

## **Comprehensive Redesign of a Storage Hall: Developing an Optimized Layout and Improving Accessibility for Customers**

This bachelor's thesis focuses on the comprehensive redesign of a storage hall for BOX-it-up, a self-storage company dedicated to providing customers with secure and accessible storage solutions. The project's primary objective was to enhance customer accessibility to their storage boxes and improve the overall efficiency of forklift operations within the storage facility. BOX-it-up offers self-storage units, known as "opslagBOXes," which customers can rent to store their belongings. These storage units are currently accessed through a small visitor area, which only allows access to four boxes at a time. This setup has led to inefficiencies and limitations in customer accessibility, prompting the need for a redesign of the storage hall to enable direct access to the storage boxes without the constraints of the visitor area.

The company identified significant potential benefits in allowing customers to access their storage boxes directly within the storage hall, thus eliminating the need for a dedicated visitor area. In addition to improving customer convenience, this change could provide BOX-it-up with a tax benefit by making the boxes accessible 24/7, potentially leading to increased annual profits. This project was carried out in collaboration with Salland Storage, another self-storage company, with the goal of developing a design solution that meets both customer needs and operational efficiency.

The project followed an integrative approach, beginning with a thorough problem identification phase that included stakeholder analysis, customer surveys, and interviews. These steps were essential in understanding the specific needs and challenges faced by both customers and the company. Four different design concepts were considered during the development process, each evaluated based on key criteria such as accessibility, safety, cost, and feasibility. The selected concept features rolling platform stairs, which not only allow 24/7 access to the storage boxes but also enhance the financial viability of the storage system by reducing operational costs and improving space utilization.

To ensure the final design met all critical requirements, the project included several key components. First, the layout of the storage hall was optimized to maximize the number of accessible storage boxes while maintaining sufficient space for forklift maneuverability. This involved careful consideration of the spacing between storage units, the orientation of the boxes, and the pathways required for efficient forklift operations. The optimized layout resulted in space for 122 accessible storage boxes, which, while not meeting the original target of 145 boxes, still represents a significant improvement over the current setup.

In addition to the layout optimization, the design of the rolling platform stairs was a critical aspect of the project. The stairs were designed to be both safe and functional, allowing customers to easily access storage boxes on the upper levels without compromising safety. The stairs' design included features such as anti-slip materials, adequate lighting in the hall, and potential enhancements like automatic braking systems to further improve user safety. Although some of these features would increase costs, they were carefully evaluated to balance safety and financial feasibility.

A comprehensive cost analysis was conducted to ensure that the final design was financially viable for BOX-it-up. The analysis considered the costs of implementing the new design, including the rolling platform stairs, layout changes, and potential safety enhancements. It was determined that the investment could be recouped within one and a half years, even with lower occupancy rates, making the design both cost-effective and beneficial in the long term.

In conclusion, the final design successfully addressed the key challenges of improving customer accessibility and optimizing forklift operations within the storage hall. While not all original requirements were met, the design offers substantial benefits, including increased storage capacity, enhanced safety, and improved operational efficiency. The project's outcomes provide BOX-it-up with a viable solution that can be implemented in the current storage hall, with the potential for further optimization in the future.