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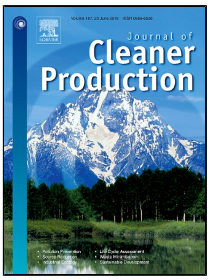

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ABSTRACT

This paper addresses the result of a case study applying green productivity and sustainability assessment to the motorcycle tire production process. The main objective of this study was to obtain a potential productivity improvement scenario and, at the same time, perform a sustainability assessment of motorcycle tire production. The study was conducted by combining a green productivity analysis with a material balance and green value stream analysis, a sustainability assessment with multidimensional scaling and a fuzzy analytical hierarchy process (AHP), which generated possible scenarios and suggested the best potential scenario. The green productivity analysis showed that the level of productivity was higher than the environmental impact in the production process. Meanwhile, based on the sustainability assessment, the economic, environmental, and social dimensions clearly affect the sustainability. The economic dimension is considered less sustainable, while the environment and social dimensions are quite sustainable. The green productivity index is useful in highlighting the eco-efficiency indicators. The best scenario suggested to improve the productivity of motorcycle tires was a combined treatment of controlling raw material characteristics and reusing water and materials. Implementation of the best scenario would increase the green productivity index from 1.081 to 1.123. The results show that applying the best scenario could improve the performance of the motorcycle tire production process.

Keywords: green productivity, green value stream, multi criteria-multidimensional analysis, motorcycle tire, rubber, sustainability index

1. Introduction

Sustainable development (SD) has led the Asian Productivity Organization (APO) to develop the Green Productivity (GP) concept to attain a higher level of productivity to serve the needs of society while, at the same time, protecting and enhancing the quality of the environment (Hur et al., 2004). Using productivity as the economic performance rather than the economic value added, the Green Productivity index (GPI) was actually developed from an eco-efficiency concept (Findiastuti et al., 2011) to provide GP with an eco-efficiency measure. It was derived from Life Cycle Assessment (LCA) and Total Cost Assessment (Hur et al., 2004) and further developed by Gandhi et al. (2006).

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