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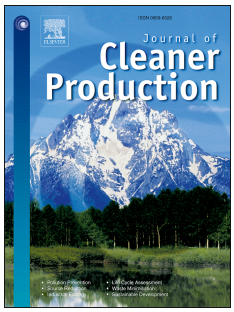

Review of Life Cycle Assessment towards Sustainable Product Development

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Nowadays, environmental problems have aroused public awareness about the trade-off between economic growth and environmental conservation. In this regard, sustainable development plays a crucial role in striking a balance between the demands of social productivity and the reserves of natural resources. In the realm of sustainable development, life cycle assessment (LCA) is an important tool to assist in ensuring proper sustainability through assessing the environmental impacts of product designs. Unlike previous reviews, which mainly focus on LCA methodology, this paper presents LCA related studies from the perspective of product development applications. In this article, the approach on how LCA can be used in product development is introduced step by step, from concept design, part design, and process design to decision making. The applications of LCA come in different forms such as impact assessment, selection, classification and decision support. The issues or challenges with respect to the four steps of LCA (i.e. goal and scope definition, life cycle inventory, life cycle impact analysis, and interpretation) have been examined and investigated. Corresponding models and theories for coping with these challenges are reviewed. In particular, widespread and popular analytical tools are identified and highlighted. Considering the vague measurement of environmental impact in an agile manufacturing system, it is suggested that the development of LCA should keep pace with the advancing complex product development system. Overall, this article sheds light on the trend of LCA applications in sustainable product development and provides the prospect of promising research directions for LCA researchers and practitioners.