Development of A Hybrid Environmental Impact Assessment Model: A Case Study on Computer Displays

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Abstract:
Existing methodologies for conducting an environmental impact assessment of alternative technologies have some limitations: some cannot detect the full range of important impact categories involved in all of the life cycle stages; some cannot focus on major important impacts at the early stages; some lack the mechanism to transparently reflect the values of different stakeholders. This paper presents a new approach for environmental impact assessment in a multi-attribute framework by using a modified Quality Function Deployment (QFD) methodology. We have applied this hybrid methodology to a previously published Life Cycle Assessment on computer displays. Our focus is on the evaluation and comparison of life-cycle environmental impacts, cost and performance attributes for cathode ray tubes (CRTs) and liquid crystal displays (LCDs). From a methodological aspect, our approach is aimed at considering all of the life cycle stages and several important impact categories with coherent treatment of the basic data in a matrix-based QFD structure. Concurrently, some statistical methods and different sets of models (such as Median Ranks, Prioritization Matrix and Analytical Hierarchy Process) are incorporated into the weighting and rating process. This allows us to elaborate the specific assessment steps and to provide a valid and systematic analysis. Our objective is to provide a feasible and easily accessible methodology so that display technology selection matrices can be developed on the basis of different stakeholders’ values. The limitations and challenges associated with this methodology are also identified and discussed in this paper.

Key words: Environmental Impact Assessment, Quality Function Deployment, Hybrid Methodology, Life Cycle Assessment, Computer Display Technology