**Magister en ciencias de la Ingeniería, mención Ingeniería Industrial**

**Propuesta de Tesis**

**Título:** Using a bin-packing viewpoint to solve the joint batching, routing and sequencing problem

**Resumen:**

Warehouses are the scene of complex logistic problems integrating different decision layers. In this thesis, we want to address the Joint Order Batching, Picker Routing and Sequencing Problem with Deadlines (JOBPRSP-D) in rectangular warehouses. Let us consider a set of customer orders to be prepared in the picking zone of a warehouse, and suppose each order is associated with a given deadline. The JOBPRSP-D is to decide how to batch orders into capacitated trolleys, how to route each trolley to collect the associated items, and how to sequence the batches to be performed by the set of available pickers such that each order is collected before its deadline.

Few works in the literature already studied this problem. Most of them propose heuristics or meta-heuristics like iterated local search (van Gils et al. (2019)). The sequencing aspect

of the JOBPRSP-D has been considered as a scheduling problem where the batches of each picker have to be scheduled in order to satisfy the orders' deadline. Recently, Briant et al. (2023) proposed a mathematical formulation based on a (multiple) bin-packing viewpoint of the problem.

Since the bin-packing problem is a well-known problem easier to model and solve than a scheduling problem, the question to investigate in this thesis will be the following: “Is a heuristic based on a bin-packing viewpoint performing better than the classical ones based on sequencing viewpoint to solve the JOBPRSP-D?”

Briant, O., Cambazard, H., Cattaruzza, D., Catusse, N., Ladier, A. L., and Ogier, M. (2023). Lower and upper bounds for the joint batching, routing and sequencing problem. arXiv preprint arXiv:2303.17834.

van Gils, T., Caris, A., Ramaekers, K., and Braekers, K. (2019). Formulating and solving the integrated batching, routing, and picker scheduling problem in a real-life spare parts warehouse. European Journal of Operational Research, 277(3):814–830.

**Palabras Claves:**

bin-packing ; warehouse management ; local search ; heuristic

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