategy that might enhance one or more dimensions of sustainability at the same time (Wu and Pagell, 2010). It might be interesting to understand if companies characterized by different commitments in the trade-offs decision process adopt different organizational practices at the operational level.

One of the case study limitations may be due to the fact that case studies analyzed cover only one industry. Finally, an important limitation of this work stems from the broad focus that it is also due to the novelty of the theme where specific issues to study and constructs to be analyzed have not been clearly defined yet. Given the relative novelty of the subject in fact, the literature lacks an exhaustive framework in which both environmental and social sustainability practices and performances can be considered.

To conclude, this research can help shed light on the roles of organizational practices in the achievement of higher sustainability performance as well as on methods to shape an organization to pursue economical, environmental and social sustainability at the same time. The research can be relevant for both theory development and practice. It extends our understanding of the relevant levers that can be used to obtain sustainability performance and, thus, shed some light on how to execute strategic orientations towards environmental and social sustainability.

## **7. References**

- Accenture, 2010, *A New Era of Sustainability*, UN Global Compact-Accenture CEO Study 2010.
- Aiking, H., Boer, J., 2004, "Food sustainability: Diverging interpretations", *British Food Journal*, Vol. 106 No. 5, pp. 359-365.
- Angell, L.C. and Klassen, R.D., 1999, "Integrating environmental issues into the mainstream: an agenda for research in operations management", *Journal of Operations Management*, Vol. 17 No.1, pp. 575-598.
- Åhlström, P. and Karlsson, C., 2000, "Sequences of manufacturing improvement initiatives: the case of delayering", *International Journal of Operations & Production Management*, Vol. 20 No.11, pp. 1259-1277.
- Ahmad, S. and Schroeder, R., 2003, "The impact of human resource management practices on operational performance: recognizing country and industry differences", *Journal of Operations Management*, Vol. 21, pp. 19-43.

- Angell, L.C. and Klassen, R.D., 1999, "Integrating environmental issues into the mainstream: an agenda for research in operations management", *Journal of Operations Management*, Vol. 17 No.1, pp. 575–598.
- Barling, J., Kelloway, E.K. and Iverson, R.D., 2003, "High-quality work, job satisfaction and occupational injuries", *Journal of Applied Psychology*, Vol. 88 No. 2, pp. 276-183.
- BCG&MIT, 2009, *The business of sustainability: imperatives, advantages and actions*, September.
- Bettley, A. and Burnley, S., 2008, "Towards Sustainable Operations Management Integrating Sustainability Management into Operations Management Strategies and Practices", in: Misra, Krishna B. ed., *Handbook on Performability Engineering*, London, UK: Springer-Verlag, pp. 875–904.
- Burke, S. and Gaughran, W.F., 2007, "Developing a framework for sustainability management in engineering SMEs", *Robotics and Computer-Integrated Manufacturing*, Vol. 23, pp. 696–703.
- Carter, C.R., 2004, "Purchasing and Social Responsibility: A Replication and Extension", *The Journal of Supply Chain Management*, Vol. 40, No. 4, pp. 4-16.
- Ciliberti, F., Pontrandolfo, P. and Scozzi, B., 2007, "Logistics social responsibility: Standard adoption and practices in Italian companies", *International Journal of Production Economics*, Vol. 113, pp. 88-106.
- Corbett, L.M., 2009, "Sustainable operations management: a typological approach", *Journal of Industrial Engineering and Management*, Vol. 2, No. 1, pp. 10-30.
- Daily, B.F. and Huang, S., 2001, "Achieving sustainability through attention to human resource factors in environmental management", *International Journal of Operations & Production Management*, Vol. 21 No. 12, pp. 1539-1552.
- Cua, K. O., McKone, K.E. and Schroeder, R.G., 2001, "Relationships between implementation of TQM, JIT, and TPM and manufacturing performance", *Journal of Operations Management*, Vol. 19 No. 6, pp. 675-694.
- de Treville, S. and Antonakis, J., 2005, "Could lean production job design be intrinsically motivating? Contextual, configurational, and levels-of-analysis issues", *Journal of Operations Management*, Vol. 24 No. 2, pp. 99-123.
- Docherty, P., Kira, M. and Shani, A.B. (Rami) (2009), "Sustainable work systems: past, present and future of social sustainability", in: Docherty, P., Kira, M. and Shani, A.B. (Rami) (Eds), *Creating Sustainable Work Systems Developing social sustainability*, Routledge, London and New York, pp. 268-289.
- Eisenhardt, K.M. and Martin, J.A., 2000, "Dynamic capabilities: What are they?", *Strategic Management Journal*, Vol. 21, pp. 1105-1121.

- Eisenhart, K.M, 1989, "Building Theories from Case Study Research," *Academy of Management Review*, Vol. 14 No.4, 1989, pp. 532-550.
- Elkington, J., 1994, "Towards the sustainable corporation: Win-win-win business strategies for sustainable development", *California Management Review*, Vol. 36 No. 2, pp. 90-100.
- Epstein, M.J., 2008, *Making Sustainability Work*, Berrett-Koehler Publisher, Inc European Commission- DG Employment and Social Affairs Business Decisions Limited (BDL), 2002, *New Forms of Work Organisation: The Obstacles to Wider Diffusion*, Business Decisions Limited.
- Fenwick, T., 2007, "Developing organizational practices of ecological sustainability. A learning perspective", *Leadership & Organization Development Journal*, Vol. 28 No. 7, pp. 632-645.
- Ferdows, K. and de Meyer, A., 1990, "Lasting Improvements in Manufacturing Performance", *Journal of Operations Management*, Vol. 9 No. 2, pp. 168-184.
- Fischer, K., and Schot, J., 1993, *Environmental strategies for industry: International perspectives on research needs and policy implications*, Island Press, Washington, DC.
- Goshal, S. and Bartlett, C.A., 1994, "Linking organizational context and managerial action: the dimensions of quality management", *Strategic Management Journal*, Vol. 15 No. 5, pp. 91-112.
- Googins, B.K., Mirvis, P.H. and Rochlin, S.A., 2007, *Beyond good company: Next generation corporate citizenship*, Palgrave MacMillan, New York.
- Gunn, T.G., 1987, *Manufacturing for Competitive Advantage: Becoming a World Class Manufacturer*, Bullinger Publishing, Cambridge, MA.
- Hayes, R.H., Wheelwright, S.C. and Clark, K.B., 1988, *Dynamic Manufacturing: Creating the Learning Organization*, Free Press, New York, NY.
- Hanna, M.D., Newman, W.R., Johnson, P., 2000, "Linking operational and environmental improvement through employee involvement", *International Journal of Operations & Production Management*, Vol. 20 No. 2, pp.148-165.
- Hayes, R.H. and Wheelwright, S.C., 1984, *Restoring Our Competitive Edge: Competing Through Manufacturing*, New York: John Wiley.
- Huselid, M.A., 1995, "The Impact of Human Resource Management Practices on Turnover, Productivity, and Corporate Financial Performance", *The Academy of Management Journal*, Vol. 38 No. 3, pp. 635-672.
- Jimenez, J. and Lorente, J., 2001, "Environmental performance as an operations objective", *International Journal of Operations & Production Management*, Vol. 21 No. 12, 2001, pp. 1553-1572.
- Jones, G., 2010, *Organizational Theory, Design and Change*, Pearson, Upper Saddle River, New Jersey.

- Kaminski, M. 2001, "Unintended Consequences: Organizational Practices and Their Impact on Workplace Safety and Productivity", *Journal of Occupational Health Psychology*, Vol. 6 No. 2, pp. 127-138.
- Kathuria, R., Partovi, F.Y., 1999, "Work force management practices for manufacturing flexibility", *Journal of Operations Management*, Vol. 18 No.1, pp. 75-93.
- Karlsson, C. and Åhlström, P., 1995, "Change processes towards lean production: the role of the remuneration system", *International Journal of Operations & Production Management*, Vol. 15, No. 11, pp.80-99.
- Kaynak, H., 2003, "The relationship between total quality management practices and their effects on firm performance", *Journal of Operation Management*, Vol. 21 No. 4, pp. 405–435.
- Kerlinger F. N., 1986, *Foundations of behavioural research*, Holt, Rinehart & Winston, New York.
- Kitazawa, S. and Sarkis, J., 2000, "The realationship between ISO 14001 and continuous source reduction programs", *International Journal of Operations & Production Management*, Vol. 20 No. 2, pp. 225-248.
- Kleindorfer, P.R., Singhal K. and Van Wassenhove L.N., 2005, "Sustainable Operations Management", *Production and Operations Management*, Vol. 14 No. 4, pp. 482–492.
- Kraatz, M.S. and Zajac, E.J., 2001, "How organizational resources affect strategic change and performance in turbulent environments: theory and evidence", *Organization Science*, Vol. 12 No. 3, pp. 632-657.
- Landsbergis, P.A., Cahill, J. and Schnall, P., 1999, "The impact of lean production and related systems of work organization on worker health", *Journal of Occupational Health Psychology*, Vol. 4 No. 2, pp. 108-130.
- Lee, A., 1991, "Integrating positivist and interpretative approaches to organizational research", *Organization Science*, Vol. 2, pp. 342- 365.
- Liebowitz, J., 2010, "The Role of HR in Achieving a Sustainability Culture", *Journal of Sustainable Development*, Vol. 3 No. 4, pp. 50- 57.
- Makower, J., 1994, *Beyond the bottom line*, Simon & Schuster, New York.
- McKenzie, S., 2004, *Social Sustainability: Towards Some Definitions*, Magill, S. Aust., Hawke Research Institute, University of South Australia.
- Mohrman, S.A., Worley, C.G., 2010, "The Organizational Sustainability Journey: Introduction to the Special Issue", *Organizational Dynamics*, Vol. 4 No. 39, pp. 289-294.
- Miller, J.G. and Hayslip, W., 1989, "Implementing manufacturing strategic planning", *Planning Review*, August-July.
- Pfeffer, J., 2010, "Building Sustainable Organizations: The Human Factor", *The Academy of Management Perspectives*, Vol. 24, No. 1, pp. 34-45.

- Porter, M.E. and Kramer, M.R., 2006, "The Link Between Competitive Advantage and Corporate Social Responsibility", *Harvard Bus. Rev.*, December, pp. 1-24.
- Ranganathan, J., 1998, "*Sustainability Rulers: Measuring Corporate Environmental And Social Performance*", [http://www.cndwebzine.hcp.ma/cnd\\_sii/IMG/pdf/sustainability\\_rulers.pdf](http://www.cndwebzine.hcp.ma/cnd_sii/IMG/pdf/sustainability_rulers.pdf).
- Roome, N., 1992, "Developing environmental management systems", *Business Strategy and the Environment*, Vol. 1, pp. 11-24.
- Roth, A.V., 1996, "Neo-operations strategy. Linking capabilities-based competition to technology", in: G.H. Gaynor, ed., *Handbook of technology management*. McGraw-Hill, New York, pp. 381–388.
- Russo, M.V. and Fouts, P.A., 1997, "A resource-based perspective on corporate environmental performance and profitability", *Academy of Management Journal*, Vol. 40 No. 3, pp. 534–559.
- Russo, M.V., 2009, "Explaining the impact of ISO 14001 on emission performance: a Dynamic Capabilities Perspective on process learning", *Business Strategy Environment*, Vol. 18, pp. 307-319.
- Sarkis, J., 1998, "Evaluating environmentally conscious business practices", *European Journal of Operational Research*, Vol. 107, pp. 159–174.
- Sarkis, J., Gonzalez-Torre, P., Badenso-Diaz, B., 2010, "Stakeholder pressure and the adoption of environmental practices: The mediating effect of training", *Journal of Operations Management*, Vol. 28, pp. 163–176.
- Samson, D., Terziovski, M., 1999, "The relationship between total quality management practices and operational performance", *Journal of Operations Management*, Vol. 17 No.4, pp.393-409.
- Schroeder, D.E., Robinson, A.G., 2010, "Creating sustainable competitive advantage through green excellence", *Organizational Dynamics*, Vol. 39 No. 4, 345-352.
- Shrivastava, P., 1995, "Environmental technologies and competitive advantage", *Strategic Management Journal*, Vol. 16, No. 3., pp. 183-200.
- Sheremata, A., 2000, "Centrifugal and Centripetal Forces in Radical New Product Development under Time Pressure", *The Academy of Management Review*, Vol. 25, No. 2, pp. 389-408.
- Skinner, W., 1974, "The focused factory", *Harvard Business Review*, Vol. 52, No. 3, pp. 113–121.
- Skinner, W., 1992, "Missing the links in manufacturing strategy", in: Voss, C. (Ed.), *Manufacturing Strategy: Process and Content*, Chapman & Hall, London, pp. 15–25.
- Specter, M., 2008, "Big Foot: In Measuring Carbon Emissions, It's Easy to Confuse Morality and Science", *New Yorker*, February, No. 25, pp. 44-53.

- Steurer, R. and Konrad, A., 2009, "Business-society relations in Central-Eastern and Western Europe: How those who lead in sustainability reporting bridge the gap in corporate (social) responsibility", *Scandinavian Journal of Management*, Vol. 25, No. 1, pp. 23-36.
- Sutcliffe, L., Maier, A., Moultrie, J. and Clarkson, P., 2009, "Development of a framework for assessing sustainability in new product development", *Proceedings of the 17th International Conference on Engineering Design (ICED'09)*.
- Teece, D.J., 2007, "Explicating Dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance", *Strategic Management Journal*, Vol. 28, pp. 1319-1350.
- Vachon, S. and Mao, Z., 2008, "Linking supply chain strength to sustainable development: a country-level analysis", *Journal of Cleaner Production*, Vol. 16 No. 15, pp. 1552-1567.
- Wilkinson, A., Hill, M., Gollan, P., 2001, "The sustainability debate", *International Journal of Operations & Production Management*, Vol. 21 No. 12, pp. 1492-1502
- Wu, Z. and Pagell, M., 2010, "Balancing priorities: Decision-making in sustainable supply chain management", *Journal of Operations Management*, Vol. 29, pp. 577-590.
- Yin, R.K., 1994, *Case Study Research: Design and Methods*, Sage Publications, Thousand Oaks, CA.
- Zairi, M. and Peters, J., 2002, "The impact of social responsibility on business performance", *Managerial Auditing Journal*, Vol.17 No.4, pp. 174-178.
- Zhu, Q. and J. Sarkis, 2004, "Relationships Between Operational Practices and Performance Among Early Adopters of Green Supply Chain Management Practices in Chinese Manufacturing Enterprises", *Journal of Operations Management*, Vol. 22, pp. 265-289.
- Zohar, D. and G. Luria, 2005, "A multilevel model of safety climate. Cross-level relationships between organization and group-level climates", *Journal of Applied Psychology*, Vol. 90 No. 4, pp. 616-629.