



Research School for Operations
Management and Logistics

The decision conundrum: empowering human operators in warehouse decision

Thomas De Lombaert, Kris Braekers, Katrien Ramaekers

Hasselt University

Research Group Logistics

thomas.delombaert@uhasselt.be, kris.braekers@uhasselt.be, katrien.ramaekers@uhasselt.be

René De Koster

Erasmus University Rotterdam

Rotterdam School of Management

rkoster@rsm.nl

Warehouses play an important role in a company's supply chain and contribute to its failure or success. Several activities are performed within a warehouse, but it has been shown that order picking (OP) is by far the costliest. Therefore, warehouse managers pursue attaining high efficiency levels regarding their OP system. In the era of Industry 4.0, central planning tools play a pivotal role in warehouses, recognized for their invaluable contribution to enhancing operational efficiency through decision support. However, these (algorithmic) operational directives erode the order pickers' perceived autonomy, one of the three basic psychological needs and found to affect worker well-being. This study presents the development, testing, and post-hoc evaluation of an autonomy-increasing experiment in a real-world warehouse. We show that granting autonomy to order pickers has a beneficial impact on individual well-being as well as organisational outcomes.

We developed an order assignment mechanism (OAM) in which order pickers can choose their next order from an order set that is presented to them at the depot. This novel OAM was tested during a three-week lasting experiment in a real-world warehouse from a major Belgian logistics service provider. We used a within-subjects study design and evaluated the outcomes in a holistic manner, as psychosocial-, physical-, and performance-related outcome measurements were collected. In total, 18 order pickers participated in our study. Results indicate a significant increase in psychosocial worker well-being, as well as positive, albeit non-significant, enhancements in physical well-being for a working system with more decision autonomy for workers. Productivity measurements remain steady. We also conducted semi-structured interviews to delve deeper into our results. These interviews reveal a very high user-experience and a keen desire to adopt the newly-proposed OAM.

Our study shows how high efficiency levels can coincide with increased worker well-being. Using a holistic evaluation approach, we show the beneficial impacts of an autonomy-increasing intervention in a real-world warehouse. The insights derived from this study can be translated to other warehouse planning problems and give rise to several subproblems which ought to be encountered with an OR perspective.