



Review

Towards sustainable development through the perspective of eco-efficiency - A systematic literature review



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ABSTRACT

Sustainability concerns have increasingly gained importance among organizations and their stakeholders around the world. In this context, eco-efficiency has become a consistent tool towards the transition to sustainable development and the efforts of eco-efficiency indicators have been used for comparative studies and decision-making tasks, providing better financial, environmental, and social performance. The aim of this paper is to provide a systematic literature review on the theme of sustainable development from the perspective of eco-efficiency, with the adaptation of the Knowledge Development Process intervention instrument - constructivist (ProKnow-C). The paper identifies and structures the state-of-the-art between Eco-Efficiency and Sustainable Development with a view to: (i) selecting a Bibliographic Portfolio (BP) that is aligned with the perception of the researchers on the theme; (ii) performing a bibliometric analysis of the selected BP; (iii) performing a thematic synthesis; (iv) finding the integration of eco-efficiency and sustainable development with other approaches; (v) proposing an innovative framework to achieve sustainable development through eco-efficiency indicators; and (vi) finding paths for further research. This research makes multiple new contributions, providing both academics and practitioners a better panorama to achieve sustainable development through eco-efficiency by expanding the literature review, highlighting the synergies and barriers between eco-efficiency and sustainable development and by comparing and analysing them, showing its relevant features. In addition, we synthesized the contributions of the BP according to the BASF indicators, sustainable dimensions and four measurement levels: industry, organization, project and process to better describe the current academic scenario on the subject.

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Contents

1. Introduction	891
2. Background and terminology	891
2.1. Eco-efficiency	891
2.2. Achieving sustainable development through eco-efficiency	892
3. Methodology	893
3.1. Methodological framework	893
3.2. Delimitations of the research	893
3.3. Procedure for the selection of bibliographic portfolio (BP)	893
3.4. Brute database filtering	894

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4.	Analysis and discussion of results	894
4.1.	Bibliometric analysis	894
4.1.1.	Impact factor of the journals	895
4.2.	Descriptive analysis of BP	895
4.2.1.	Year of publication	895
4.3.	Journals of publications	895
4.4.	Geographical focus	895
4.5.	Study methodologies	896
4.6.	Industrial sector focus	896
4.7.	Thematic synthesis	896
4.8.	Integration of eco-efficiency and sustainable development	896
4.9.	An integrative eco-efficiency indicators framework towards sustainable development	897
4.10.	Paths for further research	900
5.	Conclusions	901
	Appendix	902
	References	903

1. Introduction

Sustainability concerns have increasingly gained importance in practice and in academic discussions over the last several decades, and more recently with the UN publication “The Future We Want” one of the outcomes of the World Conference on Sustainable Development (Rio+20) held in 2012 (Leal Filho et al., 2015). According to Park et al. (2015), concerns about the planet’s sustainability have grown after the United Nation’s Conference on the Human Environment (a.k.a. Stockholm Conference) in 1972, which initiated the concept of sustainable development as a pathway for improving the quality of life for future generations.

Nowadays, the majority of organizations are seeking to achieve sustainable development with respect to “green” concepts and one of the main criteria for assessing green performance is eco-efficiency (Rashidi and Farzipoor Saen, 2015). Eco-efficiency is an improved measure of sustainability because it links environmental impacts directly with some kind of economic performance (Müller et al., 2014) and it works as a valuable tool towards sustainable development (Charmondusit et al., 2013).

In order to monitor environmental impacts, eco-efficiency indicators emerged, designed to analyse the development of eco-efficiency by measuring economic activity, both in terms of consumption and production, as well as the corresponding impacts. The assessment of these eco-indicators complements the traditional technical and economic evaluations of engineering projects and supports the decision-making process.

Eco-efficiency indicators can also be used to measure the eco-efficiency of different sectors within a country; to compare eco-efficiency within the same industry in different countries; and to identify possible areas of in which ecological efficiency can be improved. This is reflected through a number of studies that have considered the relationship and investigated the impact of eco-efficiency initiatives on the economic and environmental performance of organizations disregarding the social dimension (Charmondusit et al., 2013) - despite its importance in order to reach the goals of sustainable development (Mickwitz et al., 2006; de Almeida Guimarães and Leal Junior, 2017). However, despite these studies, a comprehensive review of published scientific articles on eco-efficiency practices and indicators seeking the sustainable development in industries, firms, projects and processes is currently lacking.

Besides that, the academic literature and research lines exploring the impact of eco-efficiency indicators on sustainability performance (Zhang et al., 2008; Rashidi and Farzipoor Saen, 2015)

and synergies of eco-efficiency and sustainable development initiatives (Hoffren and Apajalahti, 2009) still remain in early stages. Additionally, it lacks of a clear and structured research definition that may result in difficulties to advance this promising research area. Moreover, still there is a research gap on the literature on a holistic framework used to assess the eco-efficiency of products and services and reach the economic, environmental and social dimensions - TBL (triple bottom line) proposed by Elkington (1998) - in an integrated way, as highlighted by Hart and Milstein (2003) and Abreu et al. (2017).

Attending to the above mentioned motivation, this paper aims to map Sustainable Development from the perspective of eco-efficiency in main Electronic Databases (EDs). This was to be done through a method of systematic literature review, with the implementation of the adaptation of the Knowledge Development Process intervention instrument - constructivist (ProKnow-C). With this in mind, the following specific objectives were outlined: (i) to select a Bibliographic Portfolio that is aligned with the perception of the researchers on the theme of sustainable development, from the perspective of eco-efficiency; (ii) perform a bibliometric analysis of the selected Bibliographic Portfolio; (iii) perform a thematic synthesis; (iv) find the integration of eco-efficiency and sustainable development with other approaches; (v) propose an integrative framework to implement sustainability through the eco-indicators; and (vi) find paths for further research.

Furthermore, this research intends to contribute to the scientific community on the theme studied, since it presents a representative selection of international research in an interdisciplinary area. It is a relevant issue in which there is a significant dialogue of environmental, chemistry and industrial engineering, enabling the researchers to contribute with relevant research. The new contributions of the present paper are: 1) expand the literature review; 2) highlight the synergies and barriers between eco-efficiency and sustainable development; and 3) compare and analyse them, by showing its relevant features.

2. Background and terminology

2.1. Eco-efficiency

The World Business Council for Sustainable Development (WBCSD) defined eco-efficiency as: “The delivery of competitively priced goods and services that satisfy human needs and bring quality of life, while progressively reducing ecological impacts and resource intensity throughout the life-cycle to a level at least in line

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