

Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examenscommissie-BK@tudelft.nl), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

The graduation plan consists of at least the following data/segments:

Personal information	
Name	Noah Zijlstra
Student number	4565673

Studio		
Name / Theme		Sustainability transitions and the transformation of (port) cities
Main mentor	Prof.dr. P.W. Chan	Design and Construction Management
Second mentor	Prof.dr.ir. V.H. Gruis	Real Estate Management
Argumentation of choice of the studio	During my Bachelor's and Master's degree, I have always had a strong interest in sustainability in the built environment and how it can be achieved. With the global climate issues, there is a huge pressure on the construction industry to become more environmentally friendly. In order to achieve the transition to a sustainable/circular sector by 2050 set by the government, the construction industry is facing extreme challenges. Research on circularity to realize this transition is still in its early stages. This, combined with my interest in sustainability, makes studying this topic more socially and academically relevant than ever before.	

Graduation project	
Title of the graduation project	A Circular Life Cycle Cost model: An optimal balance between circularity and finances for decision making
Goal	
Location:	Within the Netherlands
The posed problem,	The construction industry has a negative impact on the environment due to its consumption of resources, generation of waste and emissions. Despite research and development in circular economy concepts, implementation is still in its early stages. There is a lack of a viable circular economy method that can integrate holistic performance assessment with the circular business

	<p>model. Additionally, there is hesitation in the industry to invest in circular construction due to financial barriers such as the assumption that it is more expensive than conventional construction.</p>
research questions and	<p>RQ: How can a circular life cycle costing model impact decision-making in property development?</p> <p>SQ1: What are the principles of a circular economy in the built environment and how is it evaluated?</p> <p>SQ2. What is the impact of implementing a circular business model on decision-making for circularity in a business context?</p> <p>SQ3: How does the comparison of building life cycle costing and a circularity measurement affect the circular economy in the built environment?</p>
design assignment in which these result.	<p>The purpose of this study is to investigate a comprehensive circular life-cycle cost model that evolves over different levels of circularity. Thereby taking into account all life cycle management activities and providing insight into the balance of finances and circularity for decision making.</p>
Process	
<p>Method description</p> <p>First, a literature review is conducted to create insight into the main definitions and concepts of circularity in the built environment. The main objective is to analyze the current knowledge to create a framework that can be used to conduct further activities in this research. This analysis forms the basis for the empirical research and here the barriers are outlined. In the second phase of the research, interviews are conducted to address the barriers. Semi-structured interviews are conducted with professionals for a market-based view of circular activities and how they can be implemented. These exploratory interviews should provide insight on how to create a</p>	

holistic circular assessment framework to ultimately conduct a life-cycle cost analysis. These interviews will help combine the scientific view with professional practice to contribute to a realistic model. Next, a case study will be conducted on a project where I have access to data through FSD (internship company). In this study, life-cycle costs and the circularity assessment of the project for different scenarios are performed. Based on this case study, interpretations can be made to create an assessment model that maps circularity and finance to the construction industry.

Literature and general practical preference

The literature review for this research aims to establish a comprehensive understanding of the concepts related to a circular economy (CE) by utilizing the definition provided by Ellen MacArthur. Additionally, the review will delve into academic research that has been conducted on assessment methods for circularity, cost-benefit models pertaining to CE, and expert perspectives on the topic through interviews. As the field of CE is continuously evolving, recent sources will be used and future research will be continually consulted to ensure an up-to-date and thorough understanding of the subject.

Reflection

1. What is the relation between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS)?

This thesis project is connected to the "Sustainability transitions and the transformation of (port) cities" studio, which examines practices that can drive the transition to a more sustainable world. Circular economy in the built environment is a crucial aspect of sustainability transitions as it helps to reduce waste and use resources effectively, while also promoting the use of renewable energy sources and decreasing carbon emissions. It is related to the Management in the built environment track as this topic is a significant focus in this master's program and worldwide governments, organizations, and managers are striving to implement circularity. These challenges play a significant role in the MBE track, and the research is based on scientific sources and frameworks that are also covered in MBE courses. The relationship between these concepts is that they all play a role in the development of sustainable, resilient, and livable cities.

2. What is the relevance of your graduation work in the larger social, professional and scientific framework.

There is a growing interest in the field of Circular Economy (CE), but the implementation of its principles in the real world is lagging behind. One of the main barriers to the implementation of CE is the economic feasibility of building projects, as investors are often hesitant to invest in circular construction due to a lack of understanding of the potential returns on their investments. This research aims to address this issue by providing practitioners with the tools to evaluate the financial viability of circular projects, helping stakeholders to better understand the opportunities offered by CE and to integrate it into their practices. The ultimate goal of developing a circular economy is to create a sustainable relationship between human activities and the natural world. By making circular projects economically feasible, investors will be more likely to invest, ultimately helping to address global issues such as climate change and the depletion of natural resources. Additionally, implementing CE will also strengthen communities through the creation of regenerative loops.

