
Leveraging Digital Twin Technology for Enhanced Sustainable Warehouse Management

Adnane Drissi Elbouzidi*¹, Samir Lamouri*², and Frédéric Rosin*³

¹École Nationale Supérieure des Arts et Métiers – LAMIH, UMR CNRS 8201 – France

²Laboratoire d'Automatique, de Mécanique et d'Informatique industrielles et Humaines - UMR 8201 – Arts et Métiers Paris Tech – France

³Arts et Métiers Paristech ENSAM Aix-en-Provence – LAMIH, UMR CNRS 8201 – France

Résumé

The growing environmental impact of the transport and warehousing sectors underlines the urgency of finding sustainable solutions. This article explores the potential of digital twins in green warehouse management to meet this challenge. Traditional methodologies are often insufficient to assess all-around sustainability problems through general Top-Down methodologies. This is why they require innovative approaches such as a Bottom-Up digital twins-based tool. By integrating existing frameworks into the virtual model, warehouses can improve sustainability metrics and make informed operational decisions. This article focuses on modeling environmental impacts within the framework of digital twins, presenting a comprehensive review of the literature to define appropriate sustainability indicators to be included. Environmental impact assessment methodologies are discussed, followed by a case study illustrating the effectiveness of digital twins.

Keywords: environment, sustainable warehousing, digital twin, sustainability, Industry 5.0

*Intervenant