Chapter 112
Intelligent Slotting for the Warehouse

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ABSTRACT

In the current and future Supply Chain landscape, we need to ensure that we keep the warehouse ship sailing amidst the turbulent waters of dynamic business growth and rapid changes in technology. There are several challenges to be overcome, and many opportunities to be embraced on the path to achieving this. In this chapter, the authors detail one of the key problems facing the warehouse and that is Slotting. They look at the various business drivers, and technological drivers impacting Slotting. They propose a solution to tackle this problem by using Market Basket Analysis and Machine Learning.

INTRODUCTION

A supply chain encompasses the physical and information flows involved in the buying, manufacturing, and delivering a product or service. Supply Chain Management (SCM) deals with the strategies for sourcing, storing, and delivering the right products to the right locations at the right time to the right markets. Warehouses play a critical role in the supply chain. They help to store the goods closer to the market so that the demands can be fulfilled on time. The major activities in warehousing are:

- Receiving,
- Storage,
- Picking,
- Shipping.

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Slotting refers to the optimal placement of the items in warehouse locations such that they can be picked in the least time with maximum accuracy and maximum space utilization. Within a warehouse, it is critical to store the right product in the right location for speedy retrieval. This improves the overall efficiency of the warehouse. The key performance indicators for a warehouse (pick efficiency, pick accuracy, and space utilization) can be considerably improved by efficient slotting.

Pick efficiency refers to the speed at which orders can be picked from the storage location and delivered to the shipping location. Pick accuracy measures the percentage of successful picks. Space utilization measures the percentage of wastage in space.

Picking incurs the maximum cost in a warehouse and efficient slotting can significantly reduce warehouse expenditures and increase warehouse efficiencies. Figure 1 illustrates the need for slotting.

From Figure 1, we can see that when products are distributed across aisles, the travel time increases, and correspondingly the picking efficiency decreases. For example, consider an order of 12 units located in 12 locations. The travel time nearly doubles if these locations are spread in four aisles instead of two aisles.

Ensuring efficient slotting for a medium to large scale warehouse necessitates a slotting planning and optimization software solution. A slotting tool is a supply chain execution software application that uses algorithms to create an optimized slotting plan based on a variety of factors (Trebilcock, 2011). It uses variants of slotting optimization software. Till date, various solutions have been deployed for generating optimized slotting plans. However, these solutions are unable to scale to meet the dynamic nature of the present day business scenarios (SCDigest, 2008).

The following business drivers make the existing slotting solutions outdated and shape the need for faster, more flexible and intelligent slotting solutions:

Figure 1. Slotting aisles