Keywords: Logistics; Warehouse design, planning and control; Metaheuristics

Title: The use of order forecasts in the online integrated order batching, picker routing and picker scheduling problem

Companies need efficient order picking operations to offer a competitive service level at a low cost. These order picking operations consist of multiple interrelated planning problems: order batching, picker routing and picker scheduling. Although these problems are usually solved individually, solving them in an integrated way leads to improved solutions. This integrated batching, routing and sequencing problem (IBRSP) has been studied in a static setting. However, in practice, new orders arrive throughout the day and may need to be picked very quickly to fulfil urgent customer requests.

Therefore, we propose a new variant of this problem, the online IBRSP, and a meta-heuristic algorithm to solve it. Every time an order picker finishes his previous task and requests a new picklist, we check whether new orders arrived. If new order arrivals occurred since the last optimization, a new schedule is constructed by integrating these new orders in the previous schedule.

Because urgent orders may arrive during the picking operations, it may be necessary to reserve some time for these dynamically arriving orders from the beginning of the planning horizon to avoid tardiness. Therefore, we study how much time should be allocated to these forecasted orders in order to minimize tardiness while keeping the order picking cost under control.