

# **Let Customers Scatter the Inventory: A Multi-Objective Storage Location Assignment in Warehouses**

## **Abstract**

The rapid growth of online retailing necessitates flexible warehouse management strategies to adapt to this evolving landscape. One of the key challenges in this area is to reduce the order-picking travel distance. This travel distance is highly affected by the Storage Location Assignment (SLA) decision, which determines how products are allocated to locations in the warehouse. This study aims to develop a mixed SLA strategy which tries to adopt different SLA strategies to some degree that is tailored to the customer order pattern. To do so, four criteria are defined to assess the SLA state: (a) Scatteredness: increases the accessibility of each Stock Keeping Unit (SKU) by spreading its units through the storage locations. (b) Integrity: avoids collecting a single order-line from multiple locations by keeping sufficient number of each SKU in its storage location(s). (c) Association: stores correlated SKUs close to each other. (d) Depot adjacency: stores high-demand SKUs near the depot(s). To address the dynamic nature of business needs, a data-driven approach is introduced to weight each criterion. Then, A multi-objective mathematical model, incorporating contextual constraints and these weighted measures, is proposed to optimize the SLA. As the ultimate goal is to reduce the order-picking travel distance, the proposed model and hypothesis will be validated for this goal under various business environments.

**Keywords:** Storage location assignment, Data-driven, Multi-objective optimization, Warehousing.