The Impact of Order Picker Skills on Warehouse Performance

Batching orders and routing order pickers is a commonly studied problem in many picker-to-parts warehouses. Many studies have focused on minimizing picker travel. However, the impact of individual differences in picking skills on performance has received little attention. We show that taking into account differences in the skills of individual pickers when assigning work has a substantial effect on total batch execution time and picker productivity. We demonstrate this for the case of a Finnish retailer. First, multilevel modeling is used to forecast batch execution times for individual pickers. Next, these forecasts are used to minimize total batch execution time, by assigning the right picker to the right order batch. We formulate the problem as a joint order batching and generalized assignment model, and solve it with an Adaptive Large Neighborhood Search algorithm. Our method is applicable to any modern warehouse using computer assisted picking tools storing time-stamped operational data. We show that total time savings of over 12% are gained in our sample warehouse when compared to the current situation. We also show that a solution found by a state-of-the-art batching algorithm can be further improved by 9%, by taking into account differences among workers. These results suggest in-between picker differences should be included into the decision making process when optimizing warehouse operations for order lead time.