

Sustainability: An Introduction View from ICIEOM

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Abstract

This Special Issue of the Brazilian Journal of Operations and Production Management (BJOPM) features four papers selected from the XVIII International Conference on Industrial Engineering and Operations Management (ICIEOM), which conference theme was “Sustainability”, and two invited papers based on keynote speeches regarding Sustainability and its association to Industrial Engineering fields (one from ICIEOM and the other from the ENEGEP conference). This editorial paper evaluates and summarizes these selected contributions as well as introduces the term sustainability.

Keywords: *Industrial Engineering, Sustainability, Operations Management, Supply Chain Management, ICIEOM.*

Introduction

The XVIII International Conference on Industrial Engineering and Operations Management (ICIEOM), held this year in Guimarães (Portugal), has encouraged communication among researchers and practitioners in the different fields of Industrial Engineering and Engineering Management. This time the conference has been shaped around sustainability fields. This Special Issue of the Brazilian Journal of Operations and Production Management (BJOPM) brings together four selected papers presented in the ICIEOM track entitled “Social Responsibility, Environment and Sustainability”, in extended versions, plus two invited papers related to “sustainability” and Industrial Engineering that were the basis for plenary presentations at ICIEOM 2012 conference and at the ENEGEP 2012 (*Encontro Nacional de Engenharia de Produção*) conference, this last one held this year in Bento Gonçalves (Brazil).

Sustainability has increasingly become important to business research and practice over the past decades as a result of rapid depletion of natural resources and concerns over wealth disparity and corporate social responsibility (Dao *et al.*, 2011). Sustainability means capability to go on for a long time. The use of this term goes back at least to the 1960s in economics and to the early 1970s in environmental management (Hansson, 2010). According to Appleton (2006), it is a problem statement that integrates

the environment and the economy in a way that both sides can live with it and use as a new starting point for addressing what is basically the same problem that existed in 1970: how to restructure the relationship of the economy to the earth. For environmental or green interests, sustainability acknowledges the reality of the environmental crisis. For economic and *status quo* interests, sustainability acknowledges the legitimacy of economic growth to meet human needs. For both, it offers the possibility that each can co-exist with the other (Appleton, 2006).

Sustainability concerns to the principles of integrating economic, environmental and social imperatives, the so called triple bottom line. Achieving sustainable development requires a careful balance of these aspects, which are defined in Schönsleben *et al.* (2010) as follows:

- Environmental aspects refer to nature as a closed system with its limited resources and regenerative capacities (e.g., for greenhouse gases) as a base for any business activity;
- Economic aspects refer to events and facts relevant to manufacturing industries' competitiveness and their business practices, both strategic and operational;
- Societal aspects refer to society represented by governmental organizations, non-governmental organizations, individuals, employees, and customers.

Interest in sustainability is growing, as evidenced by the number of papers published on different aspects of the subject. Figure 1 presents the number of papers retrieved, in the last two decades, based on a selected search using the ScienceDirect (Elsevier) database. In pseudo code, the following phrase was adapted to the search engine of the database within titles, abstracts and keywords: "sustainability" and "sustainable"; applied to the following subjects: "business, Management and Accounting", "computer science", decision science", "engineering", and "social science". The vertical axis presents the number of papers, while the horizontal axis presents the year of publication. The Chart includes the accumulative percentage of the total along the years, being 100% in 2012. The search returned 1,995 published papers.

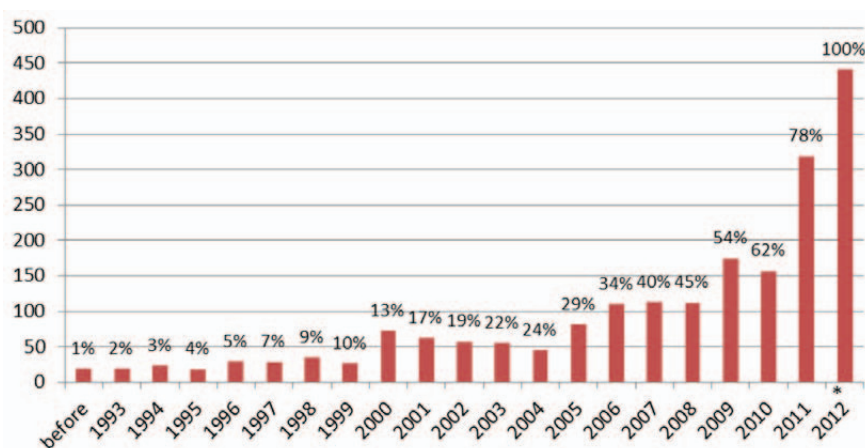


Figure 1. Growing number of published papers from Journals on sustainability until Oct. 2012.

The growing number of publications on sustainability peaks in 2012, year that included papers based just on the period until October of 2012 (time this editorial was finished). More than 50% of the papers were published during the last 4 years (2009-2012), what reflects the importance given by the academy to “sustainability”. These numbers exclude the gray literature (“scientific grey literature comprises newsletters, reports, working papers, theses, government documents, bulletins, fact sheets, conference proceedings and other publications distributed freely, available by subscription or for sale” – Weintraub, 2000, p. 54), as academics and professionals generally use academic journals to acquire knowledge and disseminate new results (Ngai *et al.*, 2009).

The development of sustainability capabilities not only serves the environment and people, but also helps firms to generate value that could enhance profitability and gain sustained competitive advantage for themselves. This development requires a holistic approach by integrating different firm resources (Dao *et al.*, 2011). Gold *et al.* (2010) go clearly beyond the firm level embracing inter-organizational resources. In their paper they argue that the paradigm shift from firm-level to supply-chain-level competition and the challenge of incorporating comprehensive sustainability goals into corporate behaviour due to worldwide growing environmental and ethical awareness induced the necessity for supply chains to act as quasi meta-organizations, coordinating information, material and financial flows internally from raw-material extraction to the final customer. Gold *et al.* (2010) also highlight that sustainability goals require even closer interaction between all firms involved, as ensuring simultaneously economic, environmental and social performance on a product's total life-cycle basis implies a much wider set of performance criteria to be met than it is the case in traditional supply chain management. This context embraces the sustainable supply chain management, that is defined in Seuring and Müller (2008, p. 1700) as

[...] the management of material, information and capital flows as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development, i.e., economic, environmental and social, into account which are derived from customer and stakeholder requirements.

These authors also argue that in sustainable supply chains, environmental and social criteria need to be fulfilled by the members to remain within the supply chain, while it is expected that competitiveness would be maintained through meeting customer needs and related economic criteria.

Next, this editorial paper summarizes the selected articles that compose this special issue that are conducted by researchers from different countries and institutions: Brazil (Federal University of Paraná, Federal University of Santa Catarina, Federal University of Technology – Parana, Methodist University of Piracicaba, Pontifical Catholic University of Paraná, Santa Catarina State University and University Nine of July), France (Audencia Nantes School of Management), Spain (Universitat Politècnica de València), and United State of America (Crummer Graduate School of Business, Rollins College).

Overview of the Special Issue Papers

The papers of this special are classified into 3 groups. The first group embraces two papers that offer general considerations regarding sustainability concepts and

trends applied in operations management, more specifically supply chain management. The first one is from Prof. Joe Miemczyk (Audencia Nantes School of Management, France) and embraces sustainable operations and supply chain management. The goal is to review some of the key challenges regarding this topic and to provide directions for future research. According to Prof. Miemczyk, sustainability raises many trade-off situations and based on past experiences, recent research and current practices, he provides a framework for future research in sustainable operations and supply chain management. Prof. Henrique Corrêa (Rollings College, USA) presents and analyses in his paper supply chain management trends and offers an overview on how should managers prepare themselves for these tendencies within crossing borders perspective. The paper reviews the main supply chain management historical evolution phases, where the fifth one is related to “operations cross borders of the organization global objective – the triple bottom line (Economic prosperity, Environmental sustainability and, Social responsibility). The increase in the influence of organized society and governments to make organizations pursue this “triple bottom line” is considered a relevant trend for the management of global supply chains and the competences to deal with this increase are also discussed within the paper.

The second group of papers presents reviews of the literature. Mr. Díaz-Madroño and Dr. Mula from the University of Valencia (Spain) analyse in their paper the current status of sustainable supply chain management and its application to the Book Publishing sector. They conclude with their review in the literature that there are several works dealing with individual sustainable practices, mainly the study of environmental impacts and the calculation of carbon footprint, but no references consider in an integrated way all partners in the supply chain Book Publishing industry (e.g. publishers, printers, distributors, retailers). Mrs Machado, Prof. Pinheiro de Lima, Prof. Gouvêa da Costa, Mrs Manfrin provide in their paper information on the integration of sustainability concepts within the Operations Management field as a discipline in Industrial Engineering. These authors analyse the aspects concerning sustainable development that have been worked out according to the operations and that have become relevant to researchers and offer an overview of trends for further research in sustainability within the Operation Management field.

The third group embraces empirical researches. Prof. Satolo, Mr. Calarge and Prof. Cauchick Miguel assess in their paper sustainability issues in the context of an integrated manufacturing system (IMS) using a multiple case study methodological approach. The goal is to identify relevant practices related to an IMS in four organizations belonging to the sugar cane and ethanol agricultural industrial sector in Brazil. An individual case description is made in addition to a cross-case comparison. These authors find evidence that there is a general concern for the environment within these organizations although this is demonstrated by a culture of reducing residuals and the control of waste of natural resources. Mrs. Trierweiller, Prof. Peixe, Prof. Tezza, Prof. Bornia and Prof. Lucila M. S. Campos verify in their paper the viability of using the Item Response Theory to measure Environmental Management evidence among industries in Brazil. The intention of such measurement is to evaluate the quality and propriety of each item individually, placing items and respondents on a single scale.

Final Remarks

The guest-editors of this special issue of the BJOPM believe that the papers of this special issue provide an interesting contribution to sustainability within some

industrial engineering fields by offering a broad look at challenges and key innovations that occupy the minds of practitioners and academic researchers. Taken together, the papers constitute stimulating reading for different audiences in the different fields of industrial engineering.

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