



Warehouse Activity Profiling & Order Picking Productivity

A warehouse is a complex and busy supply chain entity, where it is difficult to get an accurate sense of what is going on. Data analytics on warehouse comes under activity profiling, which carefully measures the activity in warehouse and analyzes it statistically. Essentially first step of any warehouse project is to understand the customer orders, which drives the system.

A detailed analysis of warehouse can be done with historical and current data, which can help consultants and practitioners in the field to make decision on various kinds of issues like storage and handling alternatives, slotting options, pick line requirements, system requirements, pick methods, and order releasing strategies.

Types of Activity Profiles

There are two main categories of warehouse profiling, customer order profiles and item activity profiles. A customer order profile deals with behavior of customer orders, is an outbound activity i.e. ordering patterns of the customer orders. An item activity profile is related to the in-house behavior of items in the warehouse i.e. dynamics (frequency, cube movement etc.) of the stock keeping units, provides support in making decision for storage and slotting options. A good analysis can even give us an idea of how to prepare the warehouse for future needs and can establish bench marks on warehouse operations like receiving, put-away, order-picking, checking, packing, shipping etc.

Warehouse Slotting for Productivity

Order picking is the most labor-intensive and costly activity in the warehouse. The order picking cost can be saved by minimizing the travel distances through allocation of most popular items near input/output point in the warehouse and slotting related stock keeping units together.

The relationships among the stock keeping units can be defined in term of affinity and association, where affinity is a non-random (have some natural correlation) occurrence of two or more stock keeping units appearing on a single order and association between two stock keeping units is absolute number of pair picks in an order data.

Affinity Factor

The affinity factor quantifies the degree of affinity between a pair of SKUs. It is defined as the ratio of the observed number of times a pair of SKUs is picked to the number of times these SKUs are expected to be picked together. Formally, the affinity factor can be defined as:



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About DecisionCraft Analytics

We provide decision-making solutions to improve operational efficiency and business responsiveness. Our consulting services employ our strengths in industry knowledge, conceptual rigor, and information technologies. Developed using concepts from decision theory; our solutions use robust optimization, simulation, and statistical engines adapted to our client's focus areas.

DecisionCraft Services

Business Diagnostics

We analyze business processes and transactional data to identify underlying patterns, unravel hidden relationships and recommend areas for improvement that can improve ROI and reduce costs.

Predictive Analytics

We use historical data intelligently to develop a view of future market trends and help our clients focus on the right audiences thereby developing their competitive edge.

$$\alpha = \frac{\text{Observed Number of Pair Picks}}{\text{Expected Number of Pair Picks}} = \frac{O}{E}$$

Association Factor

The association factor quantifies the degree of association between a pair of SKUs. It is defined as the ratio of the observed number of times a pair of SKUs is picked to the total number of order picks. The order pick is total number of orders in an order data. Formally, the association factor can be defined as

$$\beta = \frac{\text{Observed Number of Pair Picks}}{\text{Total Number of Order Picks}} = \frac{O}{T}$$

Numerical grouping is an activity, that is performed to find out the correlated groups of SKU's from a given sales data file of a warehouse or distribution center. The grouping is performed to find out the opportunity of cost saving by slotting the related SKU's together in a warehouse.

Findings

We found from our research that popularity adjusted affinity slotting is the best cost saving option for the warehouses with sku families having slow and fast movers. Affinity slotting exploits the sample correlation between fast and slow moving stock keeping units and popularity adjustment helps in pushing the slow mover cluster at the back of the warehouse. Affinity is stronger than association in setting up the relationship between the stock-keeping units because it starts sensing movement variability (fast/slow) between stock keeping units earlier than association.

Next Issue: To be decided
 Previous Issue: [Revenue Management](#)

Forecasting
 We use advanced time-series and regression techniques for forecasting behavior of critical business variables that allows our clients to plan for their resources intelligently.