

# Mapping of the conditions for efficient remanufacturing of furniture used in public environments

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## Abstract

Remanufacturing extends the lifetime of products and materials, thereby contributing to the sustainable use of resources. This paper explores the conditions for efficient remanufacturing of furniture used in public environments based on a literature review and multiple-case studies. Enablers are the existence of remanufacturable furniture of high quality and volume and suitable reverse logistics processes while hindering factors are connected to the furniture branding and perceived aesthetic life length, and the expectation that remanufactured products should be cheaper than new ones.

**Keywords:** Remanufacturing, furniture, repurpose

## Introduction

In this study, remanufacturing is defined according to British Standard Institute as “returning a used product to at least its original performance with a warranty that is equivalent or better than that of the newly manufactured product” (Jensen et al., 2019, p. 305). For furniture used in public environments this may mean that the original producer takes back for example office furniture and renovates or repurpose the used office furniture. While this is made to a small extent today, the demand for remanufactured products from customers in the public sector is increasing. Producing companies see remanufacturing as an important issue but lack effective production strategies to meet this demand. There is also a lack of research about remanufacturing of furniture for public environment, especially from a producer’s perspective. The research that exists focus on decision models for remanufacturing, eco-design, life-cycle analysis, and reverse logistics

(see for example Cobut et al., 2016; Krystofik et al., 2018; Ocampo et al., 2019). The purpose of the study is to map the conditions for efficient remanufacturing of furniture for public environment from a producer perspective.

### **Design/methodology/approach**

The study is based on a multiple-case design including a literature review (Säfsten and Gustavsson, 2020). A structured literature review was conducted during autumn 2022 in EDS, Scopus, and Web of Science, with the aim to overview research published in remanufacturing within the wood and furniture industry. The keywords used were “remanufacturing” combined with “furniture” and “wood”. Relevant hits without duplications were 36, of which 22 were journal articles. The articles were read, categorized, analysed, and summarized. Empirical data was gathered by a semi-structured interview approach of the different Swedish actors involved in the furniture business for public environments. A total of 20 interviews were conducted with producers, retailers, third party providers, regions, and municipalities in Sweden. In addition, one workshop with selected participants actors was conducted to discuss results and possible solutions in depth. The data from the interviews and workshop were analysed to identify patterns using thematic analysis based on the literature review results.

### **Findings and conclusions**

Findings indicate that there exist different definitions of remanufacturing both in theory and in practice. Another finding is that the driving force for utilization of remanufactured, repurposed, or reused furniture lies with actors from the public environment. Factors enabling remanufacturing of furniture are high quality (wooden) furniture, higher volume, as well as a functioning reverse logistics setup. Main hinders for remanufacturing are the customer expectation of a much-discounted price for remanufactured products, worries about the loss for brand reliability for smaller companies, as well a perceived outdated aesthetic design of furniture, i.e., furniture that is far from its end-of-life but has reached its end from a design perspective. The findings will help both the public sector and the producers towards more remanufactured furniture in the future. For the customer, an increased understanding of the needs of furniture in public environments is required, as well as the ability to specify these needs in the procurement. Producers should focus on design for remanufacturing, large-volume remanufacturing processes, as well as setting up licenced, decentralised repair and renovation workshops. The theoretical contribution of the paper is the exploration of an under-researched area, i.e., remanufacturing from a producers’ perspective and remanufacturing of furniture for public environments.

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