Reflections on CP development in Brazil and the Production Engineering actions

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Over the years, the evolution of environmental awareness is improving practices of corporate governance. Driven by the requirements of government, society and the production chain, organizations are adapting to search for sustainability in their business. The Cleaner Production methodology, created by UNIDO/UNEP in 1989, is gaining strength in this direction, allowing the implementation of sustainable practices in micro and small enterprises. Providing preventive practices, Cleaner Production fosters innovation, adding tangible and intangible benefits, and generating competitiveness and profitability for companies.

Performance in Production Engineering needs to focus on Skills considering a broader view of business competitiveness facing services, and according to the principles of sustainable development of the internal and external organizations' requirements.

Development

Due to major environmental disasters and to the pressure of the interested parts, the concept of managing the quality has been enhanced in recent decades. In 1960, the control was achieved through pure and simple inspection of the final product. Then, this concept was a purely statistical control where techniques of products sampling were used; in a third phase, called quality assurance. All functions of the company were designed as part of the success-failure in the search of quality. In the current concept, the quality is treated as a strategic function of the organization and known as TQM (Total Quality Management). The implementation of management practices is directly related to the improvement of procedures regarding customer satisfaction.

Environmental issues were incorporated in the organizations management since February 12, 1988, with the Law nº 9605 - Law of Environmental Crimes, which

"provides for criminal and administrative penalties derived from activities detrimental to the environment". The environment gained companies, regulators and control organs respect, especially their leaders, who felt "encouraged" by this law to value the environment, answering for their acts or omissions.

Given the society mobilization, companies began to internalize environmental issues in their business. Environmental issues are now seen as strategic areas within many companies. In some cases, companies have adopted their own specific strategies.
Currently, the major challenge for companies' executives is to identify the best strategy to maximize environmental opportunities related to their business. Government and financial institutions initiatives are providing good opportunities and benefits to establish environmental and social projects, especially for companies that already have this culture. Therefore, environmental methodologies were created to facilitate the implementation of these strategies, and among others, Cleaner Production is getting success.

Cleaner Production strategies are defined as preventive approaches to products and processes that allow progress through the objective of minimizing the waste; reducing the use of raw materials and energy; maximizing the efficiency of energy consumption and minimizing environmental impacts in all stages of production and consumption, through changes in the design, production, distribution, consumption and disposal of final products. The methodology is made up of the technical, economical and environmental evaluation of a production process through its detailed analysis and subsequent identification of opportunities, enabling to improve process efficiency. The application of Cleaner Production (CP) methodology shows to businesses that the environmental issues are strategic for competitiveness.

For the success in the implementation of sustainable practices through Cleaner Production, a stage of awareness of the Ecoteam (the project team) is essential. The

human being is the driver force of the change. The actions direction is proportional to the degree of knowledge and awareness on the issue under questioning.

In 2005, the Cleaner Production Nucleus of FIRJAN's Department of Environmental Systems assisted 28 companies of various sectors and sizes: 18 micro and small, 4 medium and 6 large companies. The results were condensed into four main groups: reducing the electricity/gas consumption, reducing waste generation, reducing water and raw materials consumption. Results were quite significant and meaningful. The average payback time was about 5 months, with the total economic benefit of more than $ 2 millions.

These data evidence that Cleaner Production methodology allows changes in the production process conjugating economic growth with environmental preservation, through the creation of technological solutions focused on pollution prevention. For this, investments in machinery and equipment are not enough. It is also necessary to invest in good managerial, planning and training techniques, as people are those who generate innovations with ideas and creativity, providing the competitive differential for businesses.

Conclusion

Organizations under Production Engineering actions need to gain skills for creating macro optimization of production operations from the following:

- Analyzing conjunctural pressures exerted on the Product Design and Organizational Design operations, in the context of two vectors: (1) top-down and bottom-up perspectives within the internal stakeholders and (2) Social Responsibility and Environmental perspectives of market, and the existing reserves of external stakeholders.

- Settling Product Design and Organizational Design operations in the context of a business broader view, through a Systemic View influenced by new competitive and regulatory parameters (carbon emission; image associated with the cleaner production; ecoeffciency and cleaner technologies; operation permissions).

- Defining responsibilities for Product and Organizational Design with respect to the modeling of strategic contexts associated with cleaner technologies and ecoeffciency.

- Establishing models for planning, implementing, controlling and improving Organizational Design operations, and placing the consequences in Product Design.

- Studying the interface between Product Design and Organizational Design operations, in order to refine decision-making process through joint decisions.

- Modeling Organizational Design operations, by setting and balancing supply chains, allied with improved Product Design operations, accordingly to concepts of ecoeffciency, cleaner technology and processes rethinking from the Cleaner Production view.

- Constructing performance indicators matrices for Product Design and Organizational Design operations considering the needs of internal and external stakeholders.

- Thinking the dialogue with parts impacted by the process of business organization, permanently and openly.

- Structuring the governance associated with an ethical nucleus, actuating on impacted parts by its internal and external processes.

- Taking as principles of operational and strategic decisions those associated with sustainable development.