Production Planning & Control

Special Issue "**Sustainable manufacturing**"

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Statement of scope

Sustainable Development (SD) aims at improving the quality of life and well-being for present and future generations. It was defined by the Burtland Commission, more than 20 years ago, as "… development that meets the needs of the present, without compromising the ability of future generations to meet their own needs". [1]This definition is still valid and, today, the aims of SD are pursued with increasing world-wide attention by Governments, Industry as well as by Research and Educational institutions. Within the SD concept, Sustainable Manufacturing (SM) is a research area which aims at the development of innovative methods, practices and technologies in the manufacturing field for addressing world-wide resources shortages, for mitigating excess environmental load and for enabling an environmentally benign life cycle of products. Given the social importance of manufacturing in our Societies, while considering its big impact from the point of view of energy consumption, use of physical resources and emissions to the environment, SM can be considered for sure a valuable topic and one of the most important issues to address in the big picture of SD.

Traditionally, Environment, Society and Economy are considered the three main dimensions of sustainability; however, especially if we focus on Sustainable Manufacturing, we should consider Technology as a fourth pillar that must not be forgotten, both for its importance as an integral component of our way of living and for the role it can play in achieving a sustainable approach in manufacturing. In this regard, research plays a strategic role in providing knowledge to innovate products, processes, production systems, industrial organizations and business models for achieving SD goals in manufacturing. Science-based disciplines and, in particular, those referring to the area of Industrial Engineering can contribute to transform research results in innovative solutions available for industry, i.e. solutions that meet the need of people, while respecting the limits of the environment in an efficient way. The importance of these topics has been recognized by the European Community that started developing new action plans [2] and already launched some exploratory research projects.

A.B. and L.H. Lovins and P. Hawken in their foreseeing article of 1999, "A road map for natural capitalism"[3] wrote that four major shifts in business practices are needed to move toward a more sustainable approach to industrial production: i) dramatically increase the productivity of natural resources, ii) shift to biologically inspired production models, iii) move to a solution-based business model and iv) reinvest in natural capital. Today, it is more than interesting to deploy these principles:

- the first objective (increase the productivity of natural resources) entails energy efficient manufacturing, improvements in the use of raw materials, new production processes and all other measures that may reduce the impact of manufacturing activity on the environment, by substantially decreasing the amount of natural resources needed for a given level in the output of manufactured products; technology may be seen as the main driver to this concern;
- the second one (biologically inspired production models) means investment in all techniques and organizational models that pursue a "biological style" into the management of products during their life cycle (i.e. to maintain, repair, re-use, retrofit products during their active life phase and to disassemble, re-manufacture, recycle products during their end-of life phase,…); this approach allows an optimized use of products during their active life and henceforth of involved materials/resources, which are re-routed to a new life or to the natural environment when the end of lifecycle is reached; both technology and organization are seen as the main drivers to this concern;
- the third objective (solution-based business models) may have a strong impact on the current business model for manufacturing, which is based on the "sale of goods" principle (where value is given to the customer through a physical product), in fact the business model proposed by this objective is based on value delivering through a flow of services, i.e. a shift is suggested, wherever possible, from an owner approach in product use to an user one (i.e. products are not sold, but are offered in a pay per use way); organization is the main driver to implement this principle;
- the last one (reinvest in natural capital) means to restore, sustain and expand the "health" of the natural ecosystem as a way to guarantee future support of the nature to the human life and to manufacturing as an activity of the human being; by the way, this objective is in line with the increasing requirements for environmental care coming from the Society and already being considered by the CSR (Corporate Social Responsibility) approach developed by the most advanced companies; societal issues may be considered as the main drivers to this regard.

The proposed Special Issue aims to open the scientific discussion on these topics by considering which challenges should be addressed by operations managers. In fact new types of products, of operations, of organization, of business

[1] Annex to the ONU, General Assembly document A/42/427, Development and International Co-operation: Environment, 1987.
[2] Action plan for sustainable consumption, production and industry, DG Enterprise and Industry, July 2008.
[3] Harward Business Review, May –June 1999

models will be needed to comply with the new constraints and the new objectives coming from the sustainability view. Obviously, a single Special Issue could never completely cover the wide spectrum of the above mentioned problems. However, the issue aims to generate a picture of the most relevant problems to deal with when approaching the operations management area under a sustainable manufacturing objective. Papers on the following topics are expected to be appropriate for the issue:

Business models for sustainable manufacturing
New production models
Sustainable product design and development
Sustainability and competitiveness in manufacturing
Operations and Corporate Social Responsibility
Product lifecycle management
Lifecycle engineering
Energy / waste management
Energy efficient manufacturing
Maintenance for Sustainable Manufacturing
Total Quality Environmental Management
Role of services in sustainable manufacturing
Disassembly technologies
Reverse logistic
Green supply chain
Green Procurement
ICTs for sustainable manufacturing

Papers or enquiries should be addressed to the Guest Editors at:
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