

ABSTRACT

Inefficient warehouse layout, especially one that disregards product movement characteristics, can lead to suboptimal internal distribution flows. This study was conducted at the distribution warehouse of PT Nusantara Bangun Mitrautama with the aim of redesigning the warehouse layout using the Class-Based Storage method combined with FSN and ABC classifications. The data used include product characteristics, volume, movement frequency, and storage positions. FSN classification is based on consumption rate, while ABC classification refers to the frequency of item dispatch and receipt. Space requirement analysis was carried out by evaluating item dimensions and stacking estimations, then comparing the current layout to the proposed design. Furthermore, material handling distance was calculated using the rectilinear distance approach to assess the effectiveness of item movement. The analysis shows that the existing layout resulted in a total material handling distance of 67,327,465.5 meters per year, while the proposed layout successfully reduced it to 52,473,630.5 meters, achieving an improvement of approximately 22%. The redesigned layout also produced better storage zoning aligned with the movement classification of each item. Fast-moving and A-category products were relocated closer to the outbound gate, while slow-moving and non-moving items were placed in less accessible areas. These results demonstrate that implementing a Class-Based Storage layout based on FSN and ABC classifications is effective in improving space utilization and reducing material handling workload. This study is expected to serve as a reference for companies aiming to optimize warehouse operations systematically and data driven.

Keywords: *Warehouse layout, Class-Based Storage, ABC, FSN, rectilinear, material handling optimization*