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Environmental, economic and technical performance: a comparative study of carrier bags

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Abstract

The concept of sustainable development arose from the questioning about the availability and rate of consumption of natural resources. The methodology of Life Cycle Assessment (LCA) and the concept of Eco-efficiency have been making a high contribution to the literature. The main objective of these is to manage sustainability with results that clarify less impacting alternatives to a process or product. In this context, the unfavorable scenario of the inadequate final destination of the plastic material after its use needs further deepening. The present article presents results of an analysis performed comparing different materials for application in disposable bags according to NBR ISO 14040 standard series. Biodegradable bags developed with Ecovio® compositions (biodegradable polymer, composed of poly (butylene adipate coterophthalate) (PBAT) and poly (lactic acid) (PLA), Ecoflex® (based on PBAT), Economical and technical analysis of these compositions was compared with conventional alternatives (kraft paper bag - PAPEL and polyethylene - PE). The simultaneous balance with environmental, economic and technical impact indicators was carried out to verify the alternatives with the best behaviors. In the development of the analysis were used methodologies that evaluate both environmental performance and also characterize polymer films. The results showed that among the 12 categories analyzed, the most relevant were Solid Residues / Energy Consumption (environmental performance) and Contact Angle / Water Sorption (technical performance). Conventional bags did not obtain a financial return after final destination, however they presented the lowest cost throughout the life cycle. Finally, the combined Environmental Impact and Characterization matrices showed that the ECO sample presented the best balance, showing the lowest environmental impact and a satisfactory technical performance.

Keywords: *Biodegradable polymers, disposable bags, Life Cycle Assessment, Characterization of polymers*