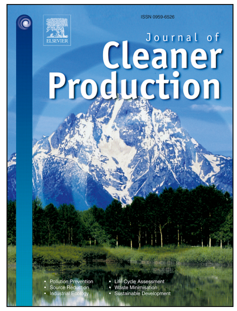

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Inventive Guidelines for a TRIZ-based Eco-Design matrix

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Abstract

Most common eco-design methods for SMEs often provide guidelines and suggestions too general, if not contradictories, to be considered as a real design practice. This paper presents a method, named "iTree", based on a set of eco-design guidelines specifically conceived to support designers in developing new greener products in accordance with the output of a product Life Cycle Assessment-LCA. The "iTree" guidelines are particularly suitable for SME - Small and Medium Enterprises, because they do not specifically require eco-design or problem solving experts. They have been conceived to suggest clear and detailed suggestions on where and how to intervene and are based on problem solving methods, such as TRIZ, design for disassembly, and other computer aided tools, adapted for eco-design purposes and simplified for non-expert users. "iTree" method provides the user with an easy and graphical way to visualize the life cycle inventory and critical areas of intervention. For each area, it suggests only the pertinent set of guidelines, customized to the specific situation. In this way, there is a direct link between the visual outcomes of the Eco-assessment phase and the Eco-improvement phase.

The experimentation of the proposed method and guidelines is described with an explanatory example. Furthermore, the method has been tested within the European project, named Remake, which aimed at testing new methods of eco-improvement for SMEs in Europe.

Keywords: Eco-Design; TRIZ; Guidelines; Eco-improvement.

1. Introduction

Nowadays the concept of *sustainability* is considered in many professional sectors with the primary objective of "meeting the needs of the present without compromising the ability of future generations to meet their own needs" (United Nations, 1987). Within such ambitious purpose, the preservation of natural resources and the protection of air, water and soil from pollution are indispensable targets. In order to achieve them, many design for environment methodologies have been conceived (Ilgin and Gupta, 2010; Singh et al. 2009; Spangenberg et al., 2010) and applied to different fields, such as Design for Recovery and Reuse, Disassembly, Waste Minimization, Separability, Energy Conservation, Material Conservation, Chronic Risk Reduction, and Accident Prevention (Zhang et al., 1997).

From the designer's point of view, the final goal can be defined as the "creation of an artifact, product, system, or process that fulfills some functional requirements at some desired level of performance, including the functional requirements of "no-impact" on the environment" (Bryant *et.al*, 2004). The decisions taken during the design stage are responsible for the largest part of the economic and environmental resources requested to sustain the whole product lifecycle. Indeed,