

FINANCIAL FEASIBILITY ANALYSIS FOR GLASS REVERSE LOGISTICS IN BRAZIL: A LOGISTICS NETWORK MODELLING

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Introdução

The purpose of this article is to analyze the impact of logistics costs on the viability of reverse logistics of glass in Brazil, considering the stretch of the logistics chain between municipalities and glass recyclers, passing through consolidation and crushing centers.

Contexto Investigado

Glass waste shows the lowest commercial value among the main recyclable materials in Brazil, especially in the North and Midwest regions. The glass recycling in the country footprint concentrates most recycling centers in the Southeast region, generating long distance transport lanes from the other regions and thus increasing the logistics costs.

Diagnóstico da Situação-Problema

A network modelling study was performed, aiming at identifying the optimal number and location of consolidation and crushing centers for glass waste throughout the country. The optimal scenario from a cost perspective enabled the evaluation of the financial feasibility of the glass reverse logistics for all 5 regions in the country or the dimension of the financial gap for driving further initiatives.

Intervenção Proposta

A logistics network modeling was conducted from secondary data collected from several public and private entities, using the weighted K-means algorithm to identify the ideal locations for the consolidation and crushing centers (hubs). Five scenarios of volume and distinct geographical origins were elaborated and analyzed considering different amounts of hubs. In the modeling, transport distances, waste volumes, transportation costs, capital costs and operating costs for each hub were considered.

Resultados Obtidos

The main results of the comparative evaluation of the different scenarios indicate that: the 'optimal' number of hubs from the point of view of costs is quite similar between the scenarios, even considering large variations in volume and in the municipalities of origin; the reverse logistics of glass waste is not financially viable for the North and Midwest regions, where the transport distances to the recyclers are very large.

Contribuição Tecnológica-Social

The results highlight the opportunities for cost reduction through a centralized strategy for the reverse logistics of glass in Brazil, in addition to allowing the estimation of the value of the investment needed to finance the appropriate destination of post-consumer glass packaging. The study points out the economic infeasibility of recycling post-consumer glass packaging in the Midwest and North regions of Brazil from a logistical point of view, even in simulated scenarios where the number and location of consolidation and crushing centers minimize costs.