


Chapter 9

A Bibliometric Analysis on Efficient Use of Environmental Resources

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ABSTRACT

The relevance of sustainability in contemporary society is on a growing trend owing to the predominance of economic development and environmental conservation plans amidst challenges of climate change. Eco-efficiency is a growing tool to qualify economic and environmental sustainability. In this chapter, the trends of eco-efficiency over the last three decades were evaluated in a bibliometric analysis from publications in the Web of Science database. An analysis of the publications, the journals they were published in, keywords used, and citations among other aspects was done using the VOSviewer software. Findings showed that the eco-efficiency concept was predominantly applied in the environmental sciences and technology fields among others. The growth in the concept was exponential, and the majority of publications were from developed countries. The application of the concept is a roadmap to better resource management and sustainable development.

INTRODUCTION

Over the last ten years, concerns regarding sustainability have increased in academic forums and in scientific fields as Caiado et al. (2017) pointed out. For instance, a publication by the United Nations titled, “The future we want” and an outcome of the Rio global conference on sustainable development in 2012 has laid bare these concerns (Leal Filho et al. 2015). The aim of these concerns is to develop a

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pathway in which the quality of life will be improved for the current and future generations. With respect to greening and environmental sustainability, most organizations are proactively seeking for solutions and production processes that embrace eco-efficiency (Caiado et al. 2017). Eco-efficiency links economic performance (production and consumption) to environmental sustainability and is therefore, a valuable metric of sustainable development (Zielinska-Chmielewska et al., 2021).

Efficient use of environmental resources commonly known as eco-efficiency is an essential tool for sustainable industrial activities. The relatively new concept involves control of environmental effects of manufacturing and production activities and misuse or overuse of resources during the life cycle of products to prevent the earth from exceeding its consumption limits (Wursthon et al., 2011). According to Gomez et al. (2018), eco-efficiency is a transformational tool towards enhanced environmental value, economic costs and production processes with minimal negative environmental effects. The processes involved in this concept ensure multi-sectoral diversity in production processes using lower input quantities that ultimately result to reduced carbon emissions (Koskela & Vehmas, 2012; Li et al., 2012; Yin et al., 2014). Adoption of effective eco-efficiency entails both economic and environmental re-considerations of production processes using techniques such as indexes system method, stochastic frontier analysis, data envelopment analysis and life cycle analysis (Ji, 2013; Barath & Ferto, 2015). By value addition using fewer inputs for environmental sustainability, eco-efficiency has been widely applied in many fields of business economics, science and engineering among other anthropogenic and industrial activities.

With advances in eco-efficiency, productive approaches are moving away from short-term and adopting long-term profit strategies to provide clients with durable products. Evenly, clients are increasingly aware of environmental benefits of consuming newly designed greener products. Consequently, sustainable production approaches have become a competitive advantage for manufacturing firms (Czaplicka-Kolarz et al. 2013). Although there are benefits associated with eco-efficiency, some authors question if it represents overall sustainability change considering that it measures the environmental pressure associated with productive activities (Bonfiglio et al. 2017). To support this suggestion Czyzewski and Matuszczak (2017) were of the viewpoint that eco-efficiency is a measure of absolute environmental pressure levels. To demystify the actual trends in eco-efficiency and understand its actual output, an extensive analysis of research on the topic is essential.

An extensive assay of the current trends and data on eco-efficiency is therefore effective to track and monitor its application in various institutions and fields as the environmental sustainability debate advances. Bibliometric analysis is one of the suitable methods to track the concepts, technologies and emergent topics in eco-efficiency. Li and Zhao (2015) lauded the technique as effective in quantitative and statistical analysis of any specified research interest. This book chapter aimed at applying bibliometric analysis to assay the research trends on eco-efficiency application and provide insight in the area as well as advice on the future prospects in the field towards environmental sustainability. The research will promote the adoption of eco-efficiency in future production and consumption activities and make recommendations on how to promote research in the subject globally. Eco-efficiency trends in the last three decades (1990 – 2020) were assayed based on the growth in publication predispositions, journals, institutions, countries, citations and keywords using the VOSviewer software.

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