

Integrating Value Chain and Sustainability Assessments to assess Circular Economy Strategies in the Built Environment

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The built environment is a significant contributor to GHG emissions and resource consumption. The circular economy (CE) can enable reaching the EU’s goal to become CO₂ neutral by 2050. Circular business models help closing, intensifying, slowing down, dematerializing and narrowing resource loops. However, approaches are lacking to assess environmental, social, economic and technological feasibility. A comprehensive overview of how circular economy strategies align with supply chain actors’ business models is unexplored.

	Objective 1	Objective 2	Objective 3	Objective 4
Research Question	• What are enablers and barriers to adopt circular economy strategies in the built environment?	• How can we achieve alignment between value chain actors’ information access & management and business models ?	• How can we generate synergies between economic, social, environmental and technological feasibility ?	• What is the market potential for circular economy strategies in the built environment?
Objective	• Identify challenges for implementing circular economy strategies in the built environment	• Identify best practices to overcome the implementation challenges	• Develop a tool to assess the economic, social, environmental and technological feasibility for supply chain actors	• Enhance the application of circular economy strategies and show market potential
Methods	• Literature review • Stakeholder analysis • Semi-structured interviews	• Literature review • Best practices	• Literature review • MFA and LCA • Field study	• Scenario analysis • Valuation methods • MCDA
Papers	Enablers and barriers Implementing a circular value chain: Enablers and barriers to adopt circular economy strategies in the built environment	Best practices Exploring best practices to achieve alignment between value chain actors’ circular business models in the built environment	Valuation tool Introducing a valuation tool to generate synergies between economic, social, environmental and technological feasibility in the circular built environment	Toolbox Implications of innovative valuation on circular economy potential: A guideline for practitioners in the built environment

Figure 1: Objectives and tasks for the PhD project

Background

There are several barriers inhibiting the application of CE in practice (Hart et al., 2019). The greatest challenges lie in the role of society and supply chain actors (Pomponi and Moncaster, 2016). A circular value chain encourages the supply chain actors to retain the highest value (Dewagoda et al., 2022). Nevertheless, application of CE design principles and the quantitative evidence of this potential is lacking (Eberhardt and Birkved, 2022).

Aim

The aim of this research is to develop an innovative, quantitative approach to assess the economic, environmental, social and technological feasibility of circular economy strategies and utilize the market potential by proposing a toolbox for supply chain actors. The PhD will be divided into four objectives which are summarized in Figure 1.

Method

The research will be based on qualitative and quantitative methodologies to enhance the applicability of the research outcomes. Qualitative methods are systematic literature review, stakeholder analysis, semi-structured interviews, best practices and case studies whereas material flow analysis, life cycle assessment, multi-criteria decision analysis and valuation methods are quantitative methods.

Future Results

The results of the PhD project are highly applicable for value chain actors in the circular built environment. First, enablers and barriers to adopt circular economy strategies are derived. Second, best practices for value chain actor alignment in the built environment are proposed. Third, an innovative valuation tool to assess environmental, social, technological and economic feasibility is developed. Lastly, a toolbox for practitioners is derived based on market potential assessment.

Perspective

The PhD project is part of the EU-funded research program QuiVal (Quantum-inspired real estate valuation).

References

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