1. Reflection

In this section, I conduct a reflective analysis of the research methodology used to write this master's thesis. Introspection and evaluation of problems encountered reveal information about the iterative nature of the research process. By investigating perspectives on methodological changes, coding strategies, and data analysis methodologies, we gain a better understanding of the dynamic progression inherent in academic inquiry.

1.1 Adjustment in scope of research

The evolution of my study scope from an initial concept to a focused focus indicates a substantial shift in approach and methodology, motivated by the need to improve feasibility and tangibility within the research setting. Initially, the study planned to conduct a wide investigation of circular development goals (CDGs) in housing projects, emphasising the necessity of stakeholder participation and the continuity of circular goals across project lifecycle stages. However, the ambiguity of the research scope made it difficult to operationalize the study's aims and define particular bounds for investigation.

In response to these limitations, the research scope was narrowed to focus solely on the use of the R-ladder framework in new social housing projects during the conception phase. This restricted focus gave greater clarity and specificity, allowing for more targeted research into stakeholder participation and the use of R-strategies to enhance circularity in housing buildings. By focusing on a specific framework and project phase, the study hopes to provide practical insights and recommendations that can help educate decision-makers and encourage innovation in sustainable urban development.

The shift from a broad analysis of circular development to a more specific examination of stakeholder engagement and R-ladder implementation required changes to the research questions and methods. The modified research questions direct the examination of stakeholder dynamics, motives, problems, and opportunities in the context of circular housing initiatives. The path from an initial notion to a defined study focus was not without hurdles. The process of turning theoretical concepts into measurable research objectives and procedures was especially notable.

1.2 Refinement of transcript coding schema

The first steps I took to code themes based on existing literature were very helpful; they gave me a base to build my study on. As I worked my way through the complicated information I had, themes like "Awareness and Education," "Collaborative Decision-making," and "Policy and Regulatory Assistance" helped me a lot. Yet, as I coded my transcripts more deeply, I became aware of how limited these broad ideas were.

While the initial coding scheme was helpful, it became clear that it was too broad to fully capture the details and subtleties of the data. The conversations and observations in the

transcripts added levels of detail and context that the first coding scheme didn't cover well enough. When I realised this, I changed how I was doing things, which led to the creation of more specific and focused codes. To improve the coding scheme, the data had to be carefully looked at to find patterns, themes, and sub-themes that kept coming up. I was able to get a better picture of the rich complexity of the talks and observations by making new codes that were tailored to the specifics of the data.

In a way, I see that this could have been avoided if my initial coding schema hadn't been based only on the broad results from my literature review. The literature gave me useful information and a decent place to start, but I needed to go into the coding process with an open mind and be ready to change things if the data showed me something different.

As time has gone on, I've learned more about how qualitative research is continuous and how important it is to be flexible and self-reflective during the coding process. By constantly changing and improving my method based on how the data is changing, I can make sure that my analysis stays rigorous, nuanced, and true to the research subject's complexity.

1.3 Adjustment in qualitative part of research

My research process experienced significant changes and modifications in terms of stakeholder selection and participation, demonstrating a dynamic approach to gathering ideas and encouraging collaboration in the context of circular housing efforts.

 Initially, the objective was to use purposive sampling, as this was a strategic and intentional criteria appropriate for qualitative research (Curtis et al., 2000). This method sought to select participants based on their relevance to the research aims, guaranteeing the inclusion of stakeholders with various viewpoints and skills in urban development, project management, consulting, and asset management. However, as the research progressed, it became clear that the intricacies of stakeholder networks in circular housing efforts demanded a more flexible sampling strategy.

 Therefore, I changed my approach to the Snowball Sampling Method (SSM) as a solution to the challenges of working with a complex and diverse stakeholder network. This strategy permitted immediate engagement with stakeholders that would otherwise be difficult to reach, allowing for the creation of trust and the collection of thorough data in complex research situations. Using SSM, the study approach was able to identify a broader range of stakeholders participating in circular housing efforts, such as project leaders, developers, architects, environmental consultants, contractors, builders, and wood suppliers.

 Furthermore, through this method, participants shared ideas that altered my perception of the asset manager's role in the stage of the project I was considering. At first, I thought this stakeholder was crucial because they would provide long-term advice on the financial health of social housing projects, tenant management, and business continuity. The SSM process, on the other hand, revealed a different picture: participants repeatedly stated that the asset manager was not important at the conceptualisation stage of the project. This revelation was significant because it caused me to shift my focus away from my initial assumptions and towards a more nuanced understanding of how stakeholders interact in social systems.

The shift from purposive sampling to SSM reflects a more adaptable and responsive approach to stakeholder involvement. While purposive sampling initially provided a structured method for selecting participants based on predefined criteria, the use of SSM enabled a more dynamic exploration of the stakeholder landscape, allowing for the inclusion of actors who might have been overlooked using traditional sampling methods. This iterative approach to stakeholder selection emphasises the necessity of tailoring research methodology to the specific needs of the research setting, resulting in greater variety and depth of insights collected.

To sum up, the decision to switch from purposive sampling to SSM demonstrates a commitment to methodological flexibility and responsiveness to emerging discoveries. Using alternative sampling methods, the research process was able to overcome the challenges associated with engaging with complex stakeholder networks, resulting in a more comprehensive understanding of circular housing initiatives and the dynamics of stakeholder collaboration within this domain.

1.4 Social network analysis and coding

Conducting a social network analysis (SNA) was a critical component of my research, providing insights into the dynamics of stakeholder relationships. However, getting a grip on the world of SNA offered a learning curve, especially as it required the use of Python scripting, which I had learned in a prior course during my master's studies. The notion of building Python code to do SNA looked overwhelming at first, as I struggled with the complexities of network analysis methods and data manipulation techniques. It was a process of trial and error. I explored unfamiliar terrain, experimenting with various coding styles and seeking advice from internet resources and tutorials.

Despite the difficulties experienced during this process, determination and dedication motivated me to continue honing my coding abilities and comprehending the complexities of network analysis approaches. Each iteration of the code provided fresh insights and refinements, allowing me to gain confidence in my ability to translate theoretical concepts into practical applications. Through ongoing analysis and experiments, I eventually created a Python code that was capable of performing SNA on the stakeholder network. This success was a crucial milestone in my research. It shows the transformative impact of practical learning and the acquisition of new technological skills.

The ability to use Python code for SNA not only improved the analytical capabilities of my research, but it also broadened the range of insights gathered from the data. With a thorough understanding of stakeholder interactions gained from the SNA, I was better able to make meaningful findings and develop practical recommendations to guide future circular housing efforts. Looking back, learning Python coding for SNA was both tough and gratifying. It demonstrated the value of interdisciplinary learning, as well as the need for tenacity when faced with unknown problems. Moving forward, the abilities learned via this endeavour will surely continue to serve me well in my academic and professional pursuits, helping me to approach complicated research problems with confidence and proficiency.

1.5 Adjustment of conceptual framework

During my research, I made several significant modifications to my conceptual framework. Initially, my research topic was very broad, "circular development goals," and aimed to address the "whole project lifecycle" (see Figure 11). This scope, while ambitious, proved to be too broad and somewhat vague. The term "circular development goals" itself was not sufficiently precise. This could make things unclear and make it hard to stay on track with a research direction that is both focused and doable.

Recognising these limitations, I revisited my conceptual framework. By taking a deeper look into circular-strategies, I realised the need for a more structured approach. I refined my focus by adopting the "R ladder framework." A well-defined hierarchy of circular-strategies that provided clearer guidelines and a more concrete basis for analysis.

In addition, I narrowed the project lifecycle scope to focus only on the "conceptualisation stage." This adjustment allowed for a more manageable and focused study. Focusing on the early stages of a project, which are very important because this is when strategic decisions are made and can have the biggest effects.

These changes, illustrated in Figure 12, have resulted in a more precise and actionable conceptual framework. By focusing on the "R ladder framework" and the "conceptualisation stage," my research now had a clearer scope and direction. However, the factor coding aligned well with my qualitative research findings. I realised that redeveloping these factors into the four C's would better reflect the specific context of my research. This redevelopment allowed the model to provide a clearer overview of my research and the processes involved.

Additionally, I changed the positions of key stakeholders within the framework. This change allowed for another view of the factors, resulting in a more comprehensive view of stakeholder engagement. It provided insights into how each stakeholder perceives the four C's I developed: collaboration and communication, coherent process and governance, conservation and environmental awareness, and cost and feasibility evaluation.

Furthermore, I integrated social network analysis into my framework. This integration shed light on the connections between the C's and the stakeholder motivations. This illustrates the intricate interplay between these elements. By incorporating these changes, my conceptual framework now offers a more nuanced picture. My research becomes more robust and useful by accurately portraying the dynamics in action.
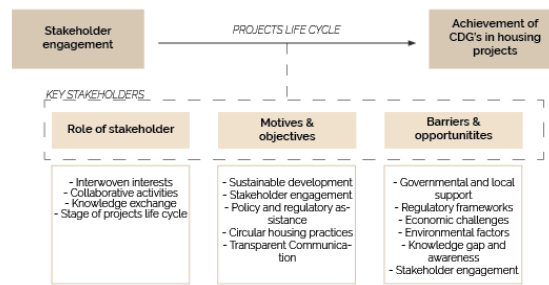
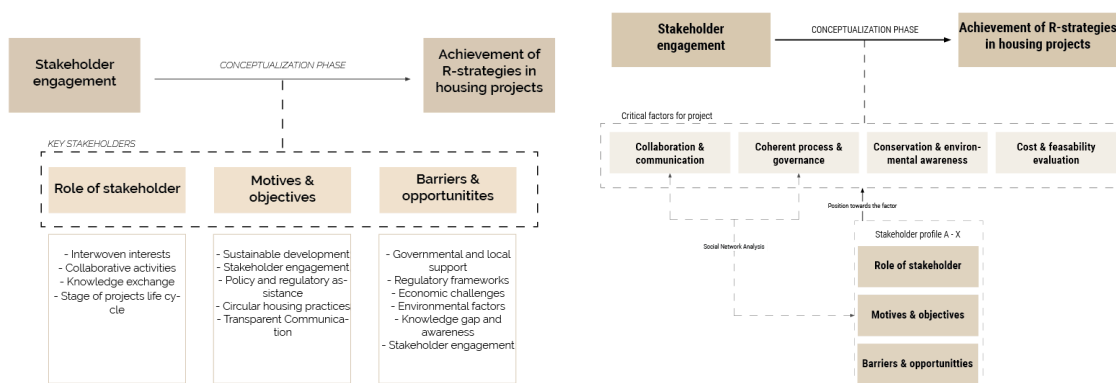Figure 11 Conceptual framework version 1 (own work)

Figure 12 Conceptual framework version 2 (left) & Conceptual framework version 3 (right) (own work)

1.6 Refinement of research questions

During the course of my research, I made significant changes to the main research question and its subquestions. The original main question, *"What are the variables that influence the engagement of stakeholders in new housing projects, and how can the use of R-strategies be maintained during the conceptualisation phase of a project?"*, was revised to the more focused and streamlined version: *"What variables influence stakeholder engagement in new circular housing projects, and how can R-strategies be sustained during the conceptualisation phase?"*.

The decision to modify the main question came after further reflection on the direction and findings of my research. Initially, the focus was slightly broader, encompassing both stakeholder engagement and the implementation of R-strategies. However, it became clear that the phrase "how can the use of R-strategies be maintained" did not align perfectly with the detailed analysis I had conducted. This misalignment was mostly about how to involve stakeholders and the real issues that come up with circular housing projects. By refining the question, I was able to bring greater clarity and precision to the focus of the research.

This clarity is especially visible in the transition to sustaining rather than maintaining. This is because sustaining involves more than just preserving, it is promoting something over time

and allowing it to continue to develop. What's very crucial in the circular built environment. Furthermore, adopting the term "new circular housing projects" clarifies the scope of my research.

In addition, two sub-research questions were adjusted, specifically sub-questions one and three. Sub-question one was revised from *"Which stakeholders from various backgrounds actively engage and contribute to the design conceptualisation phase of a circular housing project, incorporating principles of the R-ladder?"* to *"Which stakeholders from various backgrounds actively engage and contribute to the design conceptualisation phase of a circular housing project?"*. The original question focused on identifying stakeholders and their contributions while also incorporating the R-ladder principles. In the revised version, the reference to the R-ladder was removed to streamline the question and focus only on stakeholder engagement during the conceptualisation phase. This change helped avoid unnecessary complexity at this stage of the research.

Sub-question three was revised from *"What are the key challenges and opportunities stakeholders encounter in implementing the R-ladder principles, and how do these factors influence decision-making and overall project outcomes?"* to *"What are the key challenges and opportunities stakeholders encounter in implementing the R-ladder principles in housing projects?"*. The original question emphasised both the challenges and the decision-making processes related to the R-ladder principles. In the revised version, the focus was narrowed to address the challenges and opportunities in implementing these principles. This change removed the added complexity of including decision-making in the question. This adjustment provided a clearer emphasis on the practical challenges of circular strategies in housing projects.