Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examencommissie-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	Pien Wilmink
Student number	4852591

Studio		
Name / Theme	Adaptive Reuse	
Main mentor	Hilde Remøy	MBE, Real Estate Management
Second mentor	Vitalija Danivska	MBE, Real Estate Management
Argumentation of choice of the studio	I am intrigued by the potential of the existing building stock. In my opinion we cannot manage the market demand only by demolition of obsolete buildings and building new ones. I want to contribute to the improvement of efficiently reusing the existing stock. To achieve this, we need to look further than flexibility in the physical building. By understanding the process, its actors and their goals, I want to contribute to the future adaptability of existing buildings.	

Graduation project	
Title of the graduation project	As Long as it Lasts - Fostering future adaptability through strategy application in the adaptive reuse process for buildings in mixed-use areas in the Netherlands
Goal	
Location:	Netherlands, mixed-use areas.
The posed problem,	In a reality where the building stock is static relative to the demand, there is a need for future value and flexibility in our real estate stock (WorkPlace, 2023). 87% of the buildings needed in 2050, have already been built (H. Remøy & Wilkinson, 2017). Therefore, adaptability of the exiting building stock is crucial. However, hesitance is observed in choosing adaptive reuse (AR) over demolition and building new, because of higher risks, costs and uncertainties. Research has been executed regarding design strategies and process success factors, but a gap is found between theory and practice.
research questions and	Main research question: "What strategies in the building transformation process are most effective in enhancing future adaptability of buildings in mixed-use areas in the Netherlands?"

	SQ1. How can future adaptability be defined in the context of adaptive reuse? SQ2. What are barriers and enablers in the adaptive reuse process effecting the future adaptability of the buildings? SQ3. What are applicable strategies in building transformation process fostering future adaptability? SQ4. What strategies are most effective in achieving future adaptable buildings and how can these strategies be applied in practice?
design assignment in which these result.	The result of this research is a list of strategies applicable in the building transformation process, fostering future adaptability. In the prioritising list the strategies are ranked on effectiveness (based on six criteria).

Process

Method description

The research will be conducted in three parts, a literature review, case study, and the Delphi method. The data collection is both qualitative (literature review, semi-structured interviews, document review) and quantitative (ranking of the strategies).

To start with, relevant literature will help to define core concepts of the research like the adaptive reuse (AR) process, strategy, and future adaptability. In the literature review part the stakeholders and barriers, enablers and success factors of the AR process are defined and linked to one another. The literature review creates a basis for the empirical part of the research by conducting a preliminary list of strategies fostering future adaptability (FA), while addressing the most crucial phases in the process and the related stakeholders. This part creates a foundation for answering sub-question one, two and three.

The case study and Delphi method are executed simultaneously in the second part of the research from February onwards. For this research Delphi is executed in two rounds (12-18 participants). Some of the experts worked on the selected cases.
Round 1:

- The first round is executed in an interview setting (semi-structured). The expert is asked to rate the listed strategies (from literature) on effectiveness with the help of six criteria: Economic value creation, social value creation, environmental sustainability, innovation, sublimation-architectural aspects, and sublimation-cultural aspects.
- Subsequently a semi-structured interview is conducted to enrich the list of strategies, these interviews are part of the case-study as well.
- A document review is executed on the selected cases, to further enrich the list of strategies.

Round 2:

- The second round is executed in the form of an online questionnaire. The experts is provided with the prioritising list of strategies conducted from the results of the first round. Subsequently, they are executed to revise their ranking from the first round, and to include the newly added strategies (adapted from the first round) to their ranking.

Literature and general practical references

The literature review start with defining adaptive reuse and the AR process, to create a better understanding of the concept. For this part the following main references are used: (Arfa et al., 2022; Baccarini, 1996; Bullen, 2007; Douglas, 2006; Ellison & Sayce, 2007; Hamida et al., 2023; Kurul, 2007; Pallada, 2017; H. Remøy, 2010; van Hout, 2021; van Wijk, 2024; Vervloed, 2013; Wamelink et al., 2010; Wilkinson et al., 2014).

Subsequently, the AR stakeholders are listed and subdivided in four main stakeholder groups: investors, producers, regulators, and users. For this part the following main references are used: (Aigwi et al., 2021; Bond, 2011; Mısırlısoy & Günçe, 2016; Pallada, 2017; Rypkema, 2008; van Hout, 2021; van Wijk, 2024; Wilkinson et al., 2014; Winch, 2010).

Now that the AR process and its stakeholders are clarified, the barriers, enablers and successfactors of the process are explored. For this part the following main references are used: (Baccarini, 1996; Bullen, 2007; Bullen & Love, 2011; De Silva & Perera, 2016; Golić et al., 2023; Hamida et al., 2024; Kurul, 2007; Manewa et al., 2013; Pallada, 2017; Pintossi et al., 2023; H. T. Remøy & van der Voordt, 2007; van Hout, 2021; Yung & Chan, 2012).

Future adaptability will be defined on the basis of the research by (Conejos et al., 2015), and by the usage of the knowledge obtained from the first part of the literature review.

A preliminary list of strategies, which have the potential to foster future adaptability, is compiled. For this part the following main references are used: (Blakstad, 2001; Tan et al., 2018; White, 2017)

To measure the strategies on effectiveness, guidelines need to be set. The research of (Arfa et al., 2022) is used to set guidelines for the ranking of the strategies by the experts on the basis of six criteria.

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)?

Effective management is a crucial factor for enhancing adaptive reuse in the built environment. The AR process is complicated, because many stakeholders are involved and because you are dealing with an existing building rather than a blank paper. The complexity requires a deep understanding of the process, to be able to enhance AR in the future. In the master track "management in the built environment" we learn a lot about project and process management. This graduation project is broadening my knowledge on management by combining scientific research results and real practice.

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

Social relevance

Buildings need to be able to respond to both internal and external changes (Kamara et al., 2020). The largest part of the buildings already existing, needs to be adapted multiple times in the future to meet the changing demands (Conejos et al., 2014). In the Netherlands, adaptive reuse gained popularity in the recent decades. Drivers for adaptive reuse are vacancy as a result of market dynamics, growth of the population, and technological developments (Ross, 2017). The future adaptability of buildings is much researched on the level of the physical building (Hamida et al., 2022). However, the process towards future adaptability is underreported. Complexity of reuse project is seen as a crucial barrier by both initiators and financiers in considering this option (Kurul, 2007). Insights in strategies regarding the adaptive reuse process can both reduce complexity for the stakeholders and foster future adaptation potential of the buildings.

The management of the process towards future adaptable buildings can be improved by gaining knowledge about management strategies in adaptive reuse. This knowledge about the strategies can be mirrored to reality and can be used to compile management strategies enhancing the future adaptability of buildings. This research will provide insights in the applicable strategies that can be derived from the literature, but above all will mirror these strategies to reality to test its applicability.

Scientific relevance

This research is scientifically relevant because it combines different concepts which already have been researched. However, former research is mostly focussed on solely theory or practice. This study combines both aspects to get a result with higher validation.

Adaptive reuse has been researched thoroughly. Especially the adaptive reuse of heritage buildings is discussed a lot in the literature (F. Arfa et al., 2022; Bottero et al., 2019; Bullen & Love, 2011b; Foster, 2020; Sugden, 2018; Vafaie et al., 2023; Yung & Chan, 2012). Both barriers and enablers of the adaptive reuse process are stipulated (Bullen & Love, 2011c; De Silva & Perera, 2016) and critical success factors (CSFs) are discussed (Conejos et al., 2018). It stands out that in previous research the focus mainly is on current adaptive reuse processes. Even though much research can be found concerning adaptive re-use, a gap is found between the connection of adaptive reuse right now and the future adaptability of these buildings.

Adaptive reuse is linked to circularity concepts as well (Hamida et al., 2022). Subsequently, this so called 'Circular Building Adaptability' is augmented by linking it to adaptive reuse to create a framework (Hamida et al., 2023, 2024). However, the literature states that even though the framework is underpinned by scientific research, it is not tested in practice yet. Furthermore, the determinants adopted in the framework are mostly regarding the physical aspect of the building over the process elements of adaptive reuse (Hamida et al., 2023). The influence of project management strategies is underreported in the literature.

Decision-making models and strategy implications regarding adaptive reuse are mentioned in the literature (Bottero et al., 2019; Bullen & Love, 2011b, 2011a). Once

again, these models and strategies are primarily focussed on the building specifications and its location. These aspects are important, but there is a need to look further and to investigate the influence of the management of an adaptive reuse project on the building's future adaptability.

Even though research has been done on different aspects of adaptive reuse, there is a gap found in the literature when it comes to the effects of current adaptive reuse projects on the future adaptability. Simultaneously, the focus in adaptive reuse research is mostly on the building itself, rather than management strategies during the process.

References:

Aigwi, I. E., Phipps, R., Ingham, J., & Filippova, O. (2021). Characterisation of Adaptive Reuse Stakeholders and the Effectiveness of Collaborative Rationality Towards Building Resilient Urban Areas. *Systemic Practice and Action Research*, *34*(2), 141–151. https://doi.org/10.1007/s11213-020-09521-0

Arfa, F. H., Lubelli, B., Zijlstra, H., & Quist, W. (2022). Criteria of "Effectiveness" and Related Aspects in Adaptive Reuse Projects of Heritage Buildings. *Sustainability*, *14*(3), Article 3. https://doi.org/10.3390/su14031251

Baccarini, D. (1996). The concept of project complexity—A review. *International Journal of Project Management*, *14*(4), 201–204. https://doi.org/10.1016/0263-7863(95)00093-3

Blakstad, S. H. (2001). A Strategic Approach to Adaptability in Office Buildings [Doctoral thesis, Fakultet for arkitektur og billedkunst]. In *282*. https://ntnuopen.ntnu.no/ntnu-xmlui/handle/11250/229740

Bond, C. (2011). *Adaptive Reuse: Explaining Collaborations within a Complex Process* [Department of Planning, Public Policy & Management, University of Oregon]. https://hdl.handle.net/1794/11680

Bullen, P. A. (2007). Adaptive reuse and sustainability of commercial buildings. *Facilities*, *25*(1/2), 20–31. https://doi.org/10.1108/02632770710716911

Bullen, P. A., & Love, P. E. D. (2011). Factors influencing the adaptive re-use of buildings. *Journal of Engineering, Design and Technology*, *9*(1), 32–46. https://doi.org/10.1108/17260531111121459

Conejos, S., Langston, C., & Smith, J. (2015). Enhancing sustainability through designing for adaptive reuse from the outset: A comparison of adaptSTAR and Adaptive Reuse Potential (ARP) models. *Facilities*, *33*(9/10), 531–552. https://doi.org/10.1108/F-02-2013-0011

De Silva, D., & Perera, K. K. S. (2016). Barriers and Challenges of Adaptive Reuse of Buildings. *ResearchGate*. https://www.researchgate.net/publication/319879628_Barriers_and_Challenges_of_Adaptive_Reuse_of_Buildings

Douglas, J. (2006). *Building Adaptation* (2nd ed.). Routledge. https://doi.org/10.4324/9780080458519

Ellison, L., & Sayce, S. (2007). Assessing sustainability in the existing commercial property stock. *Property Management*, *25*(3), 287–304. https://doi.org/10.1108/02637470710753648

Golić, K., Kosorić, V., Kosić, T., Vučković, S. S., & Kujundžić, K. (2023). A Platform of Critical Barriers to Socially Sustainable Residential Buildings: Experts' Perspective. *Sustainability*, *15*(9), Article 9. https://doi.org/10.3390/su15097485

Hamida, M. B., Remøy, H., Gruis, V., & Jylhä, T. (2023). Circular building adaptability in adaptive reuse: Multiple case studies in the Netherlands. *Journal of Engineering, Design and Technology*, *ahead-of-print*(ahead-of-print). https://doi.org/10.1108/JEDT-08-2022-0428

Hamida, M. B., Remøy, H., Gruis, V., & van Laar, B. (2024). Towards promoting circular building adaptability in adaptive reuse projects: A co-developed framework. *Smart and Sustainable Built Environment*, *ahead-of-print*(ahead-of-print). https://doi.org/10.1108/SASBE-03-2024-0087

Kurul, E. (2007). A qualitative approach to exploring adaptive re-use processes. *Facilities*, *25*(13/14), 554–570. https://doi.org/10.1108/02632770710822634

Manewa, A., Pasquire, C., Gibb, A., Ross, A., & Siriwardena, M. (2013, January 1). *Adaptable Buildings: Striving Towards a Sustainable Future*.

Mısırlısoy, D., & Günçe, K. (2016). Adaptive reuse strategies for heritage buildings: A holistic approach. *Sustainable Cities and Society*, *26*, 91–98. https://doi.org/10.1016/j.scs.2016.05.017

Pallada, R. (2017). *Heritage Reloaded*. https://repository.tudelft.nl/record/uuid:7ce2ee65-28a9-4f1c-94c2-0eb6f3a3859f

Pintossi, N., Ikiz Kaya, D., van Wesemael, P., & Pereira Roders, A. (2023). Challenges of cultural heritage adaptive reuse: A stakeholders-based comparative study in three European cities. *Habitat International*, *136*, 102807. https://doi.org/10.1016/j.habitatint.2023.102807

Remøy, H. (2010). *Out of Office: A Study on the Cause of Office Vacancy and Transformation as a Means to Cope and Prevent*.

Remøy, H. T., & van der Voordt, T. J. M. (2007). A new life: Conversion of vacant office buildings into housing. *Facilities*, *25*(3/4), 88–103. https://doi.org/10.1108/02632770710729683

Remøy, H., & Wilkinson, S. (2017). Sustainable transformation in real estate developments through conversions. In *Routledge Companion to Real Estate Development*. Routledge.

Rypkema, D. (2008). Historic preservation and sustainable development. *Lecture given at New Brunswick University, New Brunswick, Canada*. https://preservationnj.wordpress.com/wp-content/uploads/2008/06/rypkema_2008_plenary.pdf

Tan, Y., Shuai, C., & Wang, T. (2018). Critical Success Factors (CSFs) for the Adaptive Reuse of Industrial Buildings in Hong Kong. *International Journal of Environmental Research and Public Health*, *15*(7), Article 7. https://doi.org/10.3390/ijerph15071546

van Hout, J. (2021). *Succesfully reusing heritage*. https://repository.tudelft.nl/record/uuid:d1f80f73-18ec-4c79-af3b-787fe83833e1

van Wijk, D. I. (2024). *Effective Participation Implementation in the Adaptive Reuse Development Process*. https://repository.tudelft.nl/record/uuid:20b86ef2-834c-4864-a1b7-dbec3c3ac300

Vervloed, T. (2013). *Herbestemmen van rijksmonumenten*. https://repository.tudelft.nl/record/uuid:ccaffb60-1f8e-4619-8f5e-e964337aac41

Wamelink, H., Geraedts, R., Hobma, F., Lousberg, L., & Jong, P. (2010). *Inleiding Bouwmanagement*.

White, C. (2017). *Strategic Management*. Bloomsbury Publishing.

Wilkinson, S. J., Remøy, H., & Langston, C. (2014). *Sustainable Building Adaptation: Innovations in Decision-making*. John Wiley & Sons.

Winch, G. M. (2010). *Managing Construction Projects*. John Wiley & Sons.

WorkPlace, S. (2023, February 14). *Meer aandacht voor flexibiliteit bij toekomstbestendige gebouwen*. Smart WorkPlace. https://www.smartwp.nl/nieuws/20230214-meer-aandacht-voor-flexibiliteit-bij-toekomstbestendige-gebouwen

Yung, E. H. K., & Chan, E. H. W. (2012). Implementation challenges to the adaptive reuse of heritage buildings: Towards the goals of sustainable, low carbon cities. *Habitat International*, *36*(3), 352–361. https://doi.org/10.1016/j.habitatint.2011.11.001