

Eco Efficiency production and environmental impact of pallets based on different materials

Master degree in Design Product Engineering

Alejandro Jose Bermudez Pulgar

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Abstract

Pallets made of polymer, metal, and composite materials compete in the global supply chain in accordance with the idea of sustainable development. The supply chain needs pallets that meet specific requirements, such as size, maximum load capacity, durability (lifespan), cost, and additional details are needed about their effects on the environment. Stringer and block pallets, for example, can be arranged in a variety of ways in terms of number, width, and spacing, where the best choice is made by suppliers, distributors, and retailers. A life cycle assessment of pallets, inventory data, goals, and system boundaries were found in 15 publications as result of a systematic and previous review of the literature. Pallets “cradle to grave” process were studied and analyzed using GaBi software integrated with Ecoinvent database to evaluate the environmental footprint (through six environmental impact categories). A CLCA (Consequential Life Cycle Assessment) was employed due to the limited data used in many life cycle phases and the avoidance of allocation through system expansion or substitution. Finally, it was estimated the environmental impact of the product's production and utilization. The impact can vary depending on the type of pallet (material) due to utilization and obtaining (raw material), for instance, a waste plastic pallet is greener than a pallet made of virgin plastic (due to the production of plastic). The eco-impact of a wooden pallet is considerable, however, other alternatives such as, waste plastic and composite pallet appear in specific industries. And the production of metal pallet has an important eco-impact and limited use, although can be used several cycles, recycled, and reused.

Keywords: Life Cycle Assessment, pallets production, GaBi, Ecoinvent, sustainability, ecofriendly

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