The ever increasing expectations of customers require companies to improve their operational performance. After the customer enters an order in the system, the ordered goods have to be picked in the warehouse and delivered to the customer's location. In the traditional order handling process, the order picking and order delivery processes are handled individually. The ordered items have a certain picking deadline, and the order picking operations are optimised based on this deadline. Afterwards, the delivery operations are scheduled to deliver the items to the customer. However, interactions between order picking and delivery exist, which are ignored in this sequential optimisation approach. Therefore, the use of more complex solution algorithms, taking the interactions between picking and delivery into account, may lead to better solutions.

Previous research already looked into the integration of order picking and delivery. The results indicate that solving the integrated problem leads to considerable efficiency improvements compared to handling both problems individually. In the existing studies, however, all orders were available at the start of the planning period. In practice, orders will arrive during the operations, requiring a solution algorithm capable of dealing with dynamic order arrivals. Solution approaches handling dynamic order arrivals do exist for the order picking and vehicle routing problems individually, but are not yet studied for the integrated problem.

We propose new metaheuristic algorithms to solve the integrated problem while accounting for dynamic order arrivals. Multiple solution algorithms were developed and tested, each solving the problem in its own specific manner. Based on these tests, benefits and drawbacks of the different algorithms can be studied, leading to better insights in the integrated problem and its preferred solution approach.