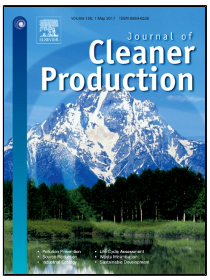
Accepted Manuscript



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PII:	S0959-6526(17)30661-3
DOI:	10.1016/j.jclepro.2017.03.196
Reference:	JCLP 9323
To appear in:	*Journal of Cleaner Production*
Received Date:	04 July 2016
Revised Date:	07 February 2017
Accepted Date:	28 March 2017

Please cite this article as: Ahmed H. Salem, Ahmed M. Deif, Developing a Greenometer for Green Manufacturing Assessment, *Journal of Cleaner Production* (2017), doi: 10.1016/j.jclepro.2017.03.196

Developing a Greenometer for Green Manufacturing Assessment

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Abstract

In this paper a toolbox (Greenometer) to assess the greenness level of manufacturing companies is proposed. The assessment approach is based on capturing the relative greenness position of any company among other industries from different sectors as well as within the same sector. The assessment was based on selected greenness attributes and their composing indicators at each of the two levels of the developed Greenometer. Geometric Mean Method (GMM) was adopted to be the generic assessment technique for cross industries greenness evaluation, while Data Envelopment Analysis (DEA) was employed to assess the greenness level of intra-industries layer. Three different industrial applications were used to demonstrate the applicability of the developed Greenometer. Results highlighted how the proposed tool can be a useful for manufacturing managers not only in understanding their green performance position at various levels, but also aiding them in their green transformation/improvement efforts. Specifically, the Greenometer assessment scores will help in setting plans through highlighting prioritized areas of required improvement as well as offering quantitative targets and tracking metrics along the transformation journey.

Keywords: Greenness assessment, Data Envelopment Analysis (DEA), Geometric Mean Method, Manufacturing (GMM).

1. Introduction

A sustainability revolution is now taking place to address the challenges of production and consumption in this century. Continuously published statistics and research capturing the rate of resource consumption and industrial growth has increased public awareness and concern over the environmental and social impact of the failures of industrialization: the environmental disaster is being seen for what it really is (Barber, 2007). Sustainability is about building a society in which a proper balance is created between economic, social and ecological aims

Green manufacturing is at the center of this sustainability revolution. The term green manufacturing was coined to reflect the new manufacturing paradigm that implements various green strategies (objectives and principles) and techniques (technology and innovations) to become more eco-efficient (Deif, 2011). There are strong customer, government and business pressures to embrace green manufacturing. This led to the development of multiple research and practical