

The Warehouse Odyssey: A Journey from Theory to Practice

Written by Victoria Lindwert and Matilda Muotka in June 2024

Uncover the secrets of warehouse configuration. Let's explore if we can bridge the gap between theory and practice in this journey through a global truck producer's pre-assembly warehouse.

Warehouses incur significant costs in the supply chain and are vital for customer service. They play a crucial role in the success or failure of businesses, so warehouse efficiency can be considered a strategic weapon within an organization. Therefore, warehouses are at the top of management's minds, and every design decision is taken carefully and with backup from experts and theory... or? The truth is that, in reality, and particularly in manufacturing companies, warehouses have low strategic priority, and their configuration, which is what the warehouse looks like and how operators work in it, is often based on the gut feeling and experience of workers rather than theory.

So, can we configure a warehouse based on theory and make it work in the real world? Here is the scoop: it is all about tailoring the configuration to fit the warehouse's context and the products it is juggling. By tweaking the layout and workflows to match the unique setup, we can blend theory with reality and actually make it happen.

Configuring a warehouse involves decisions on, for example, racking systems, rack placement, product locations, and picking routes. For each decision, there are several options. For the picking process, for example, a decision must be made whether the operators should pick in the entire warehouse or only pick in specific zones.

How can the right choice be determined? Researchers agree that it depends on the warehouse's unique context, including its role, product sizes, demand patterns, and customer requirements. For example, zone-based picking is suitable for warehouses with many products, high demand, and relatively small orders.

Sounds easy, right? But what if products in the same warehouse have totally different demands and order sizes? Then they must be configured differently and made sure to function together in the warehouse. This requires compromises, and small changes can have a huge effect. For example, this configuration project showed that switching places of a few racks with frequently picked products reduced the total travel distance in the warehouse by 27 kilometers each day.

So, to decide how a warehouse theoretically should be configured, the context must be understood. When understood, it can be matched with what the theory says are good decisions for that context. The challenge is that modern warehouses must constantly adapt to shifting demands and disruptions, which can lead to a change in warehouse capacity needs and the old warehouse context is offset. But fear not! The strength of the step-by-step framework developed in this configuration project is that new context can easily be inputted to find a new suitable configuration. If used by experienced warehouse workers, the framework can help bridge the gap between warehouse theory and practice.

This popular scientific article is derived from the master's thesis "Reconfiguration of a Pre-Assembly Warehouse Based on Context" written by Victoria Lindwert and Matilda Muotka (2024).