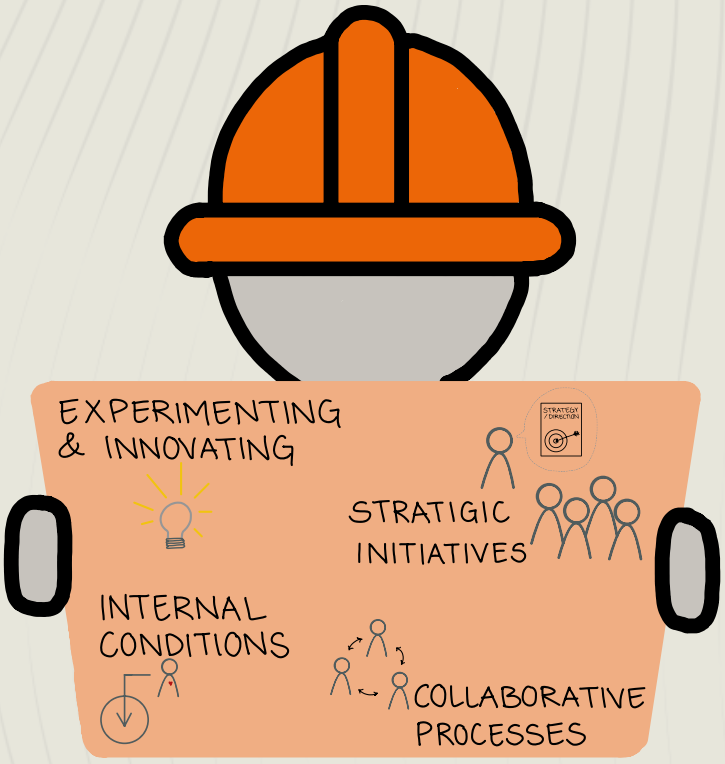
AALBORG UNIVERSITY – DEPARTMENT OF PLANNING

A transition towards regenerative business practices in the Danish construction sector

– Practices under construction



ENVIRONMENTAL MANAGEMENT AND SUSTAINABILITY SCIENCE

JUNE 2, 2023

AALBORG UNIVERSITET

Department of Planning
Environmental Management and Sustainability Science
Rendsburggade 14
DK-9000 Aalborg
https://www.en.plan.aau.dk

AALBORG UNIVERSITY
STUDENT REPORT

Title:
A transition towards regenerative business practices in the Danish construction sector – Practices under construction

Master thesis in Environmental Management and Sustainability Science

Project Period:
1th February 2023 - 2rd June 2023

Project Group:
Anne Sofie Bredgaard Myrup
Mette Knakkergaard Jensen
Rebecca Kolte-Olsen

Supervisors:
Søren Kerndrup
Henrik Riisgaard

Keywords:
Regenerative business practices, construction sector, business management, socio-ecological system, socio-technical – natural transitions, systems building.

Copies: 1

Page Numbers: 102

Date of Completion:
June, 2023

Synopsis:

This study investigates the transition towards regenerative business practices in the Danish Construction sector with a focus on businesses' systems-building activities. Thus, the study seeks to answer,

How can businesses build systems to enable regenerative business practices in the Danish construction sector?

By drawing on experiences and learnings from the systems-building practices of front-running businesses, an understanding of how these businesses build systems has been established. This has been reflected on, to assess how businesses can enhance their ability to build systems to enable regenerative business practices. The reflections have led to a set of proposed recommendations for establishing internal – and external conditions, that allow for a continuous process of experimenting and innovating to adapt to changes and benefit the socio-ecological system. However, systems-building activities requires devotion and willingness from the businesses, as regenerative business practices are an ongoing journey of continuous experimentation and innovation to benefit the entire socio-ecological system.

Preface

This Master's thesis is a culmination of five years of epiphanies, frustrations, discussions and release as students at Aalborg University. We, Mette, Anne Sofie and Rebecca, end this final semester with a certain combination of relief and nostalgia. Throughout our time at Aalborg University, we have worked with all kinds of problems, and we feel prepared to face more. We are indeed ready to contribute by doing more good instead of less bad. The programme of Environmental Management and Sustainability has allowed us to think both abstractly and concretely. Being a small group with an international outlook has contributed to good times - from Brussels to Rold Skov and at Rendsburggade 12.

Thank you to Søren and Henrik for agreeing to the idea of writing a thesis on a topic that is so far from the general public's consciousness. We have enjoyed being experimental and curious - and it has been clear that time flies when you're having fun. Additionally, tremendous gratitude is extended to the interviewees for taking the time to listen and answer questions. A considerable part of the foundation that this master's thesis is built on is made from these.

Thanks for now, and cheers from a summer evening in Thy!

Happy reading!

- Andersen, Jesper Arent (Kingo Karlsen)
- Andreasen, Henrik (Woodfiber)
- Bording, Rasmus (GreenDozer)
- Brix, Lene Damsbo (MATTER by Brix)
- Bro, Per (Boligselskabet Sjælland)
- Bruun, Christian Gjessing & Bendtsen, Kirstine Alrø Fichtner (AKF)
- Christiansen, Alexander Mollan Bohn (Dansk Standard)
- Delman, Thomas Fabian (twentyfifty futures)
- Falkenberg, Rasmus (Upcycling Forum)
- Frisesdal, Feodora Olivia (Rådet for Bæredygtigt Byggeri)
- Hessellund, Stig (Realdania)
- Jakobsen, Charlotte & Bejder, Anne Kirkegaard (Frandsen og Søndergaard)
- Kauschen, Jan Schipull (Vandkunsten)
- Kellermann, Klaus (Roskilde Municipality)
- Kiesslinger, Jørn (Lendager)
- Knudsen, Michael (Himmerland Boligforening)
- Myrdal, Christina Grann (WeBuild Denmark)
- Olesen, Gitte Gylling Hammershøj (COWI)
- Sand, Signe
- Sinding, Thomas Søgård (J. Jensen)
- Sørensen, Anders Strange (Enemærke & Petersen)
- Sørensen, Ditte Perge (Foreningen for Byggeriets Samfundsansvar)
- Thiesen, Joan Bruun (ScandiByg)
- Vendena, Greg (Byggevirke & Datter)

Anne Sofie Bredgaard Myrup
amyrup18@student.aau.dk

Mette Knakkergaard Jensen
mettje15@student.aau.dk

Rebecca Kolte-Olsen
rkolte17@student.aau.dk

Danish Summary of the Report

Planeten Jorden er hårdt presset af menneskeskabte klimaforandringer. Det er understreget i den seneste IPPC rapport[1], som fremhæver, hvordan menneskeskabte klimaforandringer på nuværende tidspunkt har resulteret i ødelæggelser på samfundet og naturen (IPCC, 2023). For at løse de udfordringer er der behov for at kigge udover det nuværende økonomiske system og troen på, at økonomisk vækst kan udligne ulighed og fjerne forurening. Der er behov for at forstå, at vores økonomi er en del af, afhænger af og påvirker samfundet og naturen (Raworth, 2018). I denne forandring spiller virksomheder og deres arbejde en central rolle.

Særligt byggebranchen bruger store mængder ressourcer, udleder CO_2 og producerer affald gennem alle byggeriets faser. I en dansk kontekst stammer 40 % af alt affald fra byggebranchen, over 40 % af CO_2 udledninger kommer fra energiforbruget i bygninger og 10 % af den samlede CO_2 udledning kommer fra byggeprocesser og produktionen af byggematerialer (Miljøministeriet, 2021; Regeringens Klimapartnerskaber, 2019).

Det er derfor særligt relevant at undersøge, hvordan forretningspraksisser i den danske byggebranche kan ændres mod at skabe værdi for både samfundet og de naturlige systemer. En tilgang, som i denne undersøgelse defineres som *regenerative forretningspraksisser*, og ses som et skridt videre end minimering af påvirkninger på natur og samfund, hvor virksomhederne med et økologisk verdenssyn forstår, at deres aktiviteter bidrager til – og en del af det socio-økologiske system. Altså skal virksomhederne bidrage positivt til en fælles vækst for både mennesker og natur. Ud fra interviews med aktører i byggebranchen er det slået fast, at disse praksisser ikke i særlig høj grad er til stede i byggebranchen på nuværende tidspunkt. Tværtimod er byggebranchen udfordret af et pres på at skulle forandre sig, og en række barrierer, som holder den tilbage. Dog ses der også et potentiale i innovation og samarbejde på tværs af aktører i branchen, som kan bryde disse barrierer.

Dette kandidatspeciale forsøger derfor at besvare følgende problemformulering:

Hvordan kan virksomheder opbygge systemer for at muliggøre regenerative forretningspraksisser i den danske byggebranche?

Med systemopbygning menes i dette tilfælde at indgå og danne netværk med aktører både fra samfund og natur, som kan skabe nye aktiviteter og forståelser for, hvad forretningspraksisser i byggebranchen indebærer. Forståelser, som skal føre til, at virksomheder i byggebranchen, gennem deres aktiviteter, skaber værdi for både samfund og natur.

[1] *Intergovernmental Panel on Climate Change (IPCC) udarbejder og publicerer omfattende vurderingsrapporter om viden om klimaforandringer, årsager og potentielle konsekvenser (IPCC, n.d.).*

Undersøgelsen tager udgangspunkt i interviews med 13 virksomheder, der anses som front-løbere i den danske byggebranche. Gennem eksperimenter og samarbejde med andre aktører i branchen forsøger de at skubbe til dagsordenen og forståelse af, hvad det vil sige at udvikle byggebranchen. Derudover anvendes Geels, 2004 *'Multi-Level Perspective'*-model, i kombination af Hahn and Tampe, 2021's forståelse af det *'socio-økologiske system'* som ramme for at forstå forandringen af byggebranchen som en *transition*, hvor naturen kommer til at indgå på lige fod med samfundet. Front-løber virksomhederne forstås som systemopbyggere, der er med til at skabe denne nye byggebranche. Problemformuleringen besvares ved at kombinere en forståelse af, hvad der gør sig gældende, når disse virksomheder systemopbygger, med den teoretiske forståelse af, hvad der skaber forandring mod den regenerative byggebranche.

Gennem kvalitative interviews er virksomhedernes intentioner, aktiviteter og reflektioner blevet klarlagt. Det har muliggjort en kortlægning af hvilke aspekter, der gør sig gældende, når virksomhederne forsøger at systemopbygge for at forandre den eksisterende byggebranche. Først og fremmest eksperimenterer og innoverer virksomheder ved at fokusere på *interne forhold*, *samarbejdsmæssige processer* og *strategiske intentioner*. Gennem disse forbundne aspekter lykkes virksomhederne med at overkomme barrierer for at forandre byggebranchen. Udgangspunktet er dog i høj grad et mål om at nedbringe CO_2 udledning og forbedre cirkulære systemer. Dette er to skridt på vejen mod regenerative praksisser, som dog stadig holde tilbage af et manglende økologisk verdenssyn.

Derfor leder studiet frem til seks anbefalinger, som virksomheder kan følge for at opbygge systemer, der kan muliggøre regenerative praksisser i byggebranchen. Med udgangspunkt i forståelse af virksomhedernes systemopbyggende aktiviteter anbefales følgende:

- Anerkende deres egen rolle i at bidrage til og en del af det socio-økologiske system.
- Involvere og engagere naturlige systemer i deres arbejde.
- Dyrke ikke-monetære værdier.
- Etablere en fælles klar vision og formål – og forpligte sig til at skabe forandringer.
- Implementere livscyklus-tænkning i alle beslutningsprocesser.
- Eksperimentere og lære af det socio-økologiske system for altid at kunne være fleksibel og tilpasse sig.

De seks anbefalinger er forbundne og vælger man at efterleve én, vil det lede til reflektioner relateret til de andre. Derudover er det vigtigt at understrege, at anbefalingerne tager udgangspunkt i hvad virksomhederne selv kan gøre – uden at tage hensyn til eksterne regulative incitamenter.

Det kan dermed konkluderes, at virksomheder kan opbygge systemer, der muliggør regenerative forretningspraksisser i byggebranchen ved at etablere interne og eksterne forhold, der giver mulighed for en vedvarende proces med at eksperimentere og innovere for at tilpasse sig forandringer og bidrage til det socio-økologiske system. At fungere på andre præmisser end det nuværende økonomiske system kræver dog i sidste ende en vis vilje og et ændret verdenssyn.

Contents

"Regeneration refers to the capacity to bring into existence again."
(Muñoz & Branzei, 2021)

From degrenerative to regenerative business practices

1

With their 6th assessment report published in March 2023, the Intergovernmental Panel on Climate Change has once again stressed the evidence of human-caused climate changes. These human-caused climate changes are impacting both nature and society. Even though more finance than ever before is put into mitigating and adapting to climate change, the effort still falls short of need (IPCC, 2023). The planetary boundaries and the social foundation in society are under pressure from human activities leading to financial crises, extreme inequality, and pressure on the environment and nature (Raworth, 2018). The current economic system is degenerative and influencing the planet and human society.

The presumption underlying the current economic system is a trust in growth to even up inequality and clean up pollution. This is questioned by Raworth, 2018 with the *"Doughnut Economics"*. Raworth, 2018 is proposing to shift the mindset towards a 21st-century economy illustrated with her doughnut model (see Figure 1.1).

In the concept of Doughnut Economics, it is recognised that the economy *"is embedded within, and dependent upon, society and the living world"* (Raworth, 2018). The inner circle of the doughnut represents the social foundation, putting a focus on the essentials for life and for the economy to be socially righteous. The outer circle represents the planetary boundaries, *"the ecological ceiling"*, within which the economy has to work, to be ecologically safe (Raworth, 2018). The mindset shifts towards the doughnut economy requires first of all system thinking, a focus on being regenerative and distributive – in contrast to degenerative and divisive – and lastly a shift away from growing towards thriving (Dougnut Economics Action Lab, n.d.; Raworth, 2018).

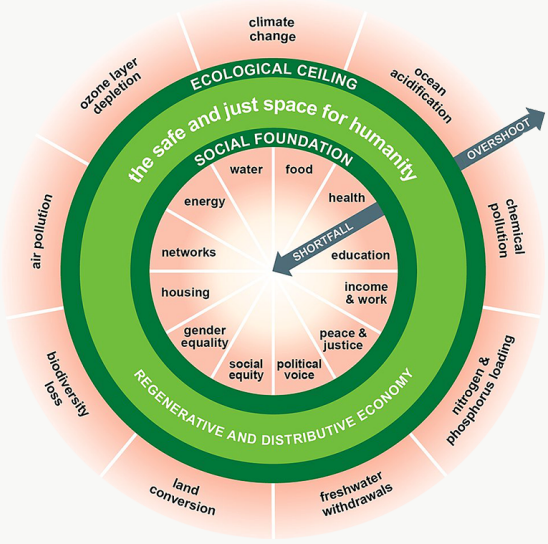


Figure 1.1. *The doughnut model* (Raworth, 2017).

Developing a regenerative and distributive economy highlights the need to focus on regenerating earth's systems, rather than solely focusing on limiting degradation (Hahn & Tampe, 2021; Raworth, 2018). Thus, regeneration is seen as a step beyond sustainability (Raworth, 2018).

As mentioned, there is growing evidence that human activities have placed increased stress and pressure on the planet, therefore also on several of the life-supporting social-ecological systems, which are pushed beyond critical limits and carrying capacities (Rockström et al., 2009). These challenges require *"major innovation efforts"*, being both an opportunity and challenge for businesses (N. Bocken et al., 2019). Businesses' activities play an essential role in this context having significant impacts on the system of both human society and the planet. Thus, businesses are facing increasing pressure to change. (Adams et al., 2012; Hahn & Tampe, 2021). Raworth, 2018, IPCC, 2023 and UNEP, n.d. both emphasise a need for meaningful involvement and active contribution from businesses and industries. It requires the urgent attention of both international companies but also small- and medium-sized enterprises. All in all, it is clear, how more substantive and transformative change is required – going from 'doing less bad' to 'doing more good' is critical, to shift towards adopting regenerative business practices (Caldera et al., 2022). To summarise, the escalating ecological degeneration and also the growing social challenges together highlight the need to rethink and reconsider the current way of doing business (Hahn & Tampe, 2021; Raworth, 2018).

1.1 A need for regenerative business practices in the construction sector

The degenerative path is exemplified in the construction sector, being one of the industries with significant impacts on both the planetary boundaries and the social foundation. There is a need for changes and modifications to achieve the goal of enhance the human-society and the planets capacity.

In Denmark, construction makes the fourth largest industry with a total revenue of around 290 billion DKK and around 193.000 employees (Bygherreforeningen & Byggefakta, 2021; Realdania, 2023b; Regeringens Klimapartnerskaber, 2019). Around 80 % or 5.000 billion DKK of the national wealth is placed in physical buildings and facilities. The construction sector intervenes with almost all industries and plays both a direct and indirect role in multiple societal and political priorities within, among others, climate, energy, and welfare (Bygherreforeningen & Byggefakta, 2021). This emphasises the importance of the construction sector in society – but because of its importance, there are also significant issues that the construction sector of the future will need to address. For example, sourcing of materials, construction, use, maintenance, and end-of-life of buildings, which in Denmark takes up a large share of the total Danish energy use, waste production, and CO_2-emissions (Jensen, 2023; Miljøministeriet, 2021; Regeringens Klimapartnerskaber, 2019).

As illustrated in Figure 1.2 on the following page, the high material consumption ultimately leads to large amounts of waste – over 40 % of the total amount of waste in Denmark comes from the construction sector. In addition, the construction and operation of buildings account for around 40 % of energy consumption (Miljøministeriet,

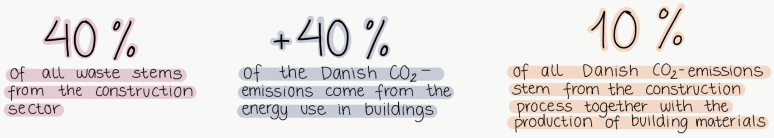


Figure 1.2. *Construction, use, and end-of-life of buildings share on total Danish energy use, waste production, and CO_2-emissions. Numbers from:* (Miljøministeriet, 2021; Regeringens Klimapartnerskaber, 2019). *[Own illustration].*

2021). Translated to a larger Danish perspective, 10 % of Danish CO_2 emissions come from the building and construction process and the production of building materials (Regeringens Klimapartnerskaber, 2019). These shares relate to different life-cycle phases of construction projects, which indicates an overall linear approach to the material flow: Only 36 % of the construction waste is recycled, with 52 % of this downcycled by fracturing (Miljøministeriet, 2021; Realdania, 2023b).

Besides significant environmental impacts, the construction sector is to a large extent project-orientated. This means that each project is organised in silos with specific elements and actors that change from project to project (Frederiksen & Johansen, 2022; Heggland, 2022). During the life-cycle of construction projects, a wide range of stakeholders with different roles and responsibilities are engaged and potentially have a key role in transitioning the construction sector to both circular – and regenerative practices (Realdania, 2023b; Regeringens Klimapartnerskaber, 2019). The overall life cycle and the central stakeholders introduced in each stage are illustrated in Figure 1.3.

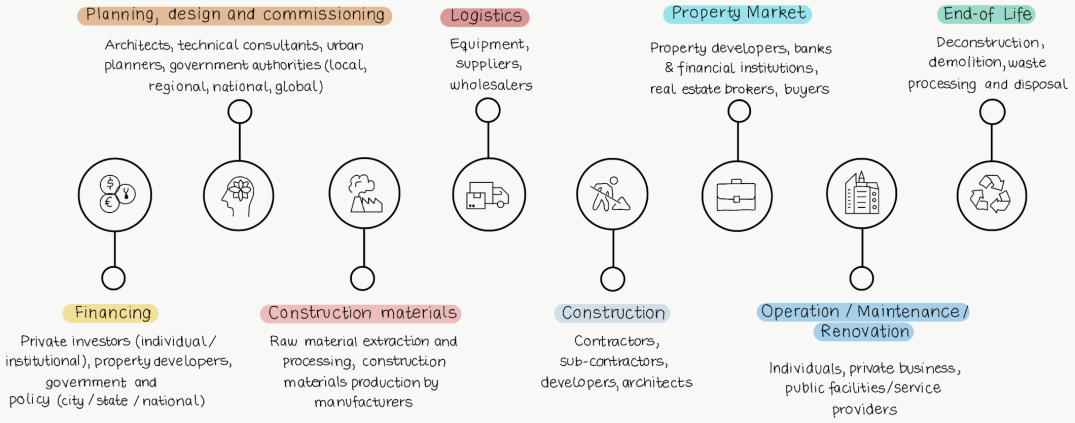


Figure 1.3. *The lifecycle of a construction project, inspired by:* International Resource Panel and One Planet network, 2020.

Over the last few years, the construction sector has started developing with a focus on implementing circular practices to navigate environmental impacts. According to Realdania, 2023b, the development is driven by front-runners across the value chain initiating experimental projects. However, the main part of the construction sector is still continuing *"business as usual"* (Realdania, 2023b). Overall, the number of stakeholders and scale of impacts of the construction sector, indicate complex challenges to be addressed. Acknowledging a need to change the practices of businesses and a potential to innovate towards more regenerative practices, it is deemed relevant to look further into the adoption of regenerative business practices in the construction sector.

State-of-the-art: Regenerative business practices in the construction sector

2

The construction sector is facing significant challenges being in a degenerative pattern. Seeing the potential of changing the pattern towards regeneration, the following chapter explores the state-of-the-art of regenerative business practices in the construction sector. Firstly, this chapter introduces the methodology of the state of the art, followed by a presentation of the findings divided into the literature review on regenerative business practices in the construction sector, and the perspective of the Danish construction sector.

2.1 A two-tier state-of-the-art

The aim of the state-of-the-art is to unfold and explore the complexity of regenerative business practices in the construction sector, and map critical factors for the adoption of regenerative business practices in the construction sector in Denmark. The state-of-the-art motivates the aim of this study and leads to the research question. The state-of-the-art is based on reviews of 46 international articles on the topic, exploratory interviews with 11 stakeholders in the Danish construction sector, and newly published reports (grey literature). This ensures an up-to-date foundation for understanding the current discussions on regenerative business practices in the literature. This two-tier approach to the state-of-the-art is illustrated in Figure 2.1.

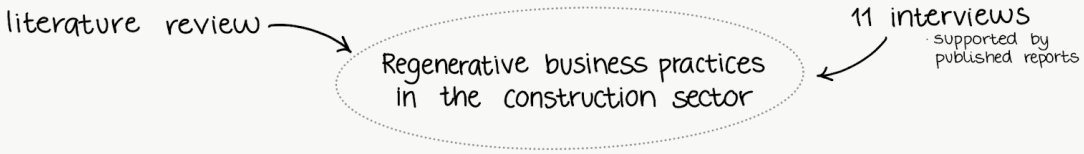


Figure 2.1. *Two-tier state-of-the-art [Own illustration].*

2.1.1 Short introduction to the research strategy

Literature review

The literature review has been conducted with a semi-systematic approach through the phases of designing, planning, analysis, and writing of the review (Snyder, 2019). While a systematic review focuses on quantitative samples and analysis, a semi-structured approach gives the ability to map a complex phenomenon, like regenerative business practices, by

including both quantitative and qualitative research across different disciplines (Snyder, 2019). The review was designed to locate and synthesise academic knowledge of regenerative business practices in the construction sector.

An initial search was conducted in February 2023 in the database, Scopus, for literature dealing with *regenerative businesses practices in the construction sector* resulted in zero results and made it clear, the scope was too specific to find a sufficient amount of literature. Therefore, it was decided to divide the literature review into two more specific focused searches and synthesise these into a joint literature review. One search string focuses on *regenerative business* and the other on *regeneration in the construction sector*. The search strings were as follows:

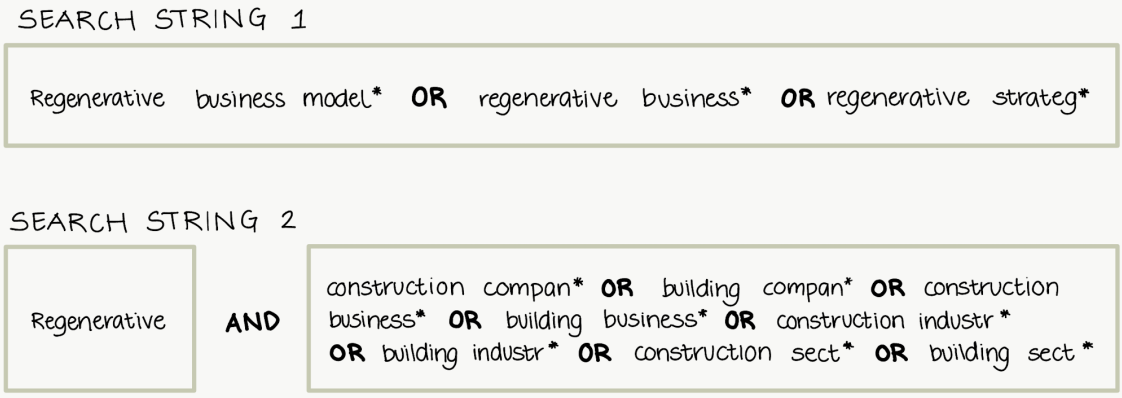


Figure 2.2. *Search string 1 and 2 [Own illustration].*

Dividing the focus of the search strings broadened the scope of the review. Intentionally, search string 1 includes a more general perspective on regenerative business, while search string 2 outlines the focus on regeneration in the construction sector. Thus, the findings from the search strings were analysed and combined. An in-depth description of the method and process of conducting the literature reviews can be found in Section 5.1 'Literature review' on page 26.

Interviews

The 11 exploratory interviews were conducted with a semi-structured approach that focused on allowing the interviewees to influence the conversation based on their knowledge of regenerative business in the construction sector. The exploratory nature of the interviews provided a comprehensive overview of the current state related to the concept of regenerative business practices in the Danish construction sector. An in-depth description of the method and process of conducting the interviews can be found in Section 5.2 'Interviews' on page 30.

Grey literature

Literature to supplement the interviews was found through open literature searches, using Google, LinkedIn, and also snowballing based on suggestions from the interviews. An in-depth description of the method and process of finding grey literature can be found in Section 5.3 'Literature searches' on page 38.

2.1.2 Merging the findings

The findings from the interviews and the literature searches were separately screened, creating visual mappings of different themes and approaches to regeneration (see Chapter 5 'Methods for data collection') on page 26. Aside from the visual mappings of the content, themes emerged to understand regeneration as a concept related to businesses in the construction sector, and critical factors for the adoption of regenerative business practices in the Danish construction sector. The themes and content are seen below. In the following, these themes are elaborated as they are found relevant to understand the nature of regenerative business practices in the construction sector and its relation to the development of the Danish construction sector.

Themes in the state-of-the-art of regenerative business practices in the construction sector:

Section 2.2 *The concept of regenerative business practices in the construction sector.* This includes understanding regenerative business practices in relation to circular economy and sustainability, and the relevance of thinking in socio-ecological systems, based on the literature on the topic.

Section 2.3 *The concept in practice – approaches and challenges.* This includes outlining relevant approaches in implementing regenerative business practices, such as focusing on the level of aspiration, management approach, regenerative technology, and the inclusion of stakeholders. The related barriers and challenges are further identified from the literature.

Section 2.4 *From the perspective of the Danish construction sector.* This includes giving insights into the current state of regenerative business practices in the Danish construction sector and the barriers related to these. The role of different stakeholders and perspectives on how to overcome the barriers is further outlined. This section takes a point of departure in interviews with 11 construction sector experts and grey literature.

2.2 The concept of regenerative business practices in the construction sector

The review shows the concept of regeneration and regenerative business practices is often generally positioned in the context of the more well-known concepts *circular economy* and *sustainability.*

The part of the literature review focusing on regenerative business shows different narratives of regenerative business in relation to the circular economy. On one hand, regenerative business practices are envisioned as moving beyond circular economy (N. M. P. Bocken & Short, 2021; Caldera et al., 2022; Chirico & Nystrom, 2018; Ilie et al., 2019). For instance, N. M. P. Bocken and Short, 2021 argues business practices have to move beyond net-zero and circular economy towards regeneration. Additionally, Ilie et al.,

2019 concludes the industry must change from linear to circular to regenerative business models. On the other hand, other scholars in the literature on regenerative business, frame regenerative business practices *as a part* of the circular economy (Benites et al., 2022; Nielsen & Hakala, 2022; Ritala et al., 2022). Nielsen and Hakala, 2022 highlights the novelty of regeneration in the circular economy as *"the positive connotation of actively engaging and interacting with the environment"*. Benites et al., 2022 emphasise how the concepts of circular economy and regeneration intertwine with a point of departure in the circular economy using the definition from Ellen McArthur Foundation, 2013 stating:

> *"Circular economy refers to an economic framework seeking to keep resources in use for as long as possible while maintaining the highest value as possible. The goal of circular economy is to eliminate waste and pollution by keeping resources in closed loop-systems, allowing nature room to regenerate its resources."*
>
> (Ellen McArthur Foundation, 2013)

Benites et al., 2022 argues, that the notation of regeneration in the Ellen McArthur Foundation's definition of the circular economy put emphasis on resources referring to the ecological system. To a great extent, the part of the literature review focusing on regeneration in the construction sector, shares a similar perspective, by conceptualising regeneration as a function, either of a material that is biocompatible and can be integrated into nature again after use (Futas et al., 2019; Ghazvinian et al., 2022; Honarvar et al., 2022; Smitha & Albert, 2021), or of a building, that is designed to reintroduce waste materials into the system e.g. by remanufacturing (Ogunmakinde et al., 2021) and being 'designed for disassembly' (Talamo et al., 2021).

However, Benites et al., 2022 argues that the Ellen McArthur Foundation's notation of regeneration does not encapsulate the entire concept, as it does not imply a strong focus on benefiting the socio-ecological system which is relevant in the context of regenerative business practices (Caldera et al., 2022; Fullerton, 2015; Hahn & Tampe, 2021). A socio-ecological system refers *"to a system with an interdependence and reciprocal actions that enhance both human society and the natural world"* (Hahn & Tampe, 2021). All in all, from both perspectives, positioning regenerative business practices in relation to circular economy, show the concept of regenerative business practices includes the main principles of circular economy with a focus on regenerating the biosphere, however, it differs by emphasising on creating value for the socio-ecological system.

As mentioned, the concept of regenerative business practices is also positioned in relation to the concept of sustainability. In the part of the literature review focusing on regenerative business, the socio-ecological system plays a key role when connecting regenerative business practices to sustainability, like with circular economy. For instance, Rahman et al., 2020 uses the terminology *'regenerative sustainability'* arguing, it entails *"... practices, actions and strategies that promote the health and well-being of all interconnected living systems"* with the purpose *"... to ensure that an organisation's sustainability efforts contribute to ensuring the well-being of the entire social-ecological system over time"* (Rahman et al., 2020).

The other part of the literature review focusing on regeneration in the construction sector shows a similar tendency to distinguish regenerative business practices from sustainability. For instance, Mercader-Moyano et al., 2021 sees regeneration in contrast to *"being solely sustainable"* by focusing on improvements and Oyefusi et al., 2022 sees it as *"a paradigm shift, moving from green to regenerative"*. With a focus on regenerative construction project management, Sertyesilisik, 2017 highlights that *"'sustainability' is often presented as an intermediate stage between green and regenerative – a 'neutral' state that, once attained, provides the necessary base condition that permits regenerative capabilities to evolve"* (Sertyesilisik, 2017). The regenerative capabilities is encapsulated as *"to achieve net positive development contributing to the regeneration of nature"* (Sertyesilisik, 2017). Sertyesilisik, 2017 emphasises that human and ecological domains need to coexist harmoniously, referring to the socio-ecological system. Furthermore, Sertyesilisik, 2017 argues the scope of project management has to change towards regenerative practices having a net-positive influence on the socio-ecological system.

All in all, in the context of the more well-known concepts, *circular economy* and *sustainability*, the literature review show, the role of the socio-ecological system is a key aspect of understanding regenerative business practices.

2.2.1 A part of – and contributor to the socio-ecological system

As mentioned before, a key aspect of regenerative business practices is it exists in – and contributes to – socio-ecological systems. The focus on the socio-ecological system implies a relational focus on interactions between nature and humans in regenerative business practice (Caldera et al., 2022; Fullerton, 2015; Hahn & Tampe, 2021).

In this connection, the part of the literature review with a focus on regeneration in the construction sector discusses the need of changing from a mechanistic to an ecological worldview of value in the construction sector to develop regenerative practices (Haselsteiner et al., 2021; Lu & Zhang, 2016; Mang & Reed, 2015). A mechanistic worldview means understanding stakeholders isolated from each other with a general focus on value for the isolated stakeholder (Mang & Reed, 2015). While from an ecological worldview, value is seen as *"benefits to life"*, and increasing the system's capability to *"generate, sustain and evolve increasingly higher orders of vitality and viability for the life of a particular place"*, whereas *life* includes both life of the natural world and human society (Mang & Reed, 2015).

As illustrated in Figure 2.3 on the following page, this ecological worldview sees value as a benefit to the entire socio-ecological system being both the human society (A, B and C) and the natural systems within and around it. On the other hand, the mechanistic world sees value as separate for either A, B or C in the human society or the natural systems.

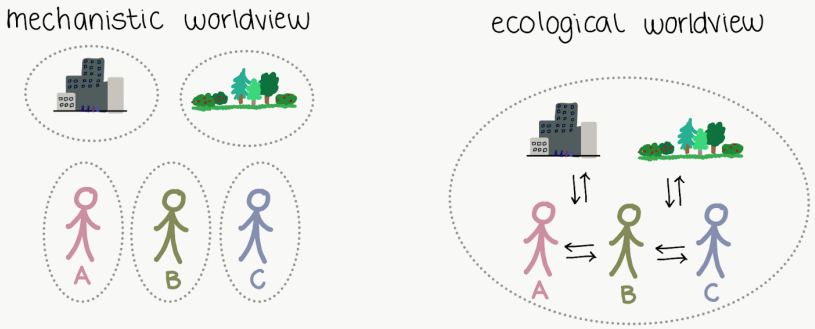


Figure 2.3. *In the ecological worldview, value is seen as benefits to both life of the natural world and human society [Own illustration].*

The ecological worldview is also seen in the conceptualisations of regenerative business practices, identified in the literature on regenerative business. For instance, Hofstra, 2016; Rahman et al., 2020 emphasise that the concept of regenerative business rests on the idea of nature and humans supporting each other in mutually beneficial ways through a holistic understanding of interactions and interrelationships. Additionally, Hahn and Tampe, 2021 share the same principles and conceptualise regenerative business practices into *"businesses that enhance, and thrive through, the health of social-ecological systems in a co-evolutionary process"*, describing the human-nature relationship through the terminology of the socio-ecological system. The conceptualisation of Hahn and Tampe, 2021 is acknowledged and emphasised in the newer literature of Stappmanns, 2022 and Caldera et al., 2022. The conceptualisation by Hahn and Tampe, 2021 is based on two system-based principles of the socio-ecological system. Firstly, a regenerative business practice involves any business goals to be defined from the perspective of the socio-ecological system. Thus, the perspective of a business as a single entity is changing to see it as a part of – and a contributor to the socio-ecological system. The relational interactions with both human society and the natural world become a central purpose of the business. Secondly, regenerative business practices requires a change towards an adaptive management approach to navigate the complexity of the socio-ecological system (Hahn & Tampe, 2021). Thereby, the perspective of business management changes from the scope of the business itself to the scope of the socio-ecological system. Thus, these two system-based principles align with the ecological worldview on creating value for both the natural world and human society.

Overall, the literature review showed the key purpose of regenerative business practices is being part of – and contributing to the well-being of the entire socio-ecological system over time. Hence, regenerative business practices in the construction sector require a rethinking of value in the business as well as new interactions and interrelationships within the socio-ecological system. Thus, it is derived that regenerative business practices must have a deep reflection of purpose for the socio-ecological system. However, enabling these regenerative business practices creating a perspective of the socio-ecological system is a challenge in the construction sector. In the following section, the implementation of regenerative business practices in the context of the construction sector is discussed based on the literature review.

2.3 The concept in practice – approaches and challenges

Through the literature review, regenerative management approaches guiding the direction, regenerative construction principles, and interactions with stakeholders are identified as key aspects of implementing regenerative business practices in the construction sector. The following elaborates in these aspects with a focus on identifying necessary approaches and limiting barriers to regenerative business practices in the construction sector found through the literature review.

2.3.1 A management approach guiding the direction

The part of the literature review focusing on regenerative business mainly focuses on regenerative business practices on the level of aspiration and management. One example is N. M. P. Bocken and Short, 2021, who operationalises regenerative business models as having a dimension focusing on continuously re-purposing for human society and nature by having an inclusive value creation. Furthermore, Hahn and Tampe, 2021 propose a framework that operationalises regenerative business through three strategies with six criteria as seen in Table 2.1. The criteria in Table 2.1 are based on the two system-based principles of the regenerative business practices as presented in previous section focusing on the business level of aspiration for the system and having an adaptive management approach. The framework of Hahn and Tampe, 2021 proposes different development stages for businesses to move from exploit to enhance.

Table 2.1. *Principles and criteria of regenerative business* (Hahn & Tampe, 2021).

Principles		**Systems based level of aspiration**			**Adaptive management approach**		
Criteria / Strategies		***Impact on ecosystem***	***Relation with ecosystem***	***Underlying business rationale***	***Sense of place***	***Temporal orientation***	***Business strategy and strategizing practices***
	Exploit	Impact as externality	Domination	Maximize shareholder value	Disembedded from place and ecosystem	Short-term, linear	Business as usual within minimum legal requirements
Degree of regeneration	**Restore**	Compensate negative impact	Instrumental separation	Secure exploitation and maximize yield from ecosystem	Place and ecosystem as exchangeable commodity	Transactional, linear	Enlightened business as usual through post hoc repair, punctual and unilateral intervention
	Preserve	Avoid impact or net zero impact	Mutually dependent co-existence	Operate business within ecological boundaries	Acknowledgement of place-specific characteristics and requirements	Long-term, linear	Adjustment of business operations through regular feedback and adaptation
	Enhance	Net positive impact	Symbiotic embeddedness	Mutually enhancing co-evolution of ecosystem and business	Uniqueness and nestedness of place within socio-ecological system	Long-term, cyclical, synchronic	Strategic integration through iterative and participative experimentation

Similar for both N. M. P. Bocken and Short, 2021 and Hahn and Tampe, 2021 is that they propose these operationalisations as potential future outlooks to change towards regenerative business. However, they need to be tested and developed further based on practice. Based on the operationalisation by Hahn and Tampe, 2021, Caldera et al., 2022 have investigated regenerative business practices in small - and medium-sized enterprises through two case studies of small- and medium sized enterprises working with regenerative business practices. Caldera et al., 2022 finds the practices of regenerative business is *"iterative and procedural based on ongoing experimentation, reflective processes and probing based on the feedback from the socio-ecological system"* (Caldera et al., 2022). Further, the practices promote *"two-way learning and knowledge sharing; both within the firm and connected ecological system"* as well as it *"prioritise innovation cultures and their capacity to adapt and respond to change, toward improving conditions for life in socio-ecological systems"* (Caldera et al., 2022). Lastly, Caldera et al., 2022 concludes that advocates are critical to enabling regenerative strategies providing systematic thinking and awareness of interactions with nature, as also proposed by Hahn and Tampe, 2021. Nevertheless, Caldera et al., 2022 highlights that it is a complex shift moving away from business as usual that requires further investigation.

The part of the literature review focusing on regeneration in the construction sector also operationalises regenerative practices through the implementation of strategies and values in business management. For instance, Lu and Zhang, 2016 proposes a corporate sustainability rating system for architecture, engineering, and construction organisations *advocating for regenerative sustainability that shifts from greening projects to greening organisations* (Lu & Zhang, 2016). Thus, the organisations can contribute to *"cultivating and shaping a true regenerative development and performance in the long term"* (Lu & Zhang, 2016). In this connection, Lu and Zhang, 2016 concludes that it is possible to create a shared value through regenerative practices, however, there are still many unknown challenging issues that need to be explored further. Similarly, Mirsky and Songer, 2009 reflects on a 'triple top line' strategy that focuses on integrating ecological, economic and social aspects from the beginning of any design process, to create holistic impact and provide unrecognised opportunities to create value (Mirsky & Songer, 2009). According to Petrovski et al., 2021 and Sertyesilisik, 2017, it is important to have structured project management and an integrated project team with change agents from the design to the use phase that focuses on creating value for the socio-ecological system. The role of stakeholders as an aspect of regenerative business practice is elaborated further below. Both Petrovski et al., 2021 and Sertyesilisik, 2017 put emphasis on establishing interactions and relations with stakeholders throughout the different phases of a project to create value. Another example of operationalising the concept of regenerative business practices on a management level is through certifications, e.g. how the Living Building Challenge [1] certification with categories can guide the design process, strategies and development of technologies in businesses (Petrovski et al., 2021).

[1] *LBC 4.0 focuses on the relationship between impact and effort. While LBC 4.0 continues the standard's mission of visionary, but attainable building goals, it also recognizes that not all projects face the same challenges or share in the same opportunities. Regenerative design should be attainable to everyone, everywhere. With 4.0, we are creating a streamlined approach focused on maximizing positive impacts specific to the place, community, and culture of the project (Institute, n.d.).*

2.3.2 Construction principles

Besides the management level, the part of the literature review focusing on regeneration in the construction sector shows the concept of regeneration is operationalised through the implementation of different kinds of technologies. For example Mercader-Moyano et al., 2021, develops a prototype for emergency housing and takes into account sourcing of local materials, and focuses on improving the quality of life of displaced people, in combination with, according to Mercader-Moyano et al., 2021, providing benefit to the environment by developing a fully circular prototype. Concrete examples of regenerative construction are also presented by Petrovski et al., 2021 and Haselsteiner et al., 2021. This includes technologies such as harvesting rainwater, photovoltaic energy production and biophilic design that integrates nature into the living space (Petrovski et al., 2021). Haselsteiner et al., 2021 adds a holistic perspective on the development of regenerative construction by developing a conceptual framework for regenerative building principles based on a literature review on regenerative standards and the 17 UN's sustainable development goals. The regenerative building principles concertise the ecological worldview, by focusing on creating value for elements of both the natural system and human society (Haselsteiner et al., 2021). (see Table 2.2).

Table 2.2. *The regenerative principles synthesised by Haselsteiner et al., 2021.*

	Regenerative principles
Ecological regeneration	Place, nature, and ecosystem
	Energy
	Carbon
	Water
	Materials and resources
Regenerative social development	Health and well-being
	Social equity
	Economy
	Culture and community
	Education and inspiration
	Environment and mobility

Haselsteiner et al., 2021 investigated drivers and barriers in the implementation of the framework for regenerative building principles allowing the implementation of regenerative technologies. The barriers mainly focused on business aspects related to employees and consultant's knowledge and experience with regenerative practices; cultural aspects – from broad-range national culture to the construction businesses' own culture; the complexity of legislation and policy adaption to regenerative practices; the lack of initiatives to reinvent leadership; and financial barriers in terms of lack of sufficient public incentives to promote the regenerative practices in the construction sector needed to overcome hidden costs of changing practices and the risk of uncertainty (Haselsteiner et al., 2021). On the other hand, identified drivers are available financial incentives, marketing and sales benefits, market advantage, reduced building life cycle costs, more effective use of energy and resources as well as enhancement of buildings' users' well-being and receiving building certification (Haselsteiner et al., 2021). Hence, overcoming barriers requires utilising drivers in the design of regenerative business practices to implement regenerative

construction principles. Thus, the literature review shows how the implementation of regeneration construction principles is closely linked to the design and implementation of regenerative business practices.

2.3.3 The role of stakeholders and interactions

Besides management approach and technologies, the literature review shows roles, influence and collaboration between stakeholders are key aspects of adopting regenerative business practices in the construction sector. From the part of the literature review focusing on regenerative business, Rahman et al., 2020 argues for the need for businesses to work together with stakeholders with the aim of building a deeper knowledge of how natural ecosystems work. Additionally, Rahman et al., 2020 argue for businesses to engage stakeholders in knowledge sharing and knowledge co-creation to build collective capacity as no single unit can have all the knowledge itself. The stakeholders can both be local producers, communities, governments, and a range of organisations, in order to be locally responsive and sensitive to local ecosystems (Rahman et al., 2020). In connection, N. M. P. Bocken and Short, 2021 argues if business models are not conceived with a cross-sector approach, *"the existing business models of other sectors may hamper transitions by reinforcing the current system"*, hence the collaboration with other businesses is important to consider in the regenerative business practice. Similarly, Chirico and Nystrom, 2018 highlights the need for adopting an integrative system perspective, recognising all living systems are interconnected, to develop regenerative business systems. In practice, the changes towards regenerative business practices requires businesses to move beyond the goal of profit and power towards benefiting both the natural - and social system through interactions and collaborations (Chirico & Nystrom, 2018; Hahn & Tampe, 2021).

The part of this literature review focusing on the regeneration in the construction sector emphasises the need for new scopes and responsibilities of construction professionals towards incorporating the natural world in their practices through phases like design, purchasing, transport, construction and end-of-life (Oyefusi et al., 2022; Sertyesilisik, 2017). In addition, Mirsky and Songer, 2009 argues for the need of proactive participation in the construction community, with the construction professional having a central collaborative role in creating opportunities for participation. Generally, the relationship between management and stakeholders in the construction sector is highlighted by Mang and Reed, 2015, who reflects on the importance of educational influence on the stakeholders within – and outside the business, towards an ecological perspective in the creation of value through the design, construction, and management process. In this context, Mang and Reed, 2015 argues for the current mechanistic view on value creation being a barrier to regenerative development.

All in all, the perspectives from the literature review emphasise the importance of changing the scope of roles within businesses and focusing on interactions with stakeholders in the construction sector as well as how to build relationships and interactions with stakeholders as no single unity can have all the capabilities. However, the literature does not show how businesses can create these collaborations and interactions. Even though, the literature does not highlight how businesses can create these collaborations and interactions, the perspective can be linked to management seeing it as a question of priority and approach.

2.3.4 Connecting the aspects and identifying barriers for implementation

Overall, the literature review shows how the concept of regenerative business in practice in the construction sector is a continuous process whereas management approach, construction principles, and roles as well as collaborations with stakeholders are key aspects. The aspects are all interconnected with the management approach. Thereby, implementing the concept of regenerative business practices becomes a question of changing the management approach towards two-way learning and knowledge sharing: both within the businesses and connected ecological system, thus value creation for the entire socio-ecological system is central. Furthermore, implementing regenerative business practices includes a management approach that prioritises innovation cultures, and the capacity to adapt to changes and respond to improve the socio-ecological system. Additionally, the review shows that a management approach in regenerative business practices is important to implement regenerative construction principles in practice – the management approach has to utilise the benefits of implementing regenerative technologies in construction. Additionally, for implementing regenerative business practices, the management has to focus on building collective capacity with stakeholders as no single unit can have all the knowledge and capabilities itself. Thus, having the right management approach enabling collaborations with different capabilities to create shared innovations processes seems as the key to realising a change of practice according to the literature review.

Besides the elaboration of the key aspects in the implementation of regenerative business practices, related barriers and challenges were identified during the elaboration of the previous sections, and are summarised as follows in Figure 2.4.

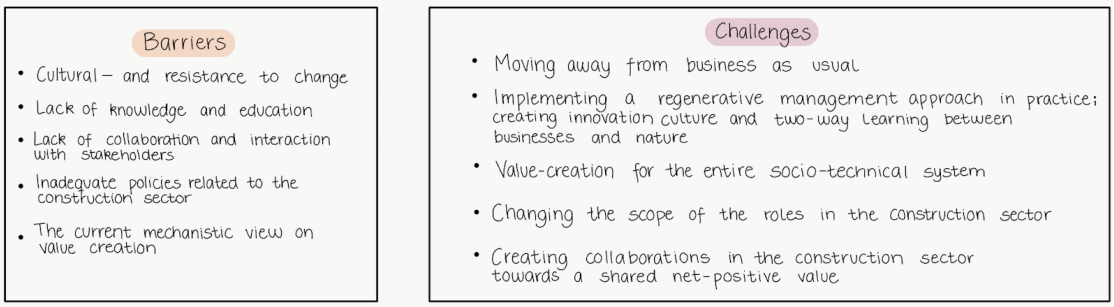


Figure 2.4. *Identified barriers and challenges [Own illustration].*

All in all, the necessary approaches and limiting barriers in the implementation of regenerative business practices highlight a need for a mind-shift and new values in the construction sector, that fosters new management approaches. These approaches and limitations, as well as the understanding of regenerative business practices, will be seen in the context of the Danish construction sector in the following section.

2.4 From the perspective of the Danish construction sector

Until now, the state-of-the-art has been based on the literature review on regenerative business practices in the construction sector. To be able to contextualise the findings in the Danish context – the following sections take a point of departure in the initial semi-structured interviews with 11 stakeholders in the Danish construction sector. The analysis of the interviews has been conducted in Miro as explained in Section 5.2 'Interviews' in Chapter 5[2]. The following presents the findings from the analysis of the interviews to explore the concept of regenerative business practices in the Danish construction sector. First, the current state of the practice is outlined followed by an exploration of the barriers and challenges in the existing system for developing regenerative business practices, which is combined with the findings from the literature review and grey literature as described in Section 2.1 'A two-tier state-of-the-art'.

2.4.1 Regenerative business practices in the Danish construction sector?

When asked to describe the current focus in the transition of the Danish construction sector, all interviewees highlighted the new climate requirements for new construction, setting up requirements to conduct life cycle analysis calculations – it applied from January 2023 (cf. Appendix C). From the interviews, regulative requirements are identified as a driver for developing the focus on sustainability in the construction sector, both on the European and national levels (cf. Appendix C). Various interviewees highlighted that the new climate requirements have created a growing focus on climate impacts from construction. In this connection, several of the interviewees expressed, it has become easier to talk about sustainability within the construction sector over the last couple of years, since the concept has become more widespread (Myrdal, 2023; Sand, 2023a).

As a part of the enhanced focus on sustainability in the construction sector, the interviews revealed a tendency for a greater focus on alternative building materials, such as more biogenic materials (cf. Appendix C). Work is being done to develop, collect and produce more data and knowledge on the area (Bejder, 2023; Perge, 2023). Nevertheless, the analysis of the 11 interviews shows the concept of regenerative practices is not currently part of the focus or well-known in the transition of the Danish construction sector. The main part of the interviewees did not know the concept or expressed limited reflections when asked to describe their understanding and thoughts on it in the Danish construction sector. On the other hand, a few of the interviewees expressed reflections of the concepts revolving around *"do no harm vs. do good"* (Perge, 2023), contributing positively (Bejder, 2023) and as *"doing something extraordinary, going that further, or making that extra effort"* (Andersen, 2023). However, various interviewees expressed it as a visionary and theoretical concept that still needs to be defined in practice (Andersen, 2023; Bejder, 2023; Vendena, 2023). None of the interviewees were actively working with the concept (cf. Appendix C). Also, the analysis of the interviews revealed a number of barriers and challenges, keeping the Danish construction sector away from changing practices. These are presented and explored in the following.

[2] *Miro is an online workspace, a kind of online whiteboard to place posters, write notes and connect thoughts (Miro, 2023).*

2.4.2 Barriers and challenges in the existing system

The construction sector is characterised as being very capital intensive and conservative (Myrdal, 2023; Perge, 2023). For multiple years, the focus in the development of the sector has been put on lowering costs and making processes more efficient. Additionally, the sector is highly fragmented involving a complex set of stakeholders (Bro, 2023a; Perge, 2023). All in all, this results in the construction sector being less adaptable to change (Christiansen, 2023; Myrdal, 2023).

Table 2.3, on the following page outlines identified barriers in the existing system for developing new practices in the Danish construction sector. The barriers have been identified by analysing the 11 interviews with the stakeholders in the Danish construction sector (cf. Section 5.2 'Interviews'). Each interviewee was asked of which barriers they experience to change the current practices in the construction sector (cf. Appendix B.1).

One of the frequently mentioned barriers in the interviews is the reluctance to take on the risks associated with changing practices in the construction sector. Myrdal, 2023 points out that the lack of knowledge and education, particularly regarding the use of recycled materials, raises concerns about, e.g., the potential of building collapses. This raises the important question of who bears the responsibility and financial burden in such cases. Overcoming this risk is linked to various barriers, such as the absence of financial incentives for innovation, limited awareness about alternative construction methods, and insufficient collaboration among stakeholders. Another significant barrier is the cultural resistance that maintains the status quo in business practices. Christiansen, 2023 and Perge, 2023 argue that addressing this resistance requires a focus on enhancing collaboration among stakeholders to develop new systems. In general, these barriers in the Danish construction sector are interconnected and mutually influential. Table 2.3 divides the barriers into five overall aspects and presents related barriers with descriptions and references.

Table 2.3. *The barriers in the existing system identified, a description of them, and the related references.*

Barriers in the existing system	Description	References
	Financial aspects	
A great focus on profits.	Construction projects must be able to generate significant profits, otherwise, they will not be built – changing practice requires investment and less profit.	Frisesdal, 2023 Perge, 2023 Hessellund, 2023 Sand, 2023 Vendena, 2023 Bro, 2023 Andersen, 2023
The building process must go fast – "time is money".	Not allowing time for testing, experimentation, and demolishing for re-use.	Vendena, 2023 Jakobsen, 2023 Perge, 2023 Andersen, 2023 Christiansen, 2023
No financial incentives for "doing better".	No financial incentives for using recycled and bio-based materials over raw materials. It is cheaper to tear down a building and build a new one instead of renovating it or using recycled materials.	Perge, 2023 Sand, 2023 Bro, 2023 Andersen, 2023
	Standards and regulations	
Major market players ability to influence standards and regulations.	The government is not willing to make the conditions that influence the business of prominent market players.	Bro, 2023 Vendena, 2023
Strict safety and energy regulations.	Not flexible for alternative ways of building.	Thiesen, 2023 Christiansen, 2023
No distinguishing between virgin and recycled materials in life-cycle-assessment calculations.	Not giving an incentive to use recycled materials to meet the new climate requirements.	Jakobsen, 2023 Christiansen, 2023
Requiring the life-cycle-assessment calculations to be submitted after the building process is over.	Not giving the incentive to use the calculations as a point of departure for, e.g., choosing materials.	Thiesen, 2023
The scope of waste regulations.	Not being flexible for reselling recycled materials due to too strict definitions of waste and contaminated waste.	Andersen, 2023
	Uncertainties and responsibilities	
The risk of doing something new – lack of insurance and collaboration.	Risks occurs when doing things other ways than usual and these must be placed on stakeholders in the construction process, which is difficult because of missing insurance ad willingness between stakeholders to share the risk.	Myrdal, 2023 Jakobsen, 2023 Frisesdal, 2023 Thiesen, 2023 Hessellund, 2023 Perge, 2023 Sand, 2023 Bejder, 2023
Uncertainties and lack of data when using recycled and alternative building materials.	Lack of knowledge about alternative building materials gives uncertainties, especially related to safety and indoor climate. There are doubts about the material's resilience and ingredients.	Vendena, 2023 Jakobsen, 2023
	Knowledge and education	
Cultural resistance; doing business as usual.	Not prioritising time and money to innovate and learn new skills.	Myrdal, 2023 Bejder, 2023 Bro, 2023 Andersen, 2023 Frisesdal, 2023 Vendena, 2023 Perge, 2023 Christiansen, 2023
Lack of knowledge and education on sustainable solutions.	Not having any clear definitions of sustainability to guide the development.	Myrdal, 2023 Jakobsen, 2023 Vendena, 2023 Perge, 2023
	Collaboration between stakeholders	
Information and visions tend to get lost between stakeholders.	Not collectively supporting the development. The difference between stakeholders can make it challenging to communicate and work together in new ways.	Thiesen, 2023 Perge, 2023
Lack of definitions of concepts like sustainability in the construction sector.	Not a common language between stakeholders might lead to misunderstandings.	Myrdal, 2023 Sand, 2023 Bejder, 2023 Thiesen, 2023 Perge, 2023
A lack of knowledge sharing and learning from completed projects.	Keeping one's cards close to one's chest as a market advantage.	Perge, 2023 Frisesdal, 2023

The barriers identified in the interviews are also recognised in the existing literature. A recently published comprehensive report titled "Roadmap for circular economy in construction"[3], by Realdania, 2023b, largely supports the barriers identified through the interviews. The report emphasises cultural resistance and the tendency to maintain the status quo, uncertainties and low willingness to take risks, as well as a focus on profitability and time optimisation. Additionally, the report highlights linear processes and the financial structures associated with businesses as additional barriers, beyond what was mentioned in the interviews. Another report, "Barriers for the uptake of circular economy in construction"[4], by VCØB Community, 2022, emphasises the lack of incentives from standards and regulations, uncertainties, the absence of documentation on reused materials, and the lack of required competencies as barriers. This report aligns with the points raised in the interviews.

Furthermore, there is an overlap between the barriers identified in the interviews and those identified in the literature review, as shown in Table 2.3. However, the literature review primarily focuses on regenerative business practices, whereas the interviewees have a limited understanding of such practices, as discussed in the previous section. One notable difference between the findings in the literature review and the interviews is the emphasis on the influence of the mechanistic worldview. The literature views the prevailing mechanistic worldview on value creation as a barrier, whereas the interviewees do not place significant emphasis on it, potentially indicating their lack of awareness or recognition of the need to be part of and contribute to the socio-ecological system. Nevertheless, the findings from the interviews and the available grey literature support the overall conclusions drawn from the literature review and provide a deeper understanding of the barriers hindering the adoption of regenerative business practices in the Danish context.

Overcoming the barriers

To overcome the system of barriers in the Danish construction sector, Hessellund, 2023 argues there is a need for new value chains collaborations, which according to Myrdal, 2023 are slowly starting to evolve. However, Vendena, 2023 and Frisesdal, 2023 argue for the need to get all stakeholders involved in changing the construction sector. For instance, the architects, engineers, and contractors play a key role in changing the information flows, ensuring knowledge from their field to the property owners, who need to set the direction and requirements for the development of the building process (cf. Appendix C). Similarly, the demolishers and material suppliers play a key role in changing the material flows developing documentation and playing a part in the early phases of the building process (cf. Appendix C). The interviewed stakeholders views on the role of different stakeholders in changing the construction sector are listed arbitrarily in Table 2.4 on the following page. The views are derived from the analysis of the interviews with stakeholder in the construction sector as described in Section 5.2 'Interviews'. All the interviewees were asked to explain and reflect on which responsibilities they see associated with the different stakeholders in changing the current practices of the construction sector.

[3] *Translated from "Roadmap for cirkulær økonomi i byggebranchen" (Realdania, 2023b).*

[4] *Translated from "Barrierer for udbredelsen af cirkulær økonomi i byggeriet" (VCØB Community, 2022).*

The newly published "Roadmap to Circular Economy within Construction" (Realdania, 2023b) supports the perspective on getting all stakeholders engaged, by arguing for a systemic approach as there is no *"silver bullet"* to change practices in the construction sector, but a process of actions that need to be coordinated. This entails focusing on the interdependence between barriers, stakeholders, and actions building new systems to change the construction sector (Realdania, 2023b).

Table 2.4. *Stakeholders, their role in changing the construction sector and the related reference.*

Stakeholders	Role in changing the system	References
European Union (EU)	Guiding the development through regulatory frameworks	Myrdal, 2023
The government	Create incentives for new business models and set more demands	Myrdal, 2023 Hessellund, 2023
Knowledge-based organisations	Participate in innovation-oriented collaborations with the construction sector.	Myrdal, 2023 Hessellund, 2023
Network organisations	Ensure knowledge sharing across the construction sector	Sand, 2023 Perge, 2023
Standards	Help scale up solutions	Christiansen, 2023
Insurance companies	Support the development by developing insurances to recycled materials	Sand, 2023
Property owners (public or private, e.g., pensions funds, investors, municipalities)	Set demands to guide the rest of the stakeholders and ensure communication across the roles Only build projects within planetary boundaries Ensure realistic time and financial frame for projects allowing for the adoption of regenerative projects	Myrdal, 2023 Bro, 2023 Perge, 2023 Frisesdal, 2023 Vendena, 2023 Andersen, 2023
Architects	Change practices towards guiding and collaborating with property owners And ensure a practice – and reality-oriented focus	Thiesen, 2023 Myrdal, 2023 Vendena, 2023 Perge, 2023
Engineers	Uses their knowledge to guide the property owner early in the process, and makes concepts, like regenerative practices, more concrete	Thiesen, 2023 Jakobsen, 2023
Contractors	Involved early in the process, sets demands to customers and material suppliers	Myrdal, 2023 Perge, 2023
Demolishers	Involved in the design phase and develops towards becoming a material supplier	Christiansen, 2023 Andersen, 2023
Material suppliers	Improve their products with solid and transparent documentation Ensure they do not over-exploit natural resources to create a balance between production and use	Thiesen, 2023 Myrdal, 2023 Jakobsen, 2023
Users of the buildings	Rethink their needs related to space	Vendena, 2023

2.5 Moving towards regenerative business practices in the construction sector?

All in all, moving beyond the concepts of sustainability and circular economy, the regenerative business practices emphasise on creating value for both the natural systems and human society. Sustaining the planet's well-being is no longer enough. The development has to contribute to the planet's well-being while also creating a social foundation for human society. With the construction sector's increasing influence on the planet and social foundation, as defined in Chapter 1 'From degrenerative to regenerative business practices', the prevalence of a degenerative practice must change towards regenerative practices enhancing the capabilities within the planets natural systems and human society. According to the findings in this literature review, regenerative business practices in the construction sector can be summarised with the following principles:

Principles of regenerative business practices in the construction sector

- Having a view on the business as a part of – and contributor to the socio-ecological system
- Focusing on value-creation for both the natural world and human society through a continuous cyclic process
- Developing the business from the outside to inwards deriving goals from the socio-ecological system
- Being adaptive to the needs of the socio-ecological system
- Focusing on the organisations rather than projects
- Creating holistic impacts from the beginning of any design process.

Nevertheless, regenerative business practices are currently a distant and complex concept for the businesses within the Danish construction sector. According to this state-of-the-art on regenerative business practices in the construction sector, having the right management approach enabling collaborations with different capabilities to create shared innovations processes is key to realise the above-mentioned principles. However, various connected barriers are influencing the transition of the construction sector, requiring new systems to enable these regenerative business practices. Yet, the businesses within the construction sector have the potential to change degenerative practices by building systems enabling regenerative business practices.

Research Question 3

In the previous chapter, it was made clear that regenerative business practices mean acknowledging businesses are embedded in, a part of and a contributor to the socio-ecological system. Regenerative business practices in the construction sector are moving beyond sustaining, and instead focusing on creating benefits for both human society and the natural world to enhance the current state of living systems.

In the context of the Danish construction sector, the concept of regenerative business practices is unclear and undefined. The conditions and current systems in the construction sector result in a number of barriers that need to be overcome to enable regenerative business practices. Overcoming the barriers entails building systems between businesses and stakeholders enabling businesses to shift from innovating in isolation to co-create value in networks for the socio-ecological system – as no single stakeholder can have all the capabilities or knowledge. Therefore, the purpose of this study is to investigate how businesses can build systems to enable a transition from degenerative business practices towards regenerative business practices in the construction sector. Consequently, this study seeks to answer the following research question:

How can businesses build systems to enable regenerative business practices in the Danish construction sector?

In this study *businesses* is defined as an entity or organisation that carries out professional activities in the construction sector, while the *construction sector* encompasses activities related to planning, designing, building, maintaining, using and demolishing buildings and infrastructure. Notably, this study focuses on the Danish construction sector.

To answer the research question, this study focuses on businesses' system-building activities by analysing businesses aiming to challenge conventional and degenerative practices. Acknowledging that these types of businesses and activities are not widespread in the construction sector at present, these businesses are seen as front-running businesses. The identification of these front-running businesses is further described in Chapter 5 'Methods for data collection' on page 26.

To guide the analysis, the following three sub-questions are developed:

1. *How can the transition towards regenerative business practices in the construction sector be defined, to conceptualise businesses' systems-building activities?*
2. *How are front-running businesses in the construction sector working with building systems to change current practices?*
3. *How can front-running businesses enhance their ability to build systems to enable regenerative business practices?*

3.1 Defining regenerative business practices in the construction sector

As it is established, the focus of this study is to examine the transition of the construction sector towards enabling regenerative business practices. The following defines the terminology of regenerative business practices by integrating the principles derived in Section 2.5 'Moving towards regenerative business practices in the construction sector?'.

Firstly, the concept of practices entails a shared understanding involving certain activities and is understood with the definition by Schatzki et al., 2001 as: *"embodied, materially mediated arrays of human activity centrally organised around shared practical understanding"*. In this study, having regenerative business practice emphasises an adaptive approach to value-creating for the benefit of the socio-ecological system, thus being a dynamic process adjusting the shared understanding accordingly to the current dynamics of the socio-ecological system. Hahn and Tampe, 2021 summaries *"adaptive management approach"* into being adaptive to changes in the socio-ecological system, and a *"systems based level of aspiration"* meaning deriving goals from the system. Thus, this results in a focus on the process in the construction sector, rather than the built environment. Additionally, Hahn and Tampe, 2021 also argues for seeing regenerative business as a *"continuum"* being something that keeps on going, changing slowly over time, rather than a *"dichotomous"* category, divided into two distinct parts, by introducing three levels of regenerative strategies: Restore, preserve, enhance – as presented in Table 2.1 (Hahn & Tampe, 2021). Thus, regenerative business practices emphasise a dynamic development process acknowledging that *"in practice, businesses may not be able or willing to fully live up to regenerative principles and criteria but only do so to different degrees"* (Hahn & Tampe, 2021).

Thus, with a point of departure in the principles defined in Section 2.5 'Moving towards regenerative business practices in the construction sector?', the terminology of *regenerative business practices* in this study emphasises a shared understanding of a continuous and iterative process, integrating the regenerative principles, towards enhancing the socio-ecological system.

4 Research Design

The following chapter outlines the research design and approach applied to answer the research question with the aim to provide transparency and reliability of the conducted research.

Being within the emerging field of *regenerative business management*, the paradigmatic orientation of this study is based on a critical epistemology moving away from a managerial epistemology. The managerial epistemology focuses on the corporate interests of businesses, while still seeing environmental and social issues as important (Ergene et al., 2021). With the critical epistemology of this study, there is a perception and acknowledgement of a need for holistic ecological well-being including both human society and the natural world, believing there is a need to create alternative forms of organising efforts to restore and enhance the ecosystem which the businesses exist within (Ergene et al., 2021). Furthermore, the research is conducted with a relational ontology enabling a worldview of humans and non-humans to co-create the world and the conditions within it (Ergene et al., 2021). Thus, the analytical focus of this study becomes unfolding practices through which relations of businesses in the construction sector are re-produced.

The research design for this study uses a qualitative approach to answer the research question (Creswell, 2009). Figure 4.1 illustrates the elements and process of the research design. As visualised, the research design employs mainly an abductive approach to the research by first establishing preexisting knowledge in the state-of-the-art leading to the research question. The abductive approach is useful in examining a phenomenon from a new perspective (Awuzie & McDermott, 2017). However, as the research is guided by a relatively new research agenda on regenerative business practices, the study is also influenced by an exploratory nature of the complexity of evolving in this field.

To examine how businesses can build systems to enable regenerative business practices, businesses' system-building activities in transitioning towards regenerative business practices in the construction sector are first of all conceptualised, allowing to create an understanding of businesses' ability to build systems towards this change of practices. The first part of the analysis adds to this conceptual framework by creating an empirical perspective by analysing current processes in the construction sector focusing on how front-running businesses are building systems to change current practices. The knowledge about the conditions influencing this process is gathered from semi-structured interviews with stakeholders working within businesses in the construction sector. Thus, the primary findings within this research are based on the perspectives and explorations of the interviewees. However, the interviews and the analysis emphasis understanding the practices of the interviewees, with a focus on unfolding their production of relations towards a certain

change, to understand how their practice is produced. The considerations and reflections on the choice of using semi-structured interviews are explained in-depth in Section 5.2 'Interviews'. The conceptual framework and the first part of the analysis are used to critically reflect on how businesses can enhance their ability to build new systems towards enabling regenerative business practices in the construction sector. This leads to various recommendations on how businesses can build systems enabling regenerative business practices in the construction sector.

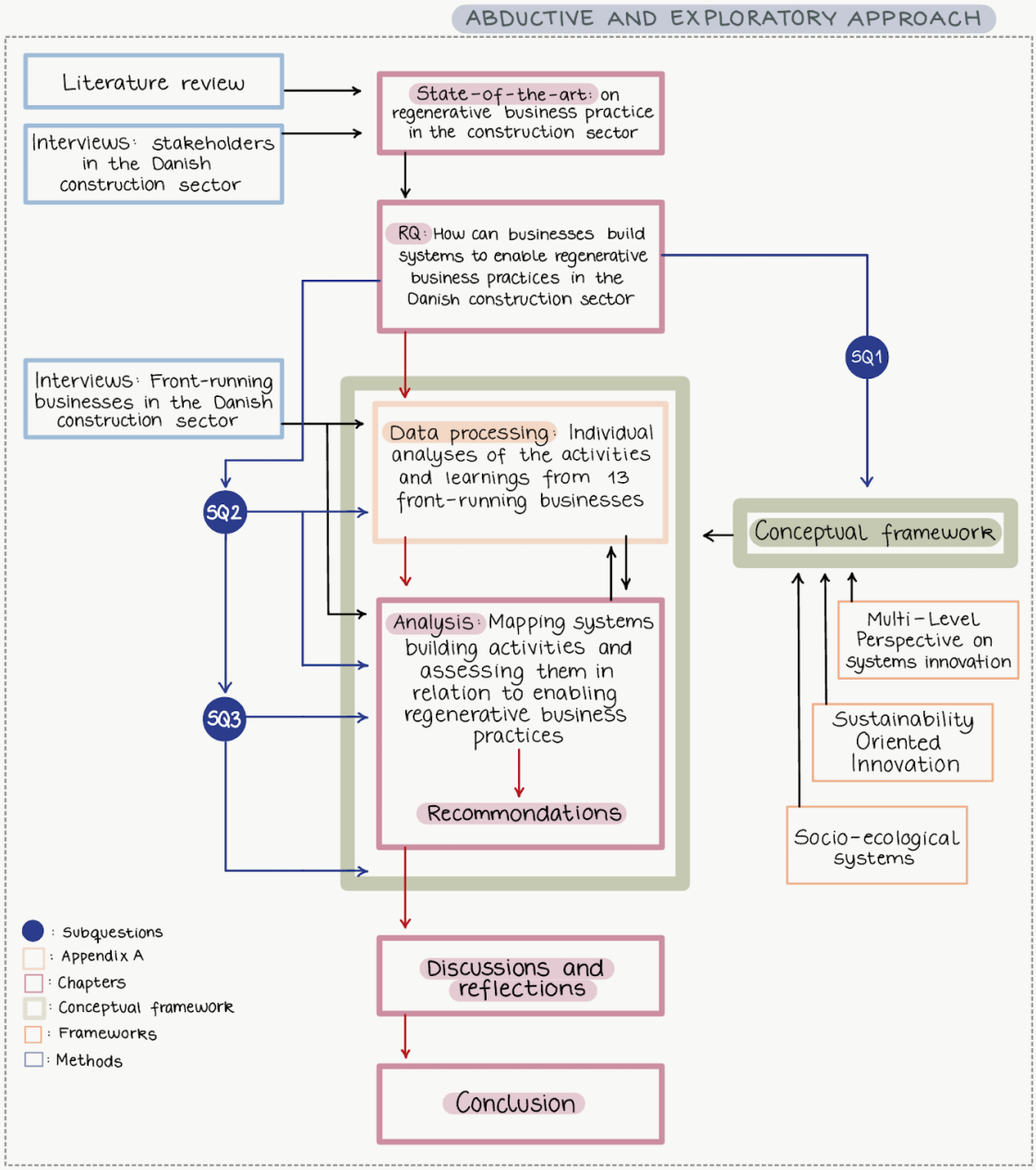


Figure 4.1. *This study's research design [Own illustration].*

Methods for data collection 5

The following chapter presents – and reflects on the methods applied to collect data, helping to answer the research question. The methods have been applied with the aim to obtain in-depth information about front-running businesses and their systems-building activities. The methods for data collection are literature review and semi-structured interviews.

5.1 Literature review

A literature review has been conducted for the state-of-the-art of regenerative business practices in the construction sector. In a broad sense, a literature review can be described as a more or less systematic way of collecting handling, and summarising previous research and knowledge. The literature review has been particularly chosen in this study to create relevant knowledge about a selected subject that can create a more grounded research basis as well as an argument for the research question – by integrating different perspectives and findings from several empirical discoveries (Booth et al., 2012; Snyder, 2019).

This literature review has been conducted with a semi-systematic approach inspired by the methodology of Snyder, 2019. Accordingly, to Snyder, 2019, the semi-systematic approach is designed *"[...] for topics that have been conceptualised differently and studied by various groups of researchers within diverse disciplines and that hinder a full systematic review process"*. In this study, this approach enables room to investigate literature on regenerative business practices in broader terms as it is acknowledged that the concept of regeneration is complex and has been conceptualised differently by multiple researchers. Furthermore, Snyder, 2019 argues the semi-systematic review has the potential to end up with a contribution of, e.g., the ability to synthesise the state of knowledge on the topic, which supports the intentions of this literature review.

The following outlines a description of the planning-, execution- and analytical phase – to secure the applicability, and thereby support the transparency of the review (Haddaway et al., 2020).

Planning the review – a focus on purpose, scope, keywords and databases

The initial phase of the literature review has been to design and plan the study, by asking the question of why this review needs to be carried out (Snyder, 2019). Firstly, different unsystematic searches have been conducted in Google Scholar to create an initial understanding of the available literature on the topic (Snyder, 2019). Also, it has created an understanding helping to reflect on the purpose, scope, research keywords and generally the direction of the review (Haddaway et al., 2020; Snyder, 2019).

This process resulted in the following purpose, scope and research keywords:

- *Purpose of the literature review:* Outline and examine the current narrative of 'regenerative business practices in the construction sector' to create an understanding of the current state-of-the-art on the topic.

- *Scope:* Subject areas should be related to environmental science, social science, business management and accounting and economics and econometrics and finance to exclude literature with a focus on medical science and biology.

- *Initial research keywords:* Regenerative, business/business model, strategy, construction / building + company / sector / business

An initial search for literature dealing with *'regenerative businesses in the construction sector'* made it clear, that the scope was too narrow to find any literature. Therefore, the review was split up in two with the aim of synthesising these two into a joint literature review. The two combined search strings are:

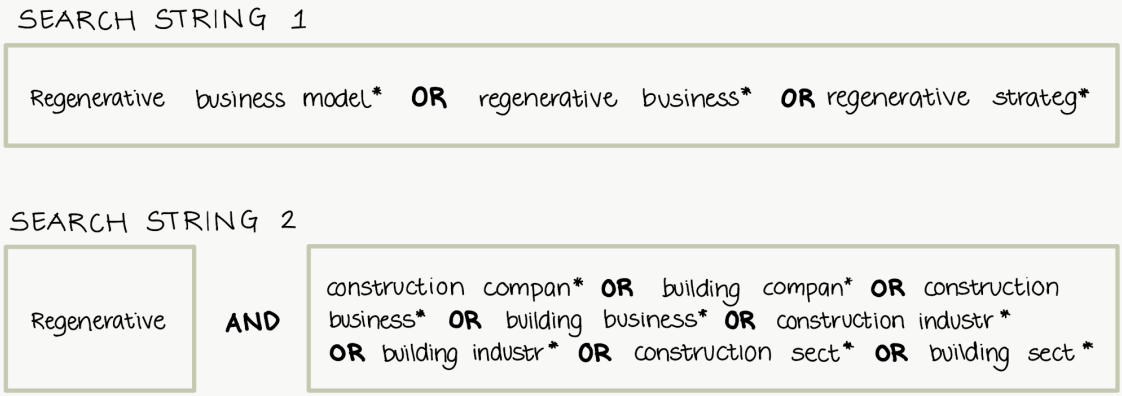


Figure 5.1. *Search string 1 and 2 [Own illustration].*

The development of these search strings has been an iterative process, with several pilot checks of the review process and search strings (Snyder, 2019).

The following describes how the literature searches of these search strings have been conducted.

Conducting the literature review

The literature searches have been conducted in Scopus, Web of Science and Google Scholar. The databases were chosen to ensure a broad spectrum of possible articles as its some of the largest databases with a comprehensive collection of scholarly articles. Figure 5.2 illustrates the process of conducting the literature review and the results during the process.

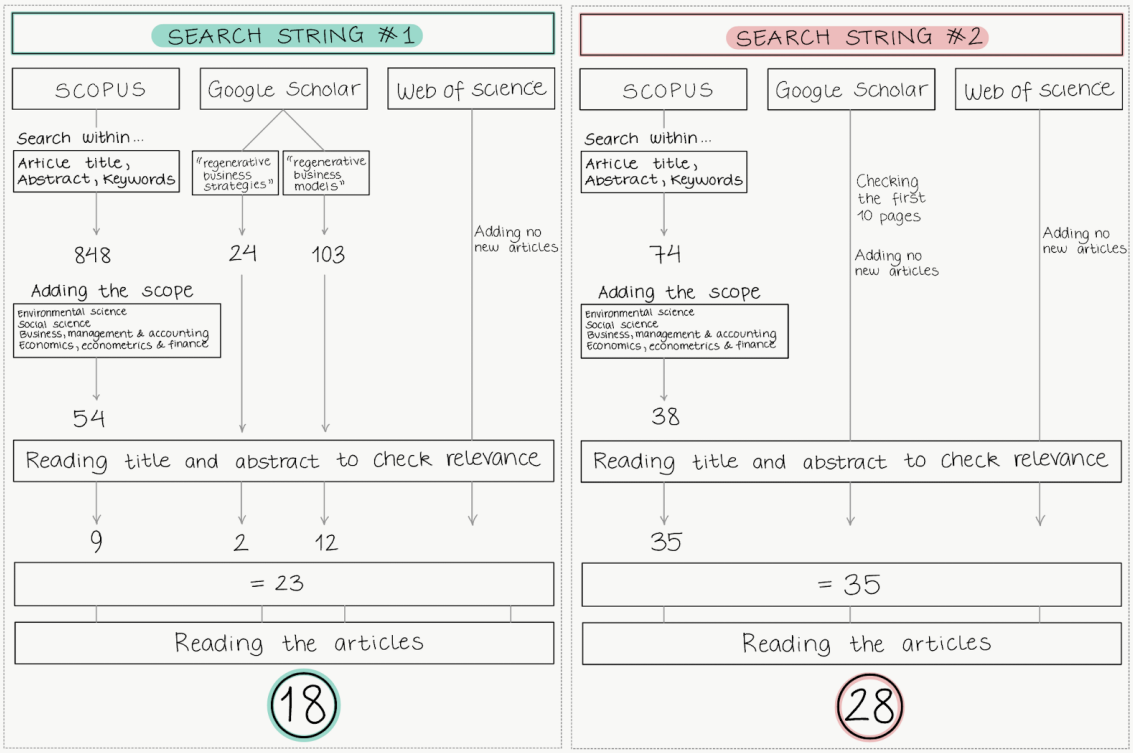


Figure 5.2. *The process of conducting the literature review.*

To narrow down the results of the first search, the defined scope was applied in Scopus. Afterwards, the results were screened with a focus on *regeneration* in relation to both business practices (search string 1) and the construction sector (search string 2). This was an attempt to take a critical view on selecting and deselecting articles. For both search strings, the screening method was to read titles and abstracts first, with a focus on sorting out non-relevant literature – this approach has been based on recommendations by Snyder, 2019. If there was doubt about the relevance, the literature has been included in the list in order to be read through and then determine the relevance later. This resulted in 23 articles from search string 1 and 35 articles from search string 2, which were read as explained in the following.

The analysis

To map relevant aspects from each article relevant to the purpose of outlining and examining the current narrative of 'regenerative business practices in the construction sector', the following questions were developed to guide the reading;

- Short summaries the key points of the article
- How do the article use – and define the concept of "regeneration"?
- Which concepts and methods are used?
- What is the recommend further research?
- What is the conclusion? (main points)
- Other thoughts and reflections?

These questions were recorded when reading the articles. During this process, the articles were narrowed to 18 articles from search string 1 and 28 articles from search string 2.

With a point of departure in the notes from each article, the online platform Miro, an online workspace for innovation, was used to thematise the articles of each search string. All in all, this process in Miro provided a comprehensive overview of the articles (see Figure 5.3.

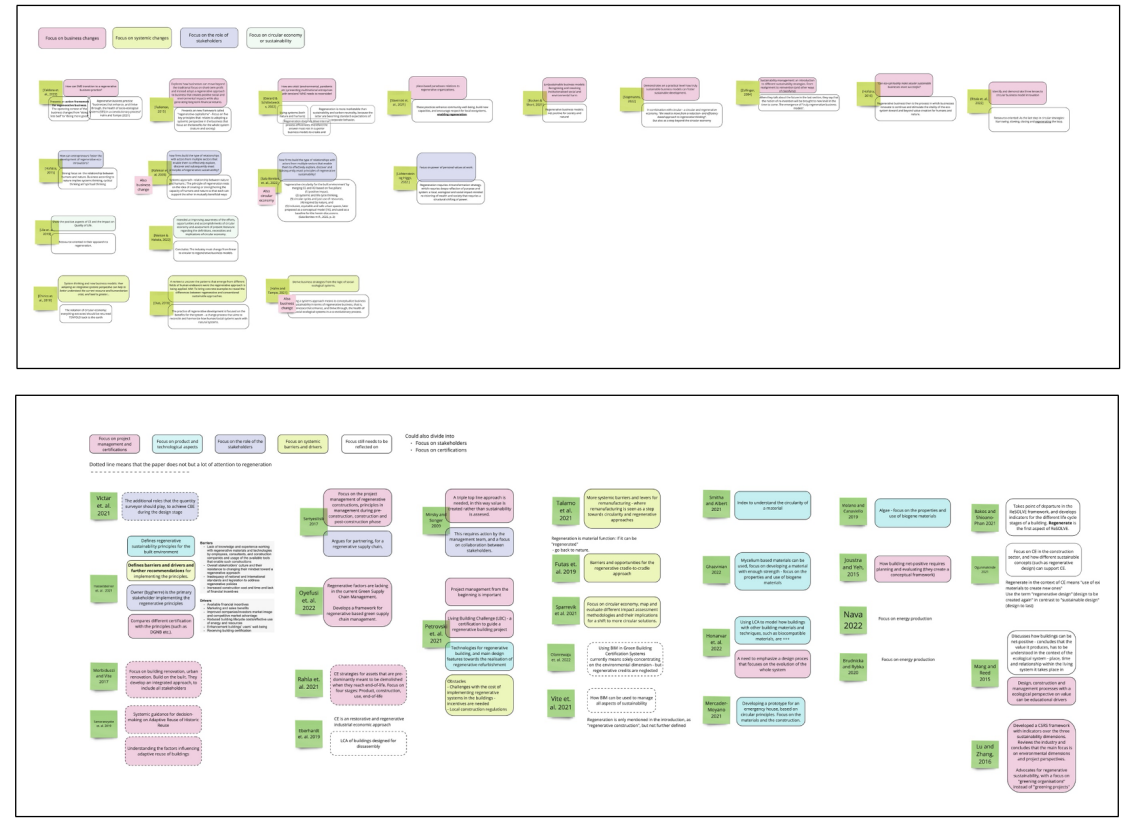


Figure 5.3. *A screenshot of the Miro boards used to organise the articles from the literature review.*

Using the reading questions and Miro to get an overview of the literature in the two search strings, was the initial start for an iterative process of encompassing a broad range of articles into understanding regenerative business practices related to the construction sector. The review of the literature resulted in creating an overall understanding of the concept of regenerative business practices followed by how the literature has seen it in practice through management approach, construction principles and the role of stakeholders and interactions. These final aspects of reviewing the literature contributed to the State-of-the-art presented in Chapter 2 'State-of-the-art: Regenerative business practices in the construction sector'. The literature review was supplemented by interviews with various stakeholders in the Danish construction sector to broaden the scope of the state-the-of-art on regenerative business practices in the construction sector. The methodological approach to the interviews is explained in the following section.

5.2 Interviews

A total of 24 qualitative interviews with different stakeholders in the Danish construction sector have been conducted during this study. The use of qualitative interviews is considered beneficial to explore complex phenomena in-depth through the interviewees' experiences and perceptions (Brinkmann & Tanggaard, 2020). In this study, using the interviews to collect data has been with a two-stringed purpose. Firstly, with the purpose of gaining insights and understanding how the construction sector is currently developing, the perception of the concept of regenerative business practices, and what barriers and opportunities there are for the adoption of these practices. Secondly, the purpose has been to gain an understanding of the dynamics in 'front-running' businesses' systems building activities towards changing the current practices in the construction sector.

The qualitative interviews have been conducted and applied to this study with the following considerations (see Figure 5.4).

Figure 5.4. *Considerations and reflections in using qualitative interviews to collect data [Own illustration].*

First of all, the interview cannot be considered a neutral technique for obtaining unaffected answers from the interviewee. The interview must be seen as an active interaction between two or more people that leads to socially negotiated, contextually based answers (Brinkmann & Tanggaard, 2020). With this in mind, the interviews have been conducted with a focus on establishing a relationship between each interviewee and the research group making the interviewee feel comfortable and share perceptions and experiences guided by the research group. Furthermore, the research group has been aware of critically raising questions and wonders about what was said. Secondly, it is advantageous to have initial knowledge of what is to be investigated and how the approach to this will be (Brinkmann & Tanggaard, 2020). In this case, this initial knowledge has been created through the preparation of an interview guide, decided to record and transcribe the interview. Thirdly, in an interview study, it is also considered advantageous to prepare and define the purpose, method, and available resources (Brinkmann & Tanggaard, 2020). With the purpose of wanting to explore a complex phenomenon in the construction sector, the interviews have

been planned with a desire to include different roles and professions in the construction sector. Further, since the research group is made up of three people, it has been possible to carry out more interviews than if the research group was smaller. The following outlines how the interview as a qualitative method has been used in two rounds to achieve the defined two-stringed purpose.

5.2.1 Round 1 Interviews

The purpose of the first round of interviews has been to create an understanding of how the construction sector is currently developing, define the perception of the concept of regenerative business practices, and understand what barriers and opportunities, there are for the adoption of these practices. The interviews from round 1 serve as a supplement to the academic and theoretical aspects found through the literature review as explained in Section 2.1 'A two-tier state-of-the-art'.

Interviews with stakeholders in the Danish construction sector

To explore different perspectives within the Danish construction sector, it has been the aim to conduct interviews with stakeholders who have a greater insight into the sector and are aware of the latest development movements. Thus, the starting point has been network organisations and associations. This has been supplemented with recommendations from the network organisations and the supervisors of this study. All in all, 14 different companies, organisations, and associations were contacted by e-mail of which one of the companies had no interest in participating and two did not respond to the request. Table 5.1 shows an overview of these. Therefore, 11 interviews with 12 different stakeholders in the construction sector have been conducted.

Table 5.1. *Round 1: The interviewees, the type of company, and date of conducted interview.*

Organisation	Employee(s) interviewed	Type of company	Date
Boligselskabet Sjælland	Per Bro	Private owner	10.03.23
Byggevirke og datter	Greg Vendena	Carpenter	24.02.23
Dansk Standard	Alexander Christensen	Organization	20.02.23
Byggeriets Samfundsansvar	Ditte Perge Sørensen	Organization	21.02.23
Frandsen og Søndergaard	Charlotte Jakobsen & Anne Bejder	Advisor	20.02.23
Kingo Karlsen	Jesper Arent Andersen	Demolisher	10.03.23
Realdania	Stig Hessellund	Association	08.02.23
Rådet for Bæredygtig Byggeri	Feodora Olivia Frisesdal	Organization	24.02.23
Rådet for Grøn Omstilling	Signe Sand	Organization	10.02.23
Scandi Byg	Joan Bruun Thiesen	Materials	15.02.23
WeBuild Denmark	Christina Grann Myrdal	Organization	16.02.23
Ambercon	Had no interest		
Nedrivningssymbiose - Thy	Did not respond		
AAU Build	Did not respond		

Preparation for the interviews

The interviews have been conducted with a semi-structured approach (Brinkmann & Tanggaard, 2020). It was decided neither to have an exclusively tightly structured approach with no opportunity for the development of the interview nor an unstructured interview

where no preparation was made. With the semi-structured interview, it was possible to prepare an interview guide prior to the interview, and thus have a guideline to follow in relation to asking the proper questions. However, there was plenty of opportunity to take the conversation elsewhere if some interesting things were mentioned by the interviewee. Similarly, if the interviewee saw some aspects of the topic that were not prepared through the interview guide. The interview guide was made up of introductory questions, core questions, and closing questions. If something interesting would be said during the interview, the opportunity to ask follow-up or in-depth questions, was there. An example of an interview guide from the first round of interviews can be seen in Appendix B.1 on page 99. Besides preparing an interview guide, each of the businesses or organisations were also researched, e.g., on Google or LinkedIn, which allowed for a better understanding of the interviewees and their workplace – which put the interviewers in a better position to conduct the interview.

Conducting the interviews

Ten of the interviews have been conducted on Microsoft Teams, except the interview with Frandsen & Søndergaard, which was conducted at their office in Aalborg. Interviews ranging in length from 30 min to over 1 hour were conducted, and all interviews were recorded – either through Microsoft Teams or on the recording function of a phone. All interviewers needed to show interest and smile, so the interviewee felt welcome and wanted. Trying to create the right atmosphere as if it was conducted in real life and not online. It was intended to create a safe space for sharing thoughts and opinions even if they were considered critical, encouraging the interviewees to freely express their knowledge and perceptions.

Analysing the interviews

After conducting the interviews, all interviews were transcribed from beginning to end, focusing on the fact that the spoken language should also make sense in writing using the *"My Good Tape"*, an AI transcription tool developed by the Danish media Zetland (Zetland, n.d.). All transcripts of interviews in round 1 can be found in Appendix C.

After the transcriptions, an Excel sheet was created with the businesses and organisations as the first column and various note categories in the first row. The categories were formed on the basis of which themes were immediately seen but also the themes on which the interview guide was created. Therefore, the Excel sheet had to contain all the notes and any quotes from the various interviews. To create a better graphical overview of the collected notes, they were processed in Miro – see Figure 5.5. In Miro, the starting point was again the themes that were from the Excel sheet and the interview guide. The following themes were constructed in Miro:

- The view on regenerative (... construction sector)
- The current trends and development
- Barriers and problems
- Possibilities and opportunities
- The roles of different stakeholders
- The future
- Other

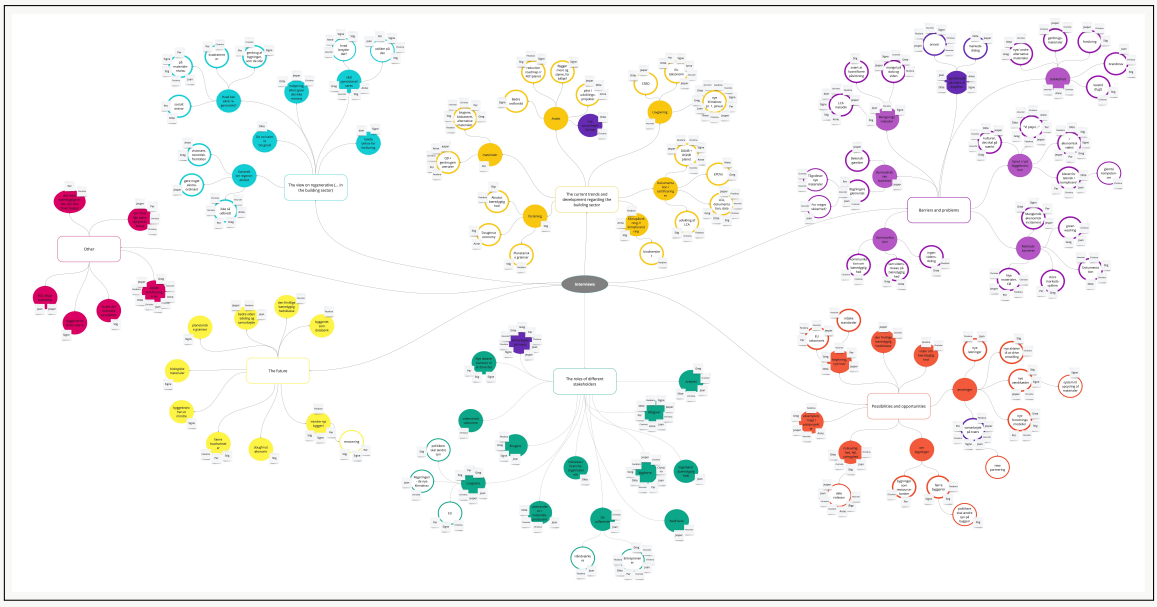


Figure 5.5. *A screenshot of the Miro board with the analysis of round 1 interviews.*

On each of the different themes, additional aspects of the themes were unfolded. Some aspects were mentioned by several of the interviewees. To create an overview of which things were mentioned the most, the interviewees were allocated to the different aspects (see Figure 5.5). The overview of the interviews, created in Miro, was incorporated with the academic and theoretical aspects found through the literature review in the state-of-the-art on regenerative businesses practices in the construction sector in Chapter 2 'State-of-the-art: Regenerative business practices in the construction sector'.

5.2.2 Round 2 Interviews

Besides using interviews as a method to create a state-of-the-art on the subject in this study, it was also used to collect data for answering the research question. As mentioned in Chapter 3 'Research Question', the aim is to investigate how businesses can build new systems to enable regenerative business practice in the construction sector. This is examined through insights into learnings and understandings of how front-running businesses are currently trying to build systems to change the current practices in the construction sector.

With the interviews, it was expected to find out 1) what stakeholders front-running businesses work together with or get influenced by when working towards changing existing practices in the construction sector, and 2) understanding the differences and similarities between various networks that are created between stakeholders and companies in the pursuit of changing practices in the construction sector.

Interviews with front-running businesses

As mentioned in Chapter 3 'Research Question', a front-running business is defined as a business that aims to challenge conventional and degenerative practices in the construction sector. To identify these front-running businesses, the process was followed as shown in Figure 5.6.

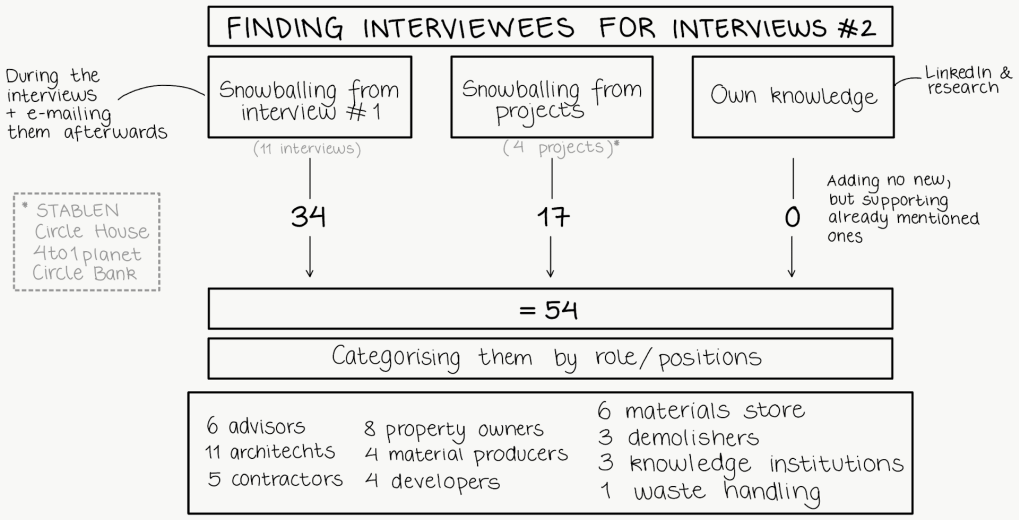


Figure 5.6. *Process of finding the interviewees for interview round 2 [Own illustration].*

To understand the interactions and connection between the different ways of identifying the front-running businesses, an overview was created in Miro. The overview in Miro had the purpose of giving an understanding of how the various companies and stakeholders were connected and referred to each other shown in Figure 5.7 on the following page. The Miro overview shows through the arrows how recommendations from each of the businesses and organisations (the yellow posts) interviewed in round 1 are connected to businesses, (the blue posts), and projects, (the pink posts) highlighted when asked who is trying to do something different in the construction sector. In addition, a few businesses were also recognised through recommendations from supervisors and the use of LinkedIn (the orange posts). All in all, these connections of recommendations to different businesses show a network of relations leading to a total of 51 businesses. After creating the overview, a categorisation was made on the different companies into their different roles. The different roles were 'Consultants', 'Architects', 'Contractors', 'Property owners', 'Material suppliers', 'Developers', 'Building market', 'Demolisher', 'Knowledge organisations' and 'Waste handling'. By creating this overview, it was possible to contact interviewees from all different roles and thus create a more nuanced view of the purpose of the round 2 interviews.

To decide which companies or persons should be contacted in this network of recommendations, the following list of criteria was made:

- More than one reference in the network.
- Needs to stand out, somehow mention something about wanting to create changes for positive impacts on nature and/or society, collaboration/co-creation, or similar on their web page.
- Needs to have a relation to the construction sector to stay within the scope of this study.

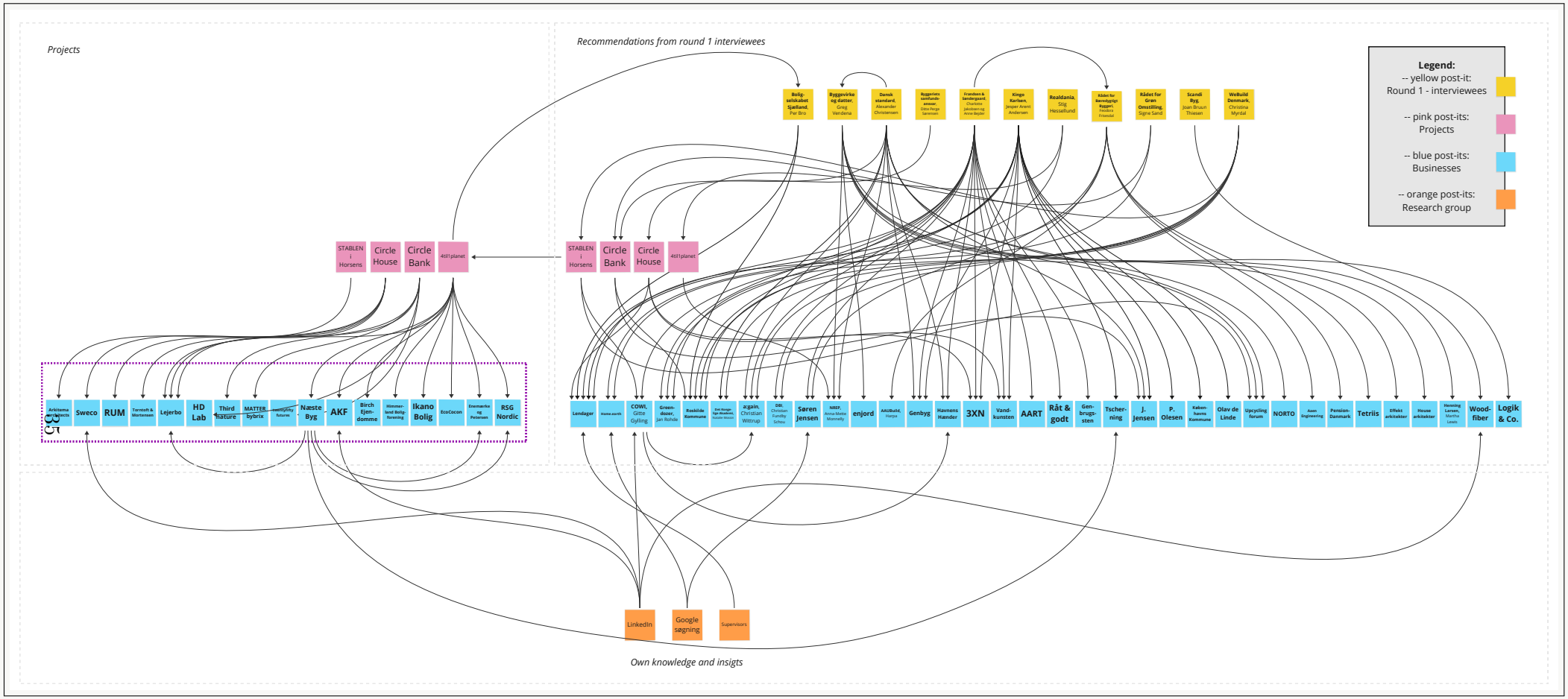


Figure 5.7. *A screenshot of the Miro board: The overview of finding the interviewees for round 2 interviews.*

All in all, this led to 27 different companies being contacted pr e-mail – or phone, if not responded after a few days. Out of the 27 companies, 15 companies agreed upon an interview date. However, two of the companies did not show up at the interview. Table 5.2 shows an overview of these.

Table 5.2. *Round 2: The interviewees, the type of company, and date of conducted interview.*

Company	Employee(s) interviewed	Company type	Date
AKF	Christian Gjessing Bruun & Kirstine Alrø Fichtner Bendtsen	Private owner	28.04.23
COWI	Gitte Gylling Hammershøj Olesen	Advisor	24.04.23
Enemærke og Petersen	Anders Sørensen	Håndværker	08.05.23
Green Dozer	Rasmus Bording	Materials	25.04.23
Havnens hænder	Did not show up	Materials	24.04.23
Himmerland Boligforening	Michael Knudsen	Public owner	28.04.23
J. Jensen	Thomas Søgård Sinding	Demolisher	28.04.23
Lendager	Jørn Kiesslinger	Architect	28.04.23
MATTER bybrix	Lene Damsbo Brix	Advisor	02.05.23
NREP	Had to cancel	Investor	27.04.23
Roskilde Municipality	Klaus Kellermann	Public owner	27.04.23
twentyfifty futures	Thomas Fabian Delman	Advisor	01.05.23
Upcycling Forum	Rasmus Falkenberg	Materials	25.04.23
Vandkunsten	Jan Schipull Kauschen	Architect	01.05.23
Woodfiber	Henrik Andreasen	Materials	24.04.23

Therefore, interviews with stakeholders from 13 businesses considered "front-running" in the construction sector were conducted.

Preparation for the interviews

The preparation for these interviews with front-running businesses was to a large extent similar to the preparation for the interviews in Round 1 choosing a semi-structured approach and preparing an interview guide, which is presented in Appendix B.2 on page 101. However differently from the interviews in Round 1, it was decided, in combination with the interview guide, to develop a Miro board to create a more inspiring and visual experience for the interviewee and at the same time guide the interviewee to share knowledge about their work with a specific project, process or activity that supported their role as a front-running business. The Miro boards were developed based on the interview guide but adjusted as more interviews were conducted. Using a pro version of the program made it possible for interviewees to participate actively in the Miro board, without logging in or creating a profile.

Conducting the interviews

Like interviews from round 1, all 12 interviews were conducted in Microsoft Teams, except the interview with Himmerland Boligforening, which was conducted in one of their meeting rooms in Aalborg. The interviews had lengths of between 45 minutes and about 1 hour, and all were recorded. The learning curve with the interview guide and Miro was steep. After the first interview (Woodfiber) it was clear that there were too many interactions in Miro, which made it difficult to have a fluent conversation, along with the changing boards. Therefore, both the Miro board and the interview guide were adapted after the

first interview. This made the conversation less fragmented compared to the previous stops and pauses when the interviewee had to fill in the Miro board. Screenshots of the final Miro boards can be seen in Figure 5.8, Figure 5.9, Figure 5.10 and Figure 5.11.

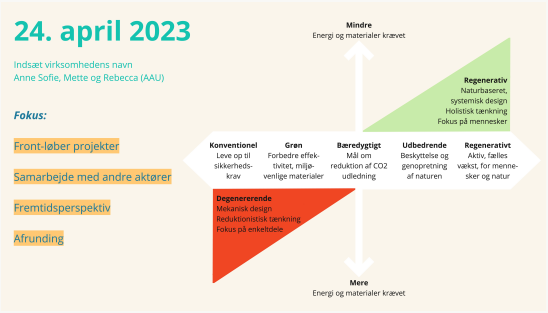


Figure 5.8. *Screenshot of Miro board: Frontpage.*

Figure 5.9. *Screenshot of Miro board: Front-running activities.*

Figure 5.10. *Screenshot of Miro board: Unfolding collaboration.*

Figure 5.11. *Screenshot of Miro board: Future outlooks.*

All in all, the purpose of using Miro as part of the interview was to make it more interactive, to facilitate a process that was interesting for the interviewee to participate in and to set the direction of the interview. In addition, there were also reflections on systematising and structuring all interviews according to the same framework to ensure consistency. Miro was to some extent a successful tool to fulfill this purpose. However, there was time pressure also challenging the use of the Miro boards. During the interviews, it was necessary for the interviewer to be aware of not making the Miro board too strict a framework for the interviews having room to spend time and being able to go in-depth with the individual boards.

Analysing the interviews

After conducting the interviews, all the interviews were transcribed by the same method as in interviews of the first round. All transcripts of interviews in round 2 can be found in Appendix D. After transcribing the interviews, each interview was read and assessed several times by different members of the research group to identify important learnings and reflections on their systems-building activities. With in mind, that the aim of this analysis was to understand the front-running businesses systems-building activities. The

process resulted in an analytical frame as presented in Section 7.2 in Figure 7.3 on page 53.

5.2.3 Reflections on the use of interviews as a method

Certainly, all interviewees wanted to be trustworthy during interviews. However, it has been important in the use of the interviews to pay attention to their statements. Sometimes, the statements about the activities could be real actions and other times, it could be influenced by their role in the activity. Both during and after, the interviews it has been emphasised to have a certain critical approach to what has been said. Therefore, websites, articles and the like were also used to support the statements. However, it is also important to be critical of this, because it is of course also influenced by the desire to emphasise the positive and not the negative. In other words, the interviews have also been about how they are trying to create changes, thus the interviews have been focused on processes rather than results to learn about both positive and challenging aspects of their different practices.

The interviews have contributed with a practical perspective on the activities of the front-running businesses, taking place in the construction sector. The number of interviews has helped to add nuance to the analyses and contributed to more concrete and realistic results. However, choosing fewer interviews might have led to a more in-depth understanding of a more limited scope of the construction sector. All in all, the interviews have contributed to a greater understanding of the practices that take place in the construction sector and more specifically in the front-running businesses, making the results of the analyses more contextualised.

5.3 Literature searches

The following section describes how knowledge has been accessed through secondary data from literature searches. Literature searches have been freely used in several phases of the project: to identify the problem, to form the conceptual framework of the project and to elaborate on assumptions, points and arguments of this study's analyses. The focus of the literature searches has been with a point of departure of aspects from the literature review and interviews that needed further development or if aspects in the scope of this study were not well-defined in the interviews or literature review. Furthermore, the literature searches have been used to develop the conceptual framework. The literature search conducted to develop this has been done with a starting point in the research group's own knowledge from their education as well as inputs from the supervisors. To a large extent, the conceptual framework has also been developed based on the initial knowledge from the state-of-the-art in Chapter 2 State-of-the-art: Regenerative business practices in the construction sector. In terms of databases, the project has primarily used Scopus and Google Scholar, supplemented by general Google searches, especially when specific Danish sources were needed. The focus has been to collect the newest knowledge or knowledge especially relevant to the scope of this study. All the literature conducted through the literature searches has been critically assessed with a focus on validating, the timeliness, use of methods as well as coherence and consistency with other literature.

Businesses' systems-building activities 6

The following chapter aims to answer the question: 'How can the transition towards regenerative businesses' practices in the construction sector be defined, to conceptualise businesses' systems-building activities?', to form a conceptual framework for answering the research question. Firstly, the process of transitioning to regenerative business practices in the construction sector is defined, based on the Multi-Level Perspective framework for system innovations combined with the concept of social-ecological systems. Finally, the businesses' systems-building activities in the transition are conceptualised. Based on the aforementioned perspectives, a preliminary framework for assessing the businesses systems-building activities in enabling regenerative business practices in the construction sectors developed.

6.1 Transitioning towards regenerative business practices in the construction sector

In the following section, the process of transitioning the current business practices in the construction sector towards regenerative business practices is conceptualised based on Geels, 2004 Multi-Level Perspective on system innovations combined with the understanding of socio-ecological systems from Hahn and Tampe, 2021.

The Multi-Level Perspective, as illustrated in Figure 6.1, has emerged as a framework for analysing systemic changes needed to address societal challenges such as, among others, environmental problems (Geels, 2011, 2019). Acknowledging how the influence and co-evolution between technology and society relate to these challenges, makes it relevant to see systemic changes as socio-technical transitions of socio-technical systems (Geels, 2011). In general, the Multi-Level Perspective frames the transition of systems as complex processes that results from the interplay of development in three analytical levels; niches, socio-technical regimes and the landscape as illustrated in Figure 6.1 (Geels, 2011).

The Multi-Level Perspective has been elaborated over the last 15 years as a result of various reflections in cases and insights through criticisms (Geels, 2019). Notably, using the model to conceptualise the transition towards regenerative business practices in the construction sector, is with a focus on contextualising the general model, to use the terminology and concepts as a frame for understanding interactions and relations between different processes of the transition.

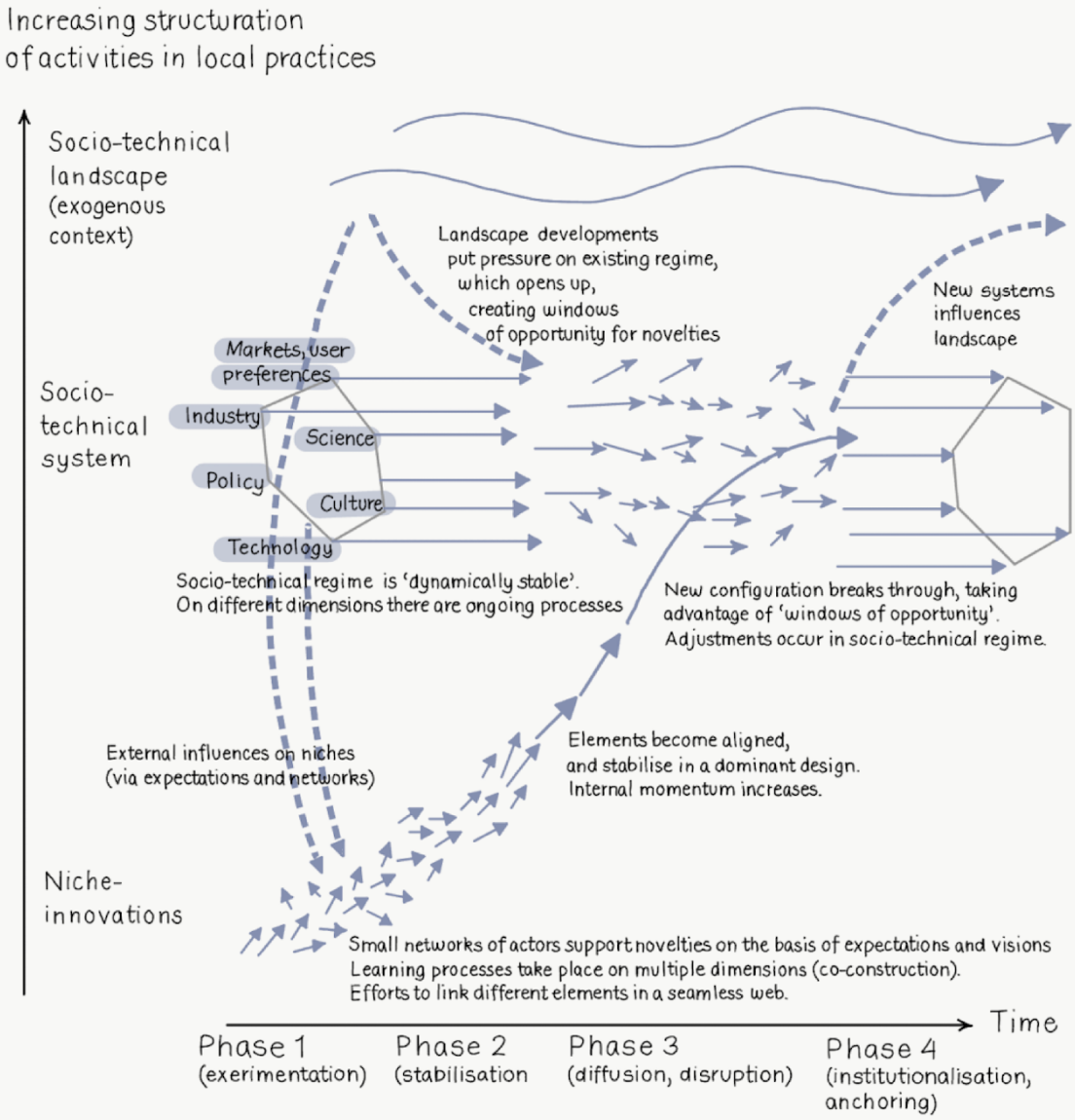


Figure 6.1. *The Multi-Level Perspective on socio-technical transitions, inspired by* (Geels, 2011, 2019).

As defined in Chapter 2 'State-of-the-art: Regenerative business practices in the construction sector', an ecological worldview on value creation, leading to the recognition of society and nature being interconnected in socio-ecological systems, is crucial for regenerative business practices. Therefore, it is deemed relevant to define how the ecological worldview on value creation and socio-ecological systems can be integrated into the understanding of the dynamic patterns of the socio-technical transitions. This is done in the following, by focusing on clarifying the terminology of niches, regimes and the landscape in the process of transitioning to regenerative business practices.

6.1.1 From socio-technical systems to socio-technical–natural systems

Geels, 2004 defines socio-technical systems as *"the linkages between elements necessary to fulfil societal functions (e.g. transport, communication, nutrition)"* – in other words,

networks of elements and their mutual dependency, where the elements include both social agents and material artefacts (Geels, 2004).

Geels, 2004 argues: *"As technology is a crucial element in modern societies to fulfil those functions, it makes sense to distinguish the production, distribution and use of technologies as sub-functions"* (Geels, 2004). This system of sub-functions *"do not function autonomously, but are the outcome of the activities of human actors"* (Geels, 2004). Thus, the socio-technical system consists of 'technical' – and 'social' aspects that are interdependent parts of a complex system. With the concept of socio-technical systems, Geels, 2004 emphasises not only focusing on innovation but also functionality to the fulfilment of societal functions. In the context of this study's focus on regenerative business practices, the focus of innovation expands from the fulfilment of societal functions to also including the fulfilment of natural systems functions, thus creating a shared value for both society and the natural systems. Geels, 2019 highlights how the Multi-Level Perspective has been fairly criticised for not addressing the socio-ecological systems.

The concept of socio-ecological systems is defined by Hahn and Tampe, 2021 as *"integrated system of ecosystems and human society with reciprocal feed-backs and interdependence"* (Hahn & Tampe, 2021). Adding this perspective to the socio-technical system, a socio-technical–natural system including all living mechanisms evolves with an ecological worldview on value creation. Thus, the socio-technical systems are recognised as being part of the natural systems and seen as one interconnected system. As defined in Section 2.2 'The concept of regenerative business practices in the construction sector', the ecological worldview sees value as *"benefits to life"*, and increasing the system's capability to *"generate, sustain and evolve increasingly higher orders of vitality and viability for the life of a particular place"*, whereas life includes both life of the natural world and human society (Mang & Reed, 2015). Thus, the ecological worldview adds an aspect of, being aware of seeing value-creation in the bigger system defined by both the socio-technical – and natural systems representing one complex ecosystem. The connection between the ecological worldview, and socio-technical – natural systems is illustrated in Figure 6.2.

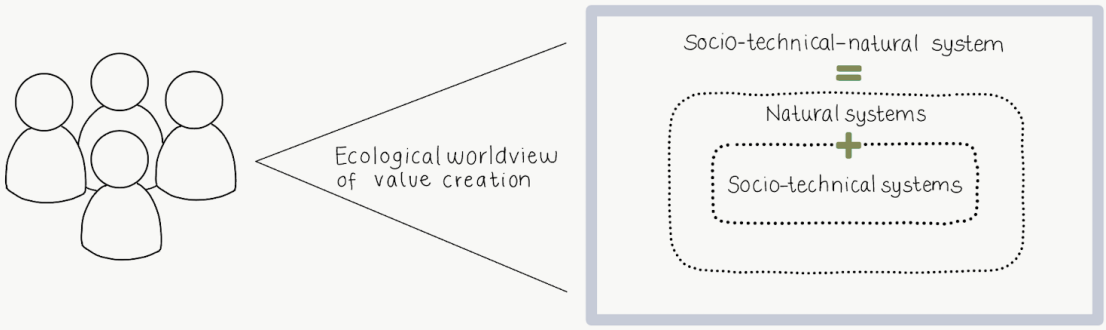


Figure 6.2. *The ecological worldview seeing that the socio-technical systems together with the natural systems add up to the socio-technical–natural system [Own illustration].*

Adding the natural systems to the understanding of socio-technical systems purposely highlights the importance of seeing the construction sector with its wide range of actors, activities, and technologies as a socio-technical system embedded in the natural world as an interconnected system, with the aim of creating value for both the fulfilment of

natural and societal functions. Thus, the businesses within the construction sector need to adopt an ecological worldview on value-creation for the socio-technical – natural system to encapsulate a system for regenerative business practices.

In this connection, the focus of this study is concerning transition processes moving from one system to another and implementing regenerative business practices. The following sections outline the concept of transitions in socio-technical–natural systems to evolve on the conceptual framework of transitioning towards regenerative business practices.

6.1.2 Socio-technical–natural transitions

The Multi-Level Perspective frames the transition of systems as complex processes that results from the interplay of development in three analytical levels; niches as networks of actors collaborating for novelties, socio-technical regimes as the established practice with associated rules stabilising the system, and the landscape as the wider context influencing both niches and the regimes (Geels, 2011). Figure 6.1 illustrates these three configurations of elements on a scale showing how higher levels are more stable than lower levels, in terms of the number of actors and degrees of alignment between the configuration of elements that constitutes the level (Geels, 2011) – notable, Figure 6.1 illustrates these three as separated entities, however, this is only for analytical purpose. The levels intertwine and interact with one another, also in the conceptualisation of socio-technical–natural system as defined in the previous section. With these interconnected analytical levels, the Multi-Level Perspective aims to conceptualise dynamic patterns in socio-technical transitions (Geels, 2011). The socio-technical transition is defined as a shift from one socio-technical system to another as a result of interactions between niches, regime and landscape (Geels, 2004).

Based on the conceptualisation of the socio-technical–natural system in the previous section, transitions in this conceptual framework are focused on enabling the regenerative business practices in a socio-technical–natural system as a result of interactions between niches, regimes and the landscape, thus involving both nature and human society.

Understanding the regime and the role of the rules

According to Geels, 2004, socio-technical systems are stabilised by the socio-technical regime. The regime is the rules that are the *"medium"* of activities but are also the *"outcome"* of activities since they are reproduced again and again by the action of the societal actors when linking specific elements together and forming the socio-technical systems. The regime is not only of technology but also in the sub-regimes of cultural, political, scientific, market and industrial dimensions that, in the case of transitioning towards regenerative business practices, are seen as embedded in the natural systems. Since the regime is the medium and outcome of a network with a dynamic that makes it difficult to define the boundaries, as *"actors and organisations are embedded in interdependent networks and mutual dependencies which contribute to stability"* (Geels, 2004). Geels, 2011 highlights the regime notion should be interpreted as *"an analytical concept that can be applied to empirical topics of different scope"* inviting the analyst to examine the deeper structures of activities of actors who reproduces rules and stabilising the regime

determining the practices in the system within the scope. In this case, the scope is defined as the Danish construction sector.

The rules embedded in the regime and sub-regimes are defined as both regulative, normative and cognitive rules (Geels, 2004). When regulative, normative and cognitive rules of different actors and organisations are aligned in and across sub-regimes, the stability of the regime is strengthened. The current rules stabilising the construction sector can be seen as a barrier to enabling regenerative business practices, as described in Chapter 2 'State-of-the-art: Regenerative business practices in the construction sector'. As pointed out, it is argued that the identified barriers are interlinked making them hard to affect and change individually (cf. Section 2.4.2 'Barriers and challenges in the existing system'), which can be understood as the lock-in mechanism of the regime. Geels, 2011 highlights existing regimes are characterised by lock-in mechanisms, thus *"innovation occurs incrementally, with small adjustments accumulating into stable trajectories"* – not only in technology but also in the sub-regimes of cultural, political, scientific, market and industrial dimensions embedded in the natural systems. This follows the understanding of how regulative, normative and cognitive rules of the sub-regimes stabilise systems (Geels, 2004), and how greater stability is provided when they *"interpenetrate and co-evolve"* (Geels, 2011). The following outlines the different regime rules and exemplifies their influence – based on some of the identified barriers in Chapter 2 'State-of-the-art: Regenerative business practices in the construction sector' as examples of lock-in mechanisms for enabling regenerative business practices.

- *The cognitive rules* are aligned in – and across sub-regimes based on, among others, the present bodies of knowledge, cognitive routines and shared beliefs, capabilities and competencies (Geels, 2004, 2011). One of the central barriers identified for enabling regenerative business practices in the construction sector was a lack of knowledge and capabilities. Thus, the current bodies of knowledge, capabilities and competencies have to be developed to change the cognitive rules towards enabling regenerative business practices.

- Likewise, *the normative rules* are aligned in – and across sub-regimes based on factors like norms, expectations, values and practices (Geels, 2011). In this context, cultural resistance; doing business as usual, was identified as a barrier for the development of regenerative business practices, leading to a need for also influencing the normative rules to enable the practices.

- Similarly, *regulative rules* are aligned in – and across sub-regimes based on frameworks like favourable institutional arrangements and regulations, and legally binding contracts (Geels, 2011). Strict safety and energy regulations were identified as barriers to enabling regenerative business practices in the construction sector, as they are not flexible for alternative ways of building.

All in all, these rules are interconnected and influence each other – for instance, the strict safety and energy regulations can be connected to the reasoning for continuing business as usual as well as the business as usual can be the reason for the lack of knowledge, competence and capabilities to enable regenerative business practices or the

whole connection vice versa. All the rules and interactions in networks between actors are stabilising the current regime of the construction sector.

If the regime is destabilised, it gives space – a *"window of opportunity"* – for new rules and activities which can stabilise a new system. Creating this destabilisation requires new interactions and relations between both human- and material actors and in this context also actors from the natural systems, resulting in the alignment of new rules to enable regenerative business practices. As argued by Geels, 2004, the sub-regimes can have internal dynamics, and when the co-ordination with other sub-regimes fails, this can lead to *"tensions"* or *"misalignment"* in the regime. This destabilisation of the regime potentially opens up for niche innovations to become integrated with the systems and a new regime to be defined (Geels, 2004). This destabilisation is the result of *"non-linear processes that result from the interplay of developments"* at the level of niches, regime and landscape (Geels, 2004). Being a non-linear process means the destabilisation of the regime does not occur step by step but is the result of various interactions within and across the level of niches, regime and landscape.

Thus, to enable regenerative business practices in the construction sector, there is a need for a new regime underlying logic to form the networks, increasing the focus on fostering innovation that benefits both human society and the natural world. Hence, transitioning towards regenerative business practices is about new networks of interactions and relations between both human-, material-, and natural actors aligning on rules supporting the enabling of regenerative business practices that creates value for the socio-technical–natural system. To understand these dynamics of destabilisation and stabilisation of the regime, the concept of niches and the landscape are introduced with a focus on understanding the interactions resulting in transitions (Geels, 2011).

The role of the landscape and niches in transitions

The concept of landscape is described as the exogenous environment influencing the regime and niches (Geels, 2011). The landscape level represents the most stable level, to the extent, that the *"landscapes are beyond the direct influence of actors, and cannot be changed at will"*. Usually, changes at the landscape level happen slowly and will over time create pressures on the regime and influence the niche development initiating transitions towards new regimes (Geels, 2011).

Relating this to the scope of transitioning to regenerative business practices in the construction sector, factors like climate changes, resource depletion and poverty can be conceptualised to the landscape. As established in Chapter 1 'From degrenerative to regenerative business practices', the status of the planetary boundaries and the social foundation is requiring businesses to change their practices – in this context the rules and networks in the regime towards regenerative business practices. This pressure can be seen as coming from the level of the landscape as it is in the exogenous environment of the construction sector. However, the degree of the pressure coming from the landscape to the regime of the construction sector is debatable as evidently, the state-of-the-art on regenerative business practices in the construction sector (cf. Chapter 2 'State-of-the-art: Regenerative business practices in the construction sector') showed the primary focus is currently on navigating climate changes through emission reductions. This is

approached with requirements of life cycle assessment, while the other boundaries like resource depletion and biodiversity are not currently an integrated part of the current regime in the construction sector (Appendix C).

On the niche level, radical innovations can emerge because of the lower level of stability: *"Niches do not emerge within regimes but often outside (although niche actors are usually aware of regime structures)"* (Geels, 2011). In other words, the niches are not following the same rules as the rest of the sector, but are aware of them. On the other hand, Geels, 2011 highlight *"they may deviate on technical rules, but stay close to existing rules with regard to users and behaviour"*. The extent of how radical the niche innovations are is thereby determined by the degree of deviation from the rules in the regime (Geels, 2011). The niches can be defined as innovations from a set of actors forming networks of activities that challenges the stabilisation of the regime (Geels, 2004). Figure 6.1 show a hierarchy notion of niches as the lowest level, however, this reflects the level of stability of the three analytical levels and not that the regime and landscape are above the niches in any way. In fact, Geels, 2011 reflects upon the idea that this hierarchical notion should be dropped and instead understood as a system of processes that happens within, in this case, the socio-technical–natural network.

Thus, in this conceptualisation, niches are seen as networks between actors working towards novelties with the aim of changing the regime in the construction sector towards enabling regenerative business practices. The niches occur in or around the socio-technical–natural system of the construction sector with the landscape and regime influencing their development. Geels, 2011 characterises the niche innovation development with three processes;

- *sharing and adjusting expectations and visions*, as guidelines for the innovation processes with the purpose of attracting attention and financial opportunities from actors.
- *develop networks with other actors* to expand the niche innovations access of resources.
- *learning across different sub-regimes* – design, business models, political frameworks and so on.

The purpose of these three processes is to develop visions and expectations to become precise and widely accepted by actors in the system, thus learning processes result in a stable configuration leading to a bigger aligned network influencing the current regime (Geels, 2004). In the context of this study, the niche development processes provide an understanding of how shared expectations and visions in networks of actors are essential for the business's ability to enable regenerative business practices. The networks of actors have to be focused on learning and developing across different sub-regimes within the scope of the construction sector. However, there is a need to understand how businesses can enact these niche development processes, to build new systems enabling regenerative business practices.

To understand how these niche innovation development processes can be initiated, this conceptual framework draws on the notion of systems building. Geels, 2004 presents the terminology *systems builders* as actors that *"travel between domains such as economics,*

politics, technology, applied scientific research and aspects of social change, weaving a seamless web into a functioning whole." (Geels, 2004). Hence, these actors are creating functioning networks towards a shared purpose across sub-regimes, which are also the foundations of the niche development processes. In this conceptualisation, the notion of systems builders is seen as businesses initiating the process of niche developments, that in the end can result in the development of new network configurations, influencing the underlying logic of the regime, and enabling regenerative business practices.

6.2 Systems builders as enablers of regenerative business practices

The scope of this study is to examine how businesses can build systems to enable regenerative business practices. In the previous section, the terminology of systems builders was introduced as initiators of the niche development processes that in the end can result in the development of new network configurations influencing the underlying logic of the regime towards enabling regenerative business practices. Focusing on the aim of this study – to examine the businesses' activities in building new systems – businesses as systems builders are conceptualised in the following based on the framework of Adams et al., 2016, with the aim of understanding the systems-building activities of businesses and related to the conceptualisation of transitioning towards regenerative business practice as defined in the previous section.

6.2.1 Businesses systems-building activities

In 2012, Adams et al., 2012 did an extensive literature review on innovating for sustainability which resulted in a framework to map the context of Sustainability-Oriented Innovation of businesses (see Figure 6.3). The framework shows different phases at which a business is working as a sustainable business, from *"Operational Optimization"* to *"Organizational Transformation"* and ending with *"Systems building"*. The latter will be explored in the following.

Business innovation in the category of systems building is seen as leading to the most radical and disruptive changes, with innovations that *"targets transforming established societal relationships and interactions between industry, consumer behaviour and lifestyles, institutional orientations, and even the very aims of business"* (Adams et al., 2016). This relates to the context of this study, which aims to see how businesses in the construction sector can build systems targeting the existing regime to form a new one, which enables regenerative business practices.

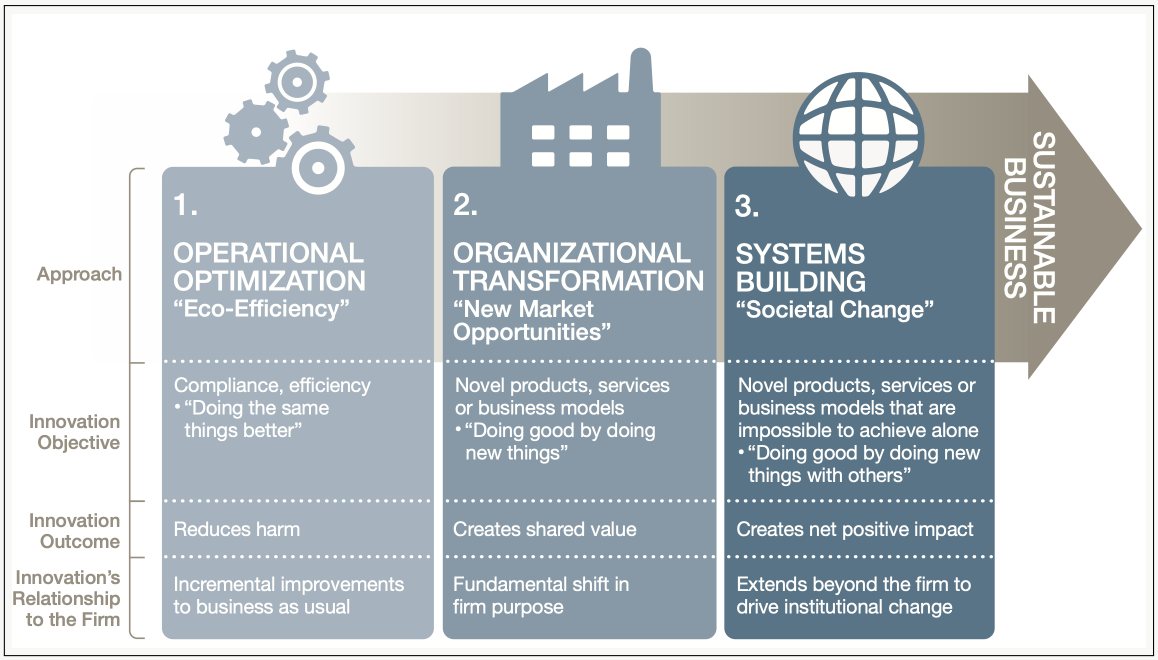


Figure 6.3. *The three contexts of Sustainability-Oriented Innovation* (Adams et al., 2016).

Following the framework developed by Adams et al., 2016, systems building means creating sustainability value in networks of collaboration, rather than individually – in other words: *"doing good by doing new things with others"* (Adams et al., 2016). The processes of systems building are presented below:

- Derive new value propositions from entire socio-technical and ecosystem value network to make a positive impact with an inclusive business
- Engage in institutional dialogues to "change the rules of the game"
- Reframe the purpose of the firm: suffuse and infuse all dimensions of triple bottom line into organisation
- Initiate, mobilise, lead and inspire systems change
- Apply equal weight to all aspects of the triple bottom line in organisational thinking and decision-making

Thus, systems building, in the context of this study, is seen as businesses acknowledging their responsibility for the socio-technical–natural system and working collaboratively to experiment to move away from the current practices by initiating, leading and inspiring system change. According to Adams et al., 2012, being a systems builder requires *"redesign of not only the firm but also the social, economic and political institutional infrastructures in which firms are located"* (Adams et al., 2012), to enable an innovation process to change the system. This process is evolved by Adams et al., 2016 – a paper intended as a contribution to the ongoing conceptual development of sustainability-oriented innovation (Adams et al., 2016). Adams et al., 2016 emphasis on being a systems builder involves activities of creating a strategy with a focus on creating a process of collaborations involving experimenting to create a learning process leading to new systems.

6.3 Conceptualising businesses' systems-building activities

All in all, the conceptualisation of transitioning towards regenerative business practices exemplifies how socio-technical–natural systems are seen as networks constituted by human actors, natural actors and their relations, defined by the socio-technical–natural regime. To enable a transition towards regenerative business practices in the construction sector, there is a need to change the underlying logic of the regime. The niche development processes illustrate how different configurations of actors can, in a dynamic process with the landscape and regime, influence the destabilisation of the regime enabling new practices. The niche's development processes occur to different extents in alignment with the existing rules of the regime. To develop these niche innovation processes towards enabling regenerative business practices, the businesses system-building activities are conceptualised as having a central role.

The transition to regenerative business practices in the construction sector requires changes at both micro, mesa and macro levels in society (Geels, 2019). This conceptual framework concentrate on the micro-level with a focus on the role of businesses as systems builders in enabling regenerative business practices. This study focuses on the systems-building activities occurring within niche innovation development processes as marked with red circles in Figure 6.4. Having both on the niche level as well as within the regime illustrates an acknowledgement of the existence of multiple transition pathways in the socio-technical – natural system, both internally in the regime and in the external environment, all influencing the alignment around the regenerative business practices in the construction sector. Furthermore, Figure 6.4 indicates that this study is with a fundamental basis of the socio-technical – natural system.

Relating the conceptual understanding of being a systems builder to the understanding of how the stability of systems is determined by the alignment of sub-systems in the regime, it is argued that businesses engaging in developing their activities with a focus on collaborating and experimenting with stakeholders across sub-systems in the construction sector, has a powerful tool to initiate niche development processes targeting towards a destabilisation of the existing systems and stabilisation of new systems to enable regenerative business practices. The connection between businesses as systems builders, niche innovation processes and enabling regenerative business practices in the construction sector is illustrated in Figure 6.5.

The purpose of this descriptive process of activities (seen in Figure 6.5) is to get an overview of how businesses' systems-building activities can play a role in enabling regenerative business practices. Accordingly, to this conceptualisation, the systems-building activities occur within the focus area of the transition highlighted with the red circles in Figure 6.4. In this way, it is assumed, the configuration of the businesses' activities – being systems building, initiating niche innovations, and enabling regenerative business practices – determines the circumstantial conditions which define how they can build systems to enable regenerative business practices. However, businesses' systems-building activities are not seen as a uniform linear process, but a dynamic set of activities with different trajectories in the transition.

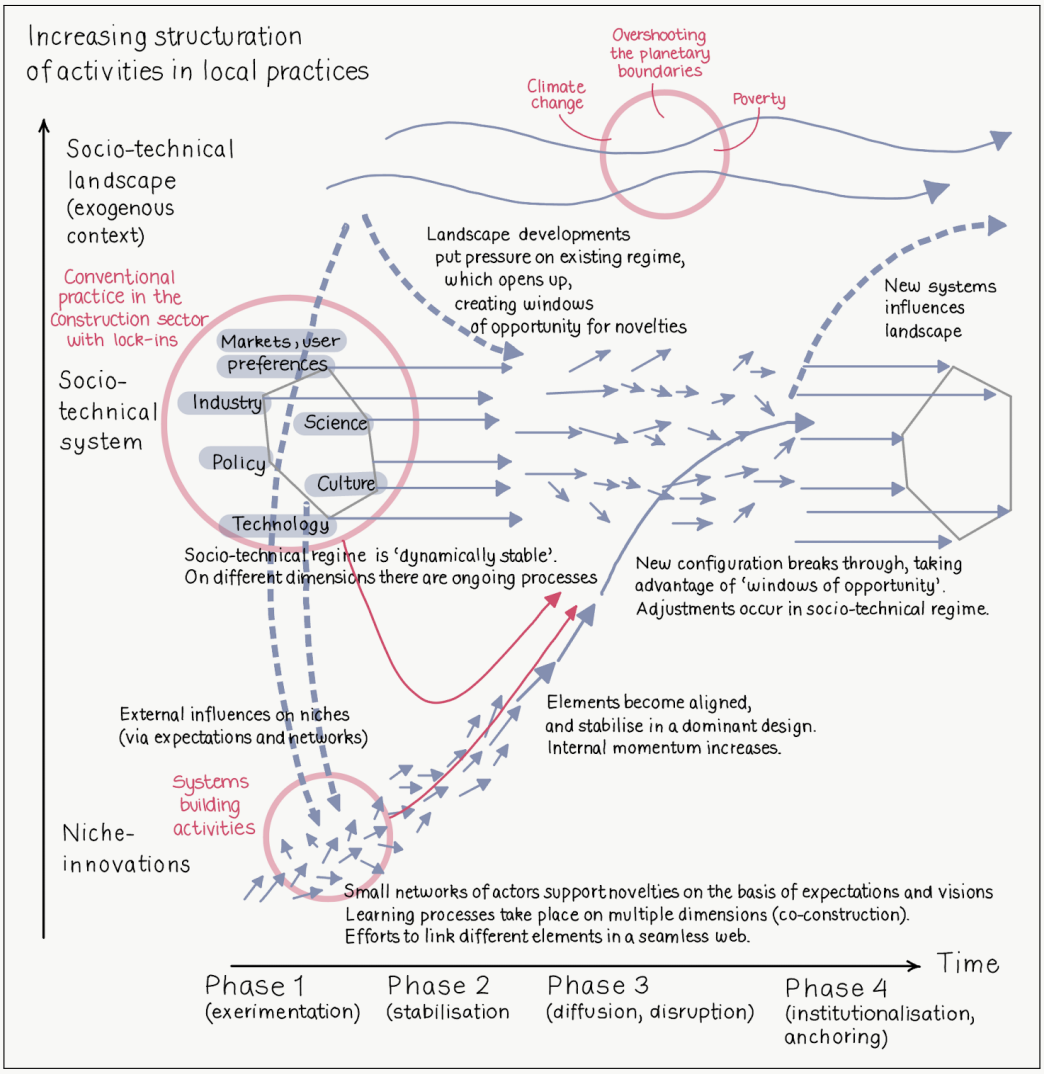


Figure 6.4. *Illustration of this study's focus in the transition towards regenerative business practices in the construction sector, inspired by* (Geels, 2019).

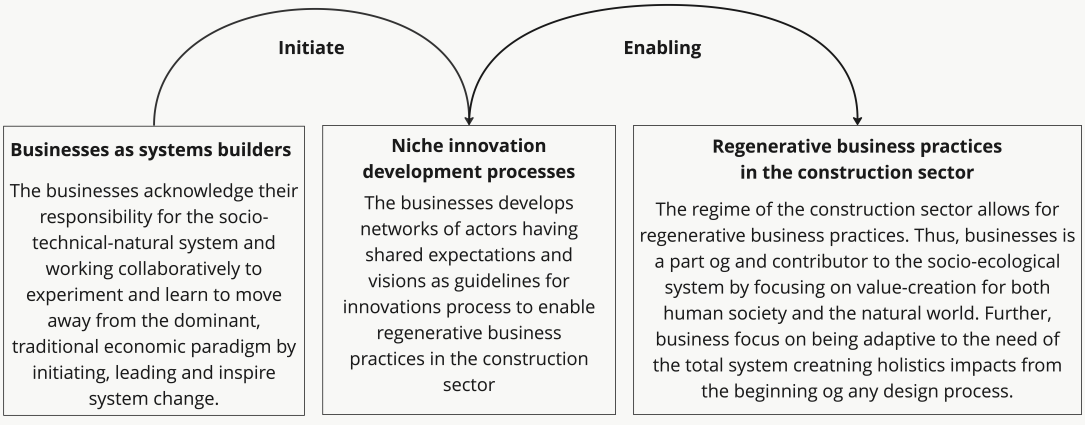


Figure 6.5. *Businesses' system-building activities in transitioning towards regenerative business practices [Own illustration].*

In the context of the construction sector, the understanding of systems-building activities for transitioning to regenerative business practices is currently not empirically predefined. In this study, the notion of businesses' systems-building activities entails collaborative processes and experimentation as defined in the descriptive processes, which will be used as a framework when searching for an understanding of how businesses can build systems to enable regenerative business practices.

Thus, the conceptual framework will be supported with an empirical analysis of current processes in the construction sector relating to how front-running businesses are building systems to change current practices. The aim is to evolve on the process defined in Figure 6.5 expanding the conceptual framework with more defined systems-building activities related to changing the current practices in the construction sector.

With the added empirical understanding, the process in Figure 6.5 will be used as a framework to understand how front-running businesses can enhance their ability to build new systems towards enabling regenerative businesses practices in the construction sector.

Learning from the front-runners 7

The following chapter is seeking to answer the questions of "how are front-running businesses in the construction sector working with building systems to change current practices?" And "how can front-running businesses enhance their ability to build systems enabling regenerative business practices?". This takes a point of departure in data collected from interviews made with 13 front-running businesses in the construction sector and using the framework derived in Chapter 6 'Businesses' systems-building activities'.

7.1 Analytical framework

Figure 7.1 illustrates the structure and connection of the elements of the analysis on how front-running businesses in the construction sector work with building systems, leading to a critical assessment of how they can enhance their ability to build systems enabling regenerative business practices.

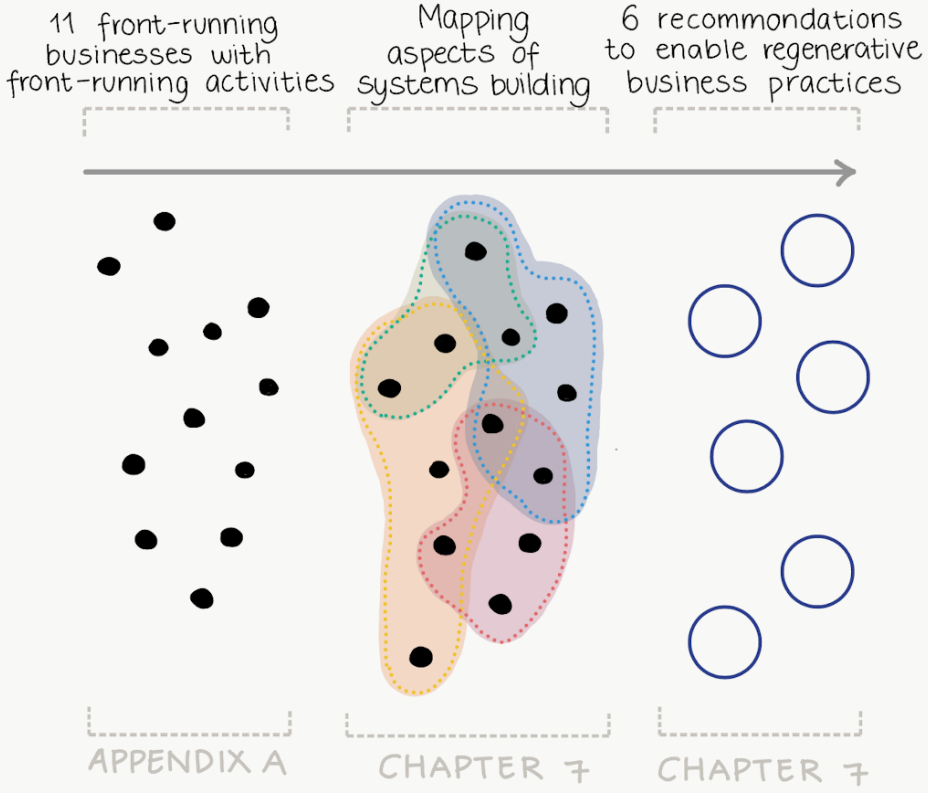


Figure 7.1. *Overview showing the structure on how the analyses in Appendix A leads to the two analyses (SQ2 & SQ3) in Chapter 7 'Learning from the front-runners' [Own illustration].*

7.1.1 Preliminary analysis of each front-running business

As illustrated in Figure 7.1, the process of the analysis takes a point of departure in analyses of each interview with the 13 front-running businesses. These analyses focus on understanding the front-running businesses' activities trying to change current practices in the construction sector. During the analyses, it was revealed how 'Circle Bank' is established with partners from three of the 13 businesses. Therefore, there will from now on be distinguished between 11 front-running businesses.

The analyses are conducted by reading and thematising the interviews initially clarifying the businesses' intentions, activities and reflections related to overcoming challenges to become successful in their system-building activities. The analytical process is visualised in Figure 7.2.

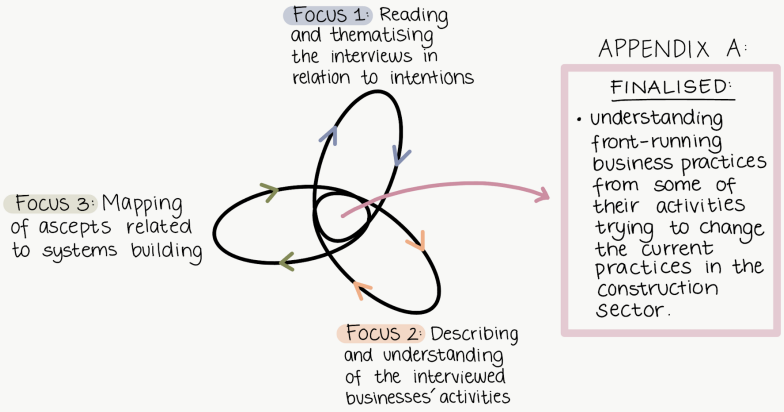


Figure 7.2. *Graphical overview of the first part of the analysis [Own illustration].*

Analysing each interview has been an iterative writing process allowing the analyses to evolve as an exploratory process resulting in the final result. The iterative process is illustrated in Figure 7.2, and the individual analyses are found in Appendix A on page 86.

7.1.2 Synthesising, learning and reflecting

Based on the analyses of each interview, the different practices of the stakeholders are synthesised into a pattern showing different aspects relevant to building systems. This identified mapping is analysed with a focus on understanding how the aspects related to building systems are unfolded in the different contexts, leading to a comprehensive overview of how the front-running businesses are working with building systems to change existing practices. From this, an understanding of what is helping them succeed or overcome challenges is established. This analysis is presented in the following, Section 7.2 'Aspects of systems building activities'.

Lastly, in Section 7.3 'System building activities to enable regenerative businesses practices', the understanding of how front-running businesses are building systems and the conceptual framework developed in Chapter 6 'Businesses' systems-building activities' is used to assess on how the front-running business can enhance their ability to build systems enabling regenerative business practices. This leads to recommendations to how front-running businesses can build systems for enabling regenerative business practices.

7.2 Aspects of systems building activities

Analysing system-building activities, interactions, reflections and learnings from 11 front-running businesses has resulted in a mapping of aspects identified as relevant for systems-building activities to change current practices in the construction sector. The mapping has been developed by gathering findings from the individual analyses in Miro – the online workspace for innovation, in an iterative and dynamic process leading to the final mapping. The overall identified themes with related aspects of building systems are shown in Figure 7.3.

From examining the activities of the front-running businesses, it is seen that they are overall all working towards minimising CO_2 emissions and increasing the use of biogenic or reused materials, with a distinct focus on experimenting to gain experiences, networks and useful learnings from failures and successes (cf. Appendix A). Therefore, *experimenting and innovating* is central to further understanding the aspects of systems building to change current practices in the construction sector.

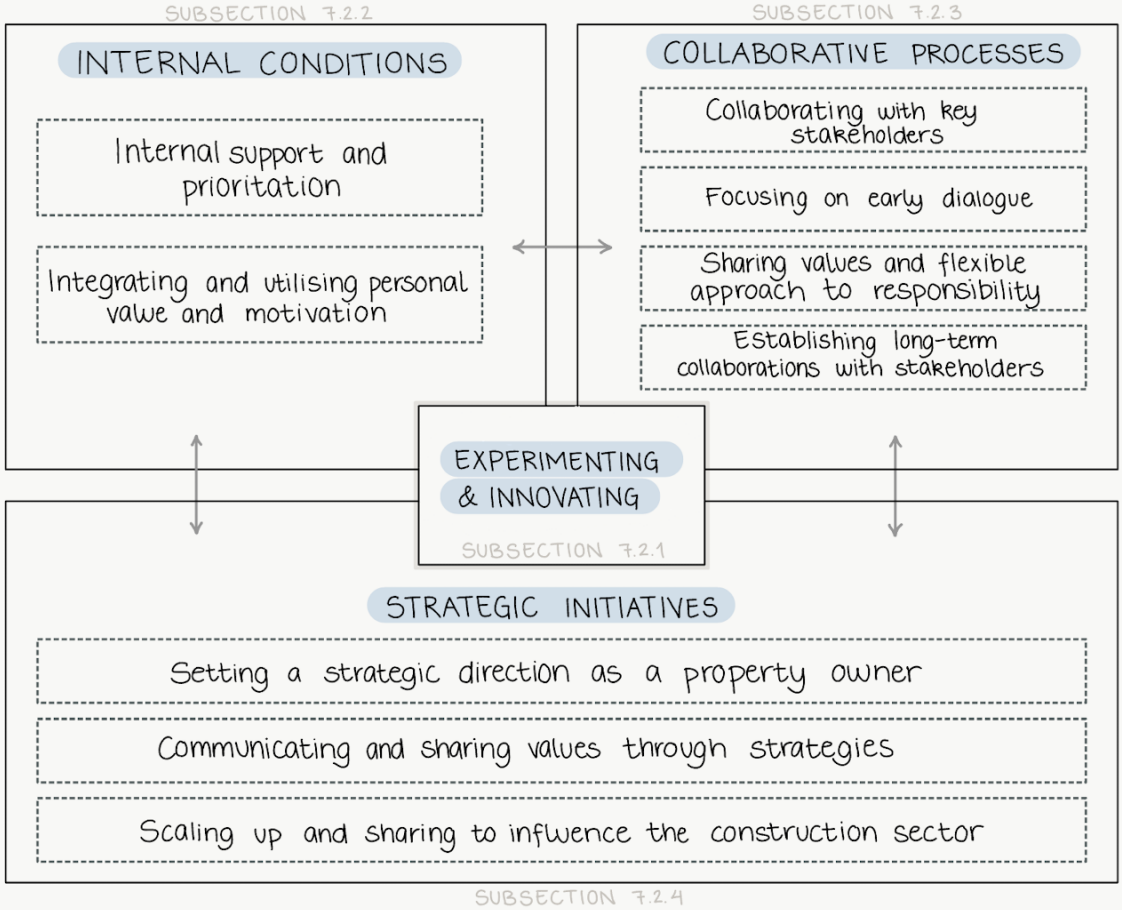
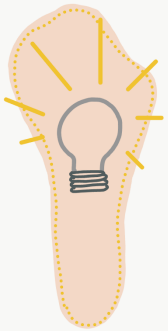


Figure 7.3. *Overview of themes of how the front-running businesses build systems, aspects of building systems and related interviewed organisations.*

7.2.1 Experimenting and innovating with processes and materials



From examining the activities of the 11 front-running businesses, it is clear how the integration of their experimental and innovative activities in their usual business practices differentiates to some extent from one another (cf. Appendix A).

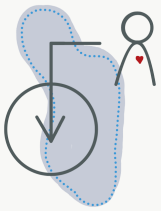
The businesses AKF, Himmerland Boligforening, Enemærke & Petersen and COWI are well-established organisations that are experimenting with projects focusing on changing practices, like the use of materials and building processes, along with their usual activities. These front-running businesses are established within the current regime, however, their experiments deviate, to some extent, from, among others, technical and cultural rules in the existing regime creating misalignment in the regime. Nevertheless, the processes of experimenting are in the early phases and not yet well-established.

Additionally, Roskilde Municipality, Vandkunsten and Lendager has been experimenting and innovating as a more integrated part of all their businesses' activities for a longer period, and have established it as part of their practices of acting as property owner and architects. These businesses are like the aforementioned also, to some extent, established in the regime. However, as experimenting and innovation are an integrated part of these businesses, they are in a dynamic process of moving in and out of the regime. These front-running businesses all have learnings and knowledge from previously established systems-building activities as the foundation for their innovative approach.

Lastly, Woodfiber, GreenDozer, Circle Bank and Upcycling Forum are newer businesses developed based on different innovation projects aimed at changing the current practices in the construction sector. Circle Bank and Upcycling Forum can be seen as the most radical, trying to innovate the design- and construction processes of the construction sector through digitalisation, with varying degrees of experimentation in practice. Woodfiber and Greendozer are to a larger extent trying to innovate to incrementally change the regime – through Woodfiber developing biogenic products as a substitute to current materials and GreenDozer experimenting with scaling up the use of re-used materials through their platform to increase.

All in all, the front-running businesses are having different starting points for their systems-building activities in the construction sector with some being more radical than others in terms of deviating from the existing regime. The analysis of front-running business revealed various themes with related aspects occurring in these different processes of experimenting and innovating to develop new understandings trying to change the current practices in the construction sector. How the experimentation and innovation processes are developed and stabilised as niches are emphasised in the following, further exploring the internal conditions, collaborative processes and strategic initiatives – as illustrated in Figure 7.3. The aim is to create an overview of the characteristics of the front-running businesses' work with building systems to change existing practices.

7.2.2 Internal conditions



Aspects of building systems related to internal conditions were identified as follows:

- Internal support and prioritisation.
- Integrating and utilising personal values and motivations.

These aspects are related to businesses acknowledging their own role in building systems and utilising themselves in the process of collaborations with others. The aspects are further examined in the following.

Internal support and prioritisation

A relevant aspect of building systems is seen as the internal structures of the business allowing the prioritising and room for innovating. This relates to managerial actions.

According to Kauschen, 2023 from Vandkunsten, having a managerial approach clearly encouraging innovation and sustainability in all aspects of their business and not centralised, creates an openness to experiment with new tools, processes and solutions in their works as architects (cf. Appendix A.10). Similarly, Kiesslinger, 2023 emphasises Lendager as an architect driven by a leader that sees it as the business's purpose to support the development of the circular economy. This gives Kiesslinger, 2023 and his colleagues, support to follow this agenda in their work and help guide the direction (cf. Appendix A.7). Notably, both Vandkunsten and Lendager are architectural businesses, influencing a culture of responsibility to the wider society. As emphasised by Kauschen, 2023: *"(...) you feel obliged to so many people, not just the developer, but also the people inside [the buildings, red.] and their children, and everything else around".* Possibly architecture as an artistic discipline comes to show in the approach of the two organisations.

Furthermore, Kellerman, 2023 from Roskilde Municipality emphasises the benefit of strong political prioritisation of experimenting and innovating to create sustainable solutions in the municipality, thus influencing Kellerman, 2023 in his role as acting as a municipal property owner. Generally, the political support gives Kellerman, 2023 room for experimenting in transformation and construction, and also when focusing on partnerships and processes (cf. Appendix A.8). In contrast to Roskilde Municipality, the managerial approach is not encouraging and supporting Himmerland Boligforening in the same way, leading to a feeling of limitations instead of possibilities (Knudsen, 2023). Himmerland Boligforening is experiencing challenges building systems due to the limitations of resources and their financial structures, not always leaving room for experimentation – unless they are engaging in partnerships with financial support, which will be elaborated later (cf. Appendix A.6). Nevertheless, comparing how Himmerland Boligforening and Roskilde Municipality are currently building systems, as described in Appendices A.6 and A.8, Himmerland Boligforening seems early in their journey with a focus on developing the internal processes while Roskilde Municipality is further in their journey focusing more on contributing to and establishing new networks.

All in all, the analysis indicates how the front-running businesses are influenced by internal support and prioritisation either creating or limiting the room for innovating and experimenting. Thus, the process of how the front-running businesses systems building is influenced by their internal support and prioritising from the organisation.

Integrating and utilising personal values and motivations

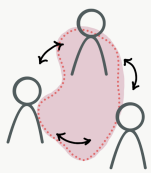
Another internal condition identified is the strength of integrating and utilising the personal motivations of employees.

For instance, Bruun and Bendtsen, 2023 from AKF highlights how advocates with personal motivation can convince everyone around them, leading towards the goal (cf. Appendix A.1). In context to this, various of the front-running businesses emphasised on the role of "younger" organisations' and professionals' values and motivations as an essential aspect to utilise and integrate to change the current practices of the construction sector. More specifically, Delman, 2023 from twentyfifty futures (Circle Bank) points out, a tendency for start-ups in the construction sector to be more value-driven as a benefit of changing current practices, and Kiesslinger, 2023 from Lendager argues for inviting more young people into the room, so *"the old people are set straight"* (Delman, 2023; Kiesslinger, 2023). Kauschen, 2023 from Vandkunsten supports the points made, by emphasising how more young people are value-driven in their career focus, wanting to have a real influence on creating a better world. In fact, several of the employees at Vandkunsten are working part-time with teaching, in order to be close to and learn from their new and innovative ideas (Kauschen, 2023).

Thus, the analysis of the front-running business shows how advocates with a value-driven motivation are influencing the practices of how some of the businesses are building systems to change current practices. Strategically making use of the strong personal values and motivations of employees contributes to the process of systems building.

All in all, the internal conditions clearly influence the processes of experimentation and innovation. By building up internal capabilities through the right managerial conditions and supporting personal and utilising personal values, the processes are further supported.

7.2.3 Collaborative processes



Besides internal conditions, a highly emphasised focus on collaborative processes was identified as a theme. In relation to this theme, the identified aspects of building systems are as follows:

- Collaborating with strategically chosen stakeholders.
- Focusing on early dialogue.
- Sharing values and flexible approach to responsibility.
- Establishing long-term collaborations with stakeholders.

These aspects are related to how the front-running businesses reach outside their own scope to create a new scope with other stakeholders building systems to change current practices. The aspects of collaborative processes relate to the premises of establishing the internal conditions as explained in the previous section. Establishing the internal processes allows

for initiating these collaborative processes, which in the following is explored based on the different practices of the front-running businesses.

Collaborating with strategically chosen stakeholders

Strategically chosen stakeholders to collaborate with and projects to take part in, are identified as an aspect that contributes to the businesses' ability to systems build. This aspect of building systems is focusing on the benefit of collaborating with specific types of stakeholders in relation to certain situations and tasks.

For instance, when Greendozer collaborate with the insurance company Willis to develop insurance for lowering the risks of using recycled materials, it can be seen as a strategic collaboration established to overcome a barrier of stakeholder uncertainty. This is essential for GreenDozer to build systems around recycled materials (cf. Appendix A.5). Likewise, when Himmerland Boligforening partners up with AAU, Green Hub Denmark and the '4 to 1 planet', they contribute with knowledge, network and finical support overcoming the barrier of missing internal resources and support to experiment A.6. Similarly, Andreasen, 2023 from Woodfiber highlights how to strengthen the network of stakeholders practising wooden-based products in their constructions, collaborating with specific stakeholders such as engineers and architects is seen as an important aspect (cf. Appendix A.11). Spreading knowledge on the use and functionalities of their products through these collaborations, they clear up the *"misunderstandings"* on the wooden-based products being too expensive (Andreasen, 2023). Another aspect highlighted in all the interviews with partners in Circle Bank is how strategically choosing partners with different backgrounds and perspectives, enables them to learn and support each other (cf. Appendix A.2). Also, COWI supports how strategic interdisciplinary collaboration is crucial, in order to gain new knowledge (Olesen, 2023).

All in all, the analysis shows the front-running businesses are collaborating with strategically chosen stakeholders to overcome barriers and utilise certain resources increasing the ability of the system of their experimentation and innovation processes to stabilise and establish to successfully reach their goal. Strategically chosen stakeholders to collaborate with can further be seen as a relevant approach for systems building when internal capabilities are not enough.

Focusing on early dialogue

One other significant aspect of several businesses' ability to build systems is the early timing of including stakeholders in the dialogue. This is first of all related to reducing the risks by planning and sharing knowledge and experiences with stakeholders from the beginning and all the way through a project.

Kiesslinger, 2023 from Lendager emphasised how the early dialogue with Miljømærkning Danmark in the project 'Svanen' made it possible to plan a strategy for the use and further testing of materials, which uncovered risks and the uncertainties of a potential increased cost for the turnkey contractor. At the same time, the early dialogue also gave Miljømærkning Danmark experiences with defining standards for reusing materials in constructions certified with their ecolabel (cf. Appendix A.7) For Upcycling Forum,

Falkenberg, 2023a highlights early dialogue with suppliers of reused materials, architects, engineers and property owners making it easier to navigate the processes. This entails finding the optimal solution, balancing ambitions for design and CO_2 reductions with risks of using re-used materials (cf. Appendix A.9). Also Kauschen, 2023 from Vandkunsten argued for early dialogue, focusing on the benefits of influencing the process of lowering the CO_2 emissions when starting an ambitious project with the developer Home.Earth, since stakeholders with different insights can collaborate on being innovative and finding solutions (Kauschen, 2023). Early dialogue is also identified as a way to find shared visions and expectations, as it was seen with Roskilde Municipality, described by Kellerman, 2023. In this case, early dialogue with the users of the skate hall 'Hal 12' enabled a *"shared narrative"* to compromise on comfort and thereby minimise the need for renovation (Kellerman, 2023) (cf. Appendix A.8).

Thus, the analysis of the front-running business show how various businesses use early dialogue to lower risks seen as important for both activities working to challenge existing processes and for activities focusing on innovating for new solutions. Thus, using the early dialogue is seen as an aspect of helping the process of building systems to stabilise and successfully reach the goal.

Sharing values and flexible approach to roles and boundaries

Besides in some cases choosing specific stakeholders, and having an early dialogue to overcome challenges, the value of collaborating with stakeholders with a similar agenda and willingness to experiment is highlighted and repeated by several stakeholders.

For AKF, Woodfiber and Circle Bank, a shared agenda across stakeholders influenced the ability to innovate on a higher level (cf. Appendix A.1, A.2 and A.11). Bruun and Bendtsen, 2023 from AKF highlighted how collaborating with a smaller business with a shared agenda, made it more viable in terms of price, to experiment with a new product in their construction, since the engagement and knowledge of the consultant was extensive, despite the size and price of their service (cf. Appendix A.1) Sinding, 2023 from twentyfifty futures/Circle Bank expressed how a consequence of not sharing values and understandings, leads to too much time spent on establishing a foundation for knowledge, otherwise spent on developing innovative solutions (Sinding, 2023). This point is also recognised by Andreasen, 2023 from Woodfiber. In this connection, A. S. Sørensen, 2023a from Enemærke & Petersen argues for the shared value amongst stakeholders is having an influence in enabling more interest-based and emollient approaches to collaboration, instead of focusing on rights and responsibilities and thereby being a barrier for developing the processes (cf. Appendix A.4).

Besides having shared values, Kiesslinger, 2023 from Lendager and Olesen, 2023 from COWI further highlighted the importance of having stakeholders being flexible in terms of roles and responsibilities, to change the current practice towards a more circular approach. Flexibility is needed when challenging what is the usual process and division of responsibility (Kiesslinger, 2023; Olesen, 2023). Olesen, 2023 relate this flexibility to a shared set of values, and how important that is when collaborating, through limiting the competitive aspects when the project is up and running. In connection to the competitive aspects, Kiesslinger, 2023 highlighted that based on experiences from Lendager, a challenge

emerges when there is a lack of willingness to share knowledge (cf. Appendix A.7. This can be related to the focus on individual responsibilities rather than shared interests, which is normally evident in construction projects due to the large amount of money at stake (Olesen, 2023).

Hence, this shows how having a shared set of values influences the ability to systems build by enabling a stronger relationship between stakeholders. This can work for more structural changes in practice, and not only for their own success and also when larger businesses are collaborating on more complex projects. At the same time Sinding, 2023 emphasised the importance of finding a balance between being 100 % value-based or income-driven, learned from trying to systems build with Circle Bank. This can be related to the above reflections, in the sense that finding a shared vision also relates to being pragmatic, to get all stakeholders on board (cf. Appendix A.2).

Overall, the analysis of the front-running businesses' activities shows how the businesses are sharing values with stakeholders influencing the businesses' ability to systems build. Sharing values is relevant to form a solid baseline when aiming to innovate new, more radical practices. At the same time, the businesses are also collaborating with stakeholders with shared values to initiate a more flexible approach to roles and boundaries which is important to avoid conflicts and instead focus on finding a good process, when experimenting with materials and approaches, especially on large-scale projects.

Establishing long-term collaborations with stakeholders

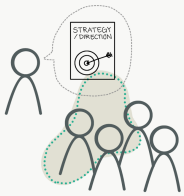
Another aspect of collaboration identified is long-term collaborations with the same stakeholders to benefit from the processes of experimenting and learning together.

Olesen, 2023 from COWI highlights how long-term collaboration enables the transfer of knowledge from one project to another since time can be spent on developing long-lasting solutions instead of *"getting to know each other"* (cf. Appendix A.3). This transfer of knowledge can also be seen in AKF's project with upscaling the straw elements in terraced houses where the same 'team' used on the small scale was also hired for scaling up the project (cf. Appendix A.1). Similarly, Brix, 2023a from MATTER by Brix, Delman, 2023 from twentyfifty futures and Sinding, 2023 from J. Jensen created a long-term collaboration leading to establishing Circle Bank as a formal business with a shared goal of building a system for the use of recycled materials in the construction sector (cf. Appendix A.2). Having this collaboration between these businesses is essential for their work and ensures a collective capacity (Delman, 2023). In connection with this, A. S. Sørensen, 2023a highlighted how Enemærke & Petersen, from the perspective of them being a contractor has benefited from establishing *"Strategic Partnerships"*, to avoid conflicts and mistakes (cf. Appendix A.4). The concept of *"Strategic Partnerships"* covers some of the points made earlier related to early dialogue and long-term collaborations. A Strategic Partnership is a formal agreement between two or more parties to reach a shared goal utilising collective capacities (Frederiksen & Johansen, 2022). This is a relatively new way of organising collaborations and tender rounds in the construction sector in contrast to the usual project organisation in the sector, described in Section 1 'From degrenerative to regenerative business practices'. According to A. S. Sørensen, 2023a, learning from earlier projects with the same stakeholders allows the creation of improvements to find a good model

to replicate, reduce transactions costs both financial and in communication as well as create a relationship based on trust (cf. Appendix A.4). Notably, the concept of strategic partnerships could be supported by collaborations with specific stakeholders and include having an early dialogue ensuring everyone in the strategic partnership is aligned and on-board with the shared goal to avoid conflicts.

Hence, the analysis of the front-running businesses shows how establishing, and building long-term relationships towards a shared goal is defined as a way to create room for experimentation, and learning processes, leading to improvements towards finding better solutions.

7.2.4 Strategic initiatives



Besides internal conditions and collaborative processes, different strategic initiatives were identified. In relation to this theme, the identified aspects of building systems are as follows:

- Setting a strategic direction as a property owner.
- Communicating and sharing values through strategies.
- Scaling up and sharing to influence the construction sector.

Thus, the theme of strategic initiatives entails developing strategies, especially highlighted for the property owner, to take responsibility and set up requirements for the stakeholders and processes. Finally, testing a product and process before scaling up and simplifying a concept is seen as two ways to strengthen communication with other actors in the network when systems building. These aspects are related both to the internal– and external aspects of businesses' building systems. The aspects are explored in the following.

Setting a strategic direction as a property owner

A strategic aspect of systems building is having a property owner take responsibility. According to various front-running businesses, the property owner has the possibility to set the strategic direction. The property owners' interest in taking responsibility is often related to a long-term interest, for example, Falkenberg, 2023a from Upcycling Forum expresses how the stakeholder with the most interest in the strategic inclusion of circular principles in their construction projects are municipalities, regions and pension funds, who are more motivated since they do not build just to sell (Falkenberg, 2023a). This point is supported by Kauschen, 2023 from Vandkunsten who argues how the long-term interested property owners are more interested in robustness and quality, and thereby allow stakeholders such as Vandkunsten room to innovate and experiment (cf. Appendix A.10). Similarly, Sinding, 2023 from J. Jensen and the 'Circle Bank' project emphasis how the property owner can set requirements to influence the strategic direction of the system related to a building project. Sinding, 2023 argues *"even if two contractors would have an agenda and try and push the property owner, it is more effective if the owner sets up requirements"*, and thereby puts emphasis on the influence of the property owner (Sinding, 2023). Additionally, Olesen, 2023 from COWI highlights how the property owner's willingness to take the lead by taking the responsibility and setting up requirements

for a change in practice is *"absolutely crucial"*, in the context of experimenting and learning from new processes (Olesen, 2023).

The above points are all made by stakeholders not having the role of property owners. However, it is also emphasised by Kellerman, 2023 from Roskilde Municipality. As a public property owner, taking responsibility means for them, that they have to lead the dialogues between the related stakeholders, and be present at the construction site. For instance, Kellerman, 2023 highlights, by setting the aspect of lowering the climate impact as a competing aspect in their tendering material, it has resulted in the contractor's team identifying a way to lower the climate impact even more than the goal, Roskilde Municipality set out, in the beginning (Kellerman, 2023).

This aspect indicates property owners are important for building systems in the construction sector as they have the opportunity to level the playing field to reach a certain goal like lowering the climate impact. All in all, this aspect of the property owner setting the strategic direction can be related to the collaborative processes, as these allow other stakeholders wanting to build systems in the construction to influence the property owner – vice versa, the property owner also has the opportunity to influence the other stakeholders. Thus, setting a strategic direction as a property owner is a way to initiate building systems in the construction sector that can lead to a change of practices.

Communicating and sharing values through strategies

Besides the direct focus on the role of the property owner, an aspect of using strategies in broader contexts was also identified from the practices of the front-running businesses. For instance, Kiesslinger, 2023 from Lendager emphasised the importance of forming a strategy together, to form the shared visions both internally and externally in projects. This can help guide utilising the internal conditions as well as the collaborative processes in building systems as it creates a guideline for where the processes have to lead. Related to the aforementioned aspect about the property owner, Kiesslinger, 2023 argued for especially the role of the property owner in taking responsibility in this strategy. In this context, Upcycling Forum has developed the 'material before pen' strategy, which Falkenberg, 2023a highlighted as a tool to clarify the processes and can be seen as a way to define a strategy aligning the understandings and visions of the stakeholders (cf. Appendix A.9). Additionally, Kiesslinger, 2023 highlighted how stakeholders, when establishing a certain system, at the beginning of a process, agree on a certain strategic direction, however as the process evolves this can be forgotten. Having an actually written strategy is one kind of tool to remind stakeholders of the actual strategy direction in the processes (Kiesslinger, 2023).

Thus, the analysis of the front-running business show how various businesses emphasise having a written strategy as a tool when building systems. A written strategy is seen as a tool to communicate and share values in the early dialogue of collaborative processes as well as guiding the internal conditions when building systems, having the possibility of leading towards alignment on goals.

Scaling up and sharing to influence the construction sector

A frequently strategic element identified in the front-running businesses' practices of building systems is a focus on experimenting and testing in order to scale up solutions in the construction sector. This aspect unfolds on different levels in the different practices of construction sector.

For instance, as mentioned by Bruun and Bendtsen, 2023, AKF is testing the straw elements before scaling up, besides the collaborative processes, this is seen as a way to communicate to other stakeholders in the sector that it is possible to change the current practices in the construction sector. The same reflection is recognised in the learnings from by Bording, 2023a from Greeendozer, emphasising how the learnings from seeing that one project practising *"gentle demolishing"* is profitable, can be taken further to inspire and navigate other projects. Olesen, 2023 from COWI also sees a value in experimenting and having learning processes to communicate examples to the rest of the construction sector inspiring them to change their current practices (Olesen, 2023). In addition, an organisation like WoodFiber, focuses their approach to systems building on systematising and simplifying a solution that can be scaled up within the current scope of the construction sector (cf. Appendix A.11). With this approach, the ability to systems build is supported by lowering barriers and making it easier for the practice to be incorporated in a larger network of stakeholders, not necessarily with the same willingness to experiment and risk.

All in all, the analysis of the front-running businesses show various business having a strategic process with a focus on scaling up to either influencing the scope of the current construction sector or the current practices in the same scope, which is assessed as an element to reach and initiate building systems with stakeholders naturally having a certain hesitation for changing practices.

7.2.5 The practices of front-running businesses building systems

The in-depth analysis of the mapping of front-running businesses' activities shows how the pattern of aspects unfolds in actions and influences systems building. Conclusively, Table 7.1 summarises the overall findings from the analysis seeking to answer the question: *"How are front-running businesses in the construction sector work with building systems to change current practices?"*, by illustrating themes, aspects and actions of the interviewed front-running businesses trying to build systems through experimenting and innovating with new practices.

Through working with internal conditions, collaborative processes and strategic initiatives, the front-running businesses are trying to create new understandings and underlying logics in the construction sector of what is possible, by linking actors in the construction sector in new ways and with new outcomes. On different levels, the front-running businesses are seeking, as systems builders, to create networks, and to initiate niche innovation development processes to enable a change of the current practices towards a certain goal. Table 7.1 show the generic aligned pattern of actions of the front-running businesses as systems builder initiating niche development processes.

How are front-running businesses building systems to change current practices?			
	Themes of how the front-running businesses build systems	***Aspects of building systems***	***Actions***
Experimentation and innovation	Internal conditions	Internal support and prioritisation	– Having internal support and prioritisation to experiment and innovate. – Initiate the journey of building systems.
		Integrating and utilising personal values and motivations	– Strategically involving advocates with a value-driven motivation to influence the process of system building.
	Collaborative processes	Collaborating with key stakeholders	– Collaborating with key stakeholders to overcome barriers and utilise certain resources increasing the ability of the system to stabilise and establish to successfully reach their goal.
		Focusing on early dialogue	– Using early dialogue to lower certain risks around new practices to stabilise them in the new system.
		Sharing values and a flexible approach to roles and boundaries	– Sharing values with stakeholders to form a solid baseline for innovating new practices. – Initiating a more flexible approach to roles and boundaries by establishing shared values.
		Establishing long-term collaborations with stakeholders	– Wanting – and establishing long-term collaborations towards a shared goal. – Creating a common room for experimentation – and learning processes leading to improvements towards stabilising new practices.
	Strategic initiatives	Setting a strategic direction as a property owner	– Initiating or taking a strategic role as the property owner to level the playing field and guide the establishment of a system in building projects.
		Communicating and sharing values through strategies	– Having a written strategy to use in the beginning and keep stakeholders involved towards shared goals.
		Scaling up and sharing to influence the construction sector	– Having a strategic process with focus on scaling up to either influence the scope of the current construction sector or the current practices in the same scope.

Table 7.1. *Overall themes, aspects of systems building and related actions based on the businesses' front-running activities.*

7.3 System building activities to enable regenerative businesses practices

In the previous section, the activities in relation to systems building of the front-running businesses were identified and mapped, which led to the development of four interconnected themes seen as framing the businesses practice of systems building towards changing existing practices in the construction sector: Experimenting and innovating, internal conditions, collaborative processes and strategic initiatives.

This pattern of actions, in Table 7.1, to create changes becomes clear when looking back into the barriers identified in Section 2.4.2 'Barriers and challenges in the existing system', seeing them as regime rules that need to be re-configured to change practices. For instance, the impact of more value-based collaborations creating networks is challenging the barrier of profit-based focus. Similarly, having an early dialogue, like between Lendager and Miljømærkning Danmark, is influencing the barrier of non-flexible regulations (cf. Appendix A.7). Moreover, the barrier in terms of competing interests is challenged by long-term collaborations sharing knowledge and learning from experimenting. Thus, the front-running businesses' ways of working in the construction sector seek to create new rules and understandings of practices. Seeing that the aspects are spread over more than one stakeholder and one business, indicates how networks and shared understandings form incipient alignments of practices along the niche stakeholders and businesses. Some are more radical with regards to the existing regime than others and variations of emphasis on different aspects are identified, leading to what can be seen as a *dynamic alignment*, overall moving in a direction of a new system. The next evident question to ask is now – are these activities working towards stabilising a system enabling regenerative practices?

7.3.1 Enabling regenerative business practices?

Looking at the aims of the businesses as described in the introduction to section 7.2 'Aspects of systems building activities', it is seen that the primary focus of changing existing practices through building systems is to find ways of lowering CO_2 emissions and increase the use of biogenic or reused materials.

The focus on lowering CO_2 emissions and materials is also central in the future outlooks for the businesses when asked to share their vision of how the construction sector would look in 2050. Overall, the businesses emphasise biogenic materials would be the expected primary material in the future, and further how comprehensive digitalisation of data on the materials in the existing buildings, will support the valuation of re-used materials. All in all, the aims of the front-running businesses' practices and their perception of the future visions, underline a primary focus on current systems building to enable more sustainable and circular practices in the construction sector (Appendix D).

Even though, both lowering CO_2 emissions and focusing on materials are related to the degree of regeneration, as stated in Chapter 2 'State-of-the-art: Regenerative business practices in the construction sector', there is a distinct difference found in regenerative business practices having a focus on always adapting to benefiting and meeting the needs of the entire socio-ecological system. Currently, the aims of the front-running businesses' building systems are to change current practices *doing less bad instead of doing more*

good, focusing at *"preserving"* and thereby being at the beginning of the journey towards regenerative practice (Hahn & Tampe, 2021). In fact, the innovations of the identified activities are to a large extent still only fulfilling the functions of society – while the core concept of regenerative businesses practices is to be net-positive (cf. Chapter 2 'State-of-the-art: Regenerative business practices in the construction sector'), and to the same extent fulfil the functions of nature.

To enable regenerative business practices in the construction sector, the front-running businesses have to *initiate, lead and inspire* within the frame of system-building activities accordingly to the process conceptualised in Chapter 6 'Businesses' systems-building activities'. This entails initiating the development of networks with actors participating in innovation processes having an ecological worldview that entails the regenerative principles as defined in Section 3.1 'Defining regenerative business practices in the construction sector'. Based on the previous analysis of how front-running businesses build systems to change current practices in the construction sector, a series of systems-building activities were identified, which has the potential to develop these specific networks with actors to enable regenerative business practices. However, it requires a mind-shift to use these systems-building activities strategically to enable regenerative business practices. The following section outlines recommendations for how businesses can enhance their ability to build systems enabling regenerative business practices in the construction sector.

7.4 Recommendations for enabling regenerative business practices in the construction sector

The proposed recommendations are developed with a focus on helping to establish the needed mind-shift for regenerative business practices, as they are defined in Section 3.1 'Defining regenerative business practices in the construction sector'. They take the point of departure in the four interconnected themes, gained from activities of front-running businesses: Experimenting and innovating, by focusing on internal conditions, collaborative processes and strategic initiatives (cf. Table 7.1). These are supported by a theoretically based understanding of business systems-building activities for a transition towards regenerative business practices found in Section 6.3 'Conceptualising businesses' systems-building activities', and a thorough understanding of the context of the Danish construction sector outlined in section 2.4 'From the perspective of the Danish construction sector'.

The proposed recommendations can work as a starting point for established – or newly formed businesses in the Danish construction sector, to reflect and get inspired for their contribution to the crucial system change of the construction sector. For all-ready front-running businesses, the recommendations can be seen as suggestions for the integration of regenerative business practices in their systems-building activities. Thus, regenerative business practices will be an add-on or further development of their existing practices. Notably, no business practice can ever become fully regenerative. In contrast to sustainability, the limits of *doing more good* are non-existing – it is a constant adaptive process to benefit the socio-ecological system.

The six recommendations are illustrated in Figure 7.4 on the following page.

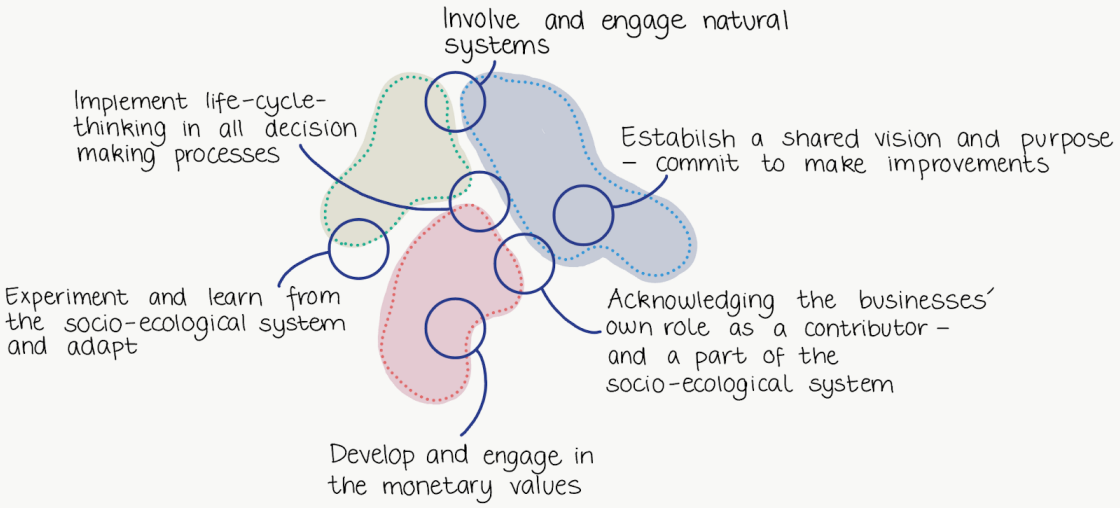


Figure 7.4. *Overview of how the front-running businesses can systems build for regenerative business practices [Own illustration].*

Acknowledging the businesses' own role as a contributor and a part of the socio-ecological system

First of all, the businesses have to reflect on how the business is a part of – and contributor to the socio-ecological system. From the analysis of how front-running businesses are building systems to change current practices, it was clear that the businesses' own role in relation to both human society and natural systems was not well-established or reflected on. A part of the regenerative business practices is to be locally responsive and sensitive as part of and contributor to local socio-ecological systems, which has to be considered when following this recommendation. Being a systems builder enabling regenerative business practices, as defined in Section 6.3 'Conceptualising businesses' systems-building activities', requires an acknowledgement of one's own role. Hence, this recommendation highlights the need for businesses to manifest their role in relation to the socio-ecological systems to let the natural system influence the dynamic stabilisation in the regime. Also, this recommendation entails seeing the construction sector as a system of interconnected actors and practices, that goes beyond the built environment into the socio-ecological system. This includes acknowledging how underlying logics of aesthetics and economic paradigms are not tied to the specific stakeholders of the construction sector but to a wider context, which can enable a more systemic approach. Thus, it is recommended this aspect of manifesting the businesses' role as a contributor and a part of the socio-ecological system could become an integrated part of the internal conditions in the systems-building activities having to clearly state and communicate through, for instance, leadership commitment, thus firstly internally establish the role of the businesses to be able to communicate it in the collaborative processes.

Involve and engage natural systems

This recommendation entails focusing on receiving feedback from nature, to build a deeper knowledge of how natural ecosystems work. According to Hahn and Tampe, 2021 co-learning and co-development, especially with strategically chosen stakeholders can *"improve the effectiveness of ecosystem management measures"*. Hence, strategically chosen

stakeholders can work as the voice of the ecosystem. Regenerative business practices imply a strong involvement of nature (cf. Chapter 2 'State-of-the-art: Regenerative business practices in the construction sector'). Noticeably, the emphasis on nature was not identified during the analysis of how the front-running businesses build systems (cf. Appendix A). Hence, actively involving and engaging the natural systems as a stakeholder could guide the business towards regenerative business practices. Thus, it is recommended, to stabilise a system, where actors are connected also with natural systems, nature could become an integrated part of the "Strategic Partnerships" under collaborative processes in the systems-building activities, which was highlighted in the previous analysis.

Develop and engage in the non-monetary values

Furthermore, to initiate a mind-shift towards regenerative business practices, businesses should continue to further prioritise and utilise personal values and motivation in professional work, to turn the focus of the business towards value-creation for both the natural world and the human society. Multiple times, the stakeholders emphasised a turn towards a more value-driven approach to their work, focusing on doing better for the planet (Appendix A.1, A.2, A.7 and A.10). At the same time, it was seen how front-running businesses that collaborate with other stakeholders with this value-driven approach as a shared vision, focus less on the individual business sustainability achievements and more on the long-term transition of the construction sector, understood as a more systemic approach. Further utilising the individual's recognition of a non-monetary value in the focus of the work of the business, and sharing these values in visions within collaborations, could potentially enable regenerative business practices. In fact, both Vandkunsten and Lendager emphasised how they as organisations could support the development of the construction sector in the next 30 years through supporting *"crazy"* and *"interesting"* ideas (Kauschen, 2023) and listen more to the ideas of young people (Kiesslinger, 2023). Thus, it is recommended to facilitate brainstorms across departments within the business and create space for employees and stakeholders to develop and reflect on the values of the business, and how to integrate them into the business practices. However, businesses must be aware of how their value creation is supporting their role in the socio-ecological system. The recommendations could become an integrated part of internal conditions knowing it is an iterative and dynamic process accordingly to the needs and impacts on the socio-ecological system.

Establish a shared clear vision and purpose – commit to make improvements

Besides defining the businesses' own role and values, the businesses should, based on its internal conditions, ensure the reflection in the collaborative processes by having a shared vision and purpose clearly stating how the collaborative processes intend to benefit the socio-ecological system. Having shared visions and a purpose with systems to benefit the socio-ecological system is central in the regenerative business practices, as identified in Section 3.1 'Defining regenerative business practices in the construction sector'. Geels, 2011 argues the establishment of these visions *"provide guidance for the innovation activities"*. The analysis of the front-running businesses' systems-building activities showed, how various businesses experienced it as a challenge to ensure a shared established starting

point in the whole building process and reach all stakeholders as it is a complex process with many involved. Hence, it is recommended to establish a shared vision and purpose that define the contribution to the socio-ecological system and explicit in the collaborative processes to guide decision-making processes and ensure an alignment between stakeholders on committing to do more good. This could be integrated into the process of *sharing values* as a strategic process influencing the collaborative processes.

Implement life-cycle-thinking in all decision making processes

As mentioned, regenerative business practices are about enhancing the capabilities of both human society and the natural systems instead of only doing less bad. To ensure this aspect, life-cycle thinking in all decision-making processes is seen as a potential tool, as it allows to consider the impact of processes from the development phase to the end-of-life phase. This could also support the development of the circular economy in the construction sector which, as defined in Section 2.2 'The concept of regenerative business practices in the construction sector' is a part of ensuring the regenerative biosphere. On the other hand, as highlighted in Chapter 2 'State-of-the-art: Regenerative business practices in the construction sector', the lack and complications of data and environmental product declarations on biogenic and re-used building materials, also indicated how a too narrow focus on LCA calculations can become a barrier for change. Hence, it is important to make a distinction between LCA as calculations of life-cycle impacts, and life-cycle thinking as a holistic way to consider the consequences of a decision on the socio-ecological system. The analysis of the front-running businesses showed this focus is evolving wanting to integrate biogenic- and reused materials (cf. Appendix A). However, to support this growing focus, integrating life-cycle-thinking would ensure this focus on materials is guided in a direction creating benefits for the socio-ecological system. Thus, it is recommended to integrate life-cycle thinking as a strategic initiative that can create transparency in both internal and collaborative decision-making processes.

Experiment and learn from the socio-ecological system and adapt

The strong focus on experimenting and innovating seen in the activities of the front-running businesses can be utilised for a change in mind-shift towards regenerative business practices. It can be argued that integrating experimentation in the way of working in the construction sector, builds towards enabling the ability to work iterative with being adaptive to the needs of the socio-technical-ecological system. This means, businesses in the construction sector should continuously improve the experimental and innovative room by internally supporting and finding like-minded to innovate with, and together develop a flexible approach to roles and areas of responsibility, as it has already started. However, emphasising this, as it is a centre of the regenerative business practices to be adaptive to changes and have ongoing learning processes acknowledging that no one can have all the capabilities itself. Thus, it is recommended that the systems-building activities are continually being experimented with and further developed in order to keep on learning from the socio-ecological system. This could for instance be integrated into the business' clear vision and purpose, thereby also committing to making these continuous improvements and optimisations.

Summing up, the six proposed recommendations for businesses to build systems enabling regenerative business practices in the construction sector, relates processes of innovating and experimenting with internal, collaborative and strategic aspects, to the transition towards a regenerative construction sector. As shown in Figure 7.4, the activities of systems building overlap over several recommendations underlining that they are interconnected.

Discussion and reflections 8

In the following chapter, the findings of the study are discussed. This discussion focuses on the challenges related to businesses' systems-building activities for regenerative business practices in the construction sector, and how this study is positioned in the research field of regenerative business management. Finally, the implications of the research design and approach of this study are discussed.

8.1 Regenerative business practices – a reality for the construction sector or just wishful thinking?

The premises of this study has been the potentials of regenerative business practices, as a mean to change businesses influence of the escalating ecological degeneration and growing social challenges. From the findings, it is clear how enabling regenerative business practices requires, not only a certain set of actions but a mind shift. This entails a radical change in worldview, moving away from seeing economic growth and profit as the end goals, towards contributing to both the human society and natural systems, as an interrelated system to benefit and enhance (cf. Chapter 2 'State-of-the-art: Regenerative business practices in the construction sector').

However, when reflecting on the focus of the front-running businesses in the construction sector, it is argued, the concept seems complex and distant in practice. Both initial interviews conducted to get an insight into the state of the construction sector, and activities of front-running businesses, revealed how movements are currently oriented on mitigating climate impacts by reducing CO_2 emissions, meeting LCA requirements in the building regulation along with an increasing focus on circular economy. In the literature, the concept has been criticised for *"being symbolic and evocative, but with limited application for business, except the agricultural sector"* (Hahn & Tampe, 2021). One can question, if a radical shift in worldview is compatible with the logic of businesses or if pressure should come from outside in, to change the practices of the businesses.

In the interview with Sinding, 2023 from J. Jensen, the latter was emphasised. According to Sinding, 2023, the future construction sector will be motivated to build with local and biogenic materials – first of all because of necessity, since *"we won't get other materials, because all other materials are sold everywhere else in the world, we're at the back of the queue"* (Sinding, 2023). Following the Multi-Level Perspective framework on transitions, this resource shortage can be seen as pressure from the landscape influencing the practices of business.

Another perspective in this discussion is the role of regulative incentives. Konietzko et al., 2023 emphasises how *"strong and contested policy frameworks are necessary for achieving regenerative business models"*. This perspective is supported in Chapter 2 'State-of-the-art: Regenerative business practices in the construction sector'. Trying to understand the drivers in the current construction sector, it was highlighted how influencing (and limiting) the regulative framework of the construction sector is on the transition of the construction sector. Even though this was not a focus of the interviews with front-runners, it was brought up various times. This does not necessarily mean, that the potentials of businesses being systems builders are not there – in fact, the study has shown how businesses with their systems-building activities, can overcome even regulative barriers. However, from primarily focusing on the normative and cognitive changes in this study, regulative incentives could be a way to support the niche innovation processes of the front-running businesses. In May 2023, a supplementary agreement to the National Strategy for Sustainable Construction was made, enabling the calculation of re-used materials with zero impact in LCA calculations (Social-, Bolig- og Ældreministeriet, 2023). A. S. Sørensen, 2023a highlights how this regulative change is important: *"[...] and then finally, the politicians got it together to say that they [red., reused materials] are now going in with a zero. And zero is not necessarily accurate, because you can end up having to process a material in an insane amount. But it's a better starting point than if it's new to us. So, it's really awesome."* (A. S. Sørensen, 2023a). Seeing this, regulations can also support systems-building activities, by giving room for niche innovations to further stabilise by affecting the economic logic. Examples could be setting requirements for enhancing biodiversity in construction projects (Miljømærkning Danmark, 2023) or more explicitly pricing contributions to the socio-ecological system (Krausing, 2022). This indicates the need for further investigating the external movements around the construction sector, that could influence the process of systems building towards enabling regenerative business practices. Also, the question arises of which role these policy frameworks potentially have in developing the mind-shift and worldview needed for businesses to build new systems to enable regenerative business practices. The findings of this study show how shifting the mindset and worldview requires creating a supportive and encouraging environment for adapting and experimenting leading to learnings (cf. Section 7.3 '7.3'), which the regulations could be a potential tool to influence the creation of. Yet, regulative incentives are a part of creating a greater transition pathway towards regenerative business practices in the construction sector.

Adopting the mindset of doing more good instead of less bad to the socio-ecological system represents a journey, an ongoing process, requiring adaptive practices constantly being aware of the needs of the socio-ecological system. Thus, the regenerative business practice to not entail a stable state but constant dynamic interactions and efforts to develop towards benefiting the socio-technical–natural system. Thus, the rules of the regime have to embrace a constant dynamic stabilisation of regenerative business practices, rules that at the moment are under construction (cf. Chapter 2 'State-of-the-art: Regenerative business practices in the construction sector').

Specific challenges for the transition of the construction sector can further be considered. As highlighted in Chapter 1 'From degrenerative to regenerative business practices', the construction sector is dominated by a project-oriented work approach often with

numerous stakeholders involved. According to amongst other A. S. Sørensen, 2023a from Enemærke & Petersen, this can narrow the time perspective of the innovations. Thus, the focus likely becomes the projects rather than the organisation, as was proposed in the definition of regenerative business practices in Chapter 2 'State-of-the-art: Regenerative business practices in the construction sector'. At the same time, an advantage of the project-oriented approach may in fact be this short-time perspective, which can allow for experimentation and ideas to be tested. However, this requires a willingness, and as already emphasised, an integration of a mindset shift in the approach. Another potential context-related challenge is the distinct focus on avoiding (and revealing) greenwashing in the construction sector. This leads to the reflection that defining regenerative business practices as a journey, will make it even more difficult to sort out businesses taking advantage of the undefined concept in their communication. Additionally telling apart the front-running businesses wanting to change the system, and businesses who are rather a product of the development, being aware of potential market advantages from working with re-used and biobased materials can be difficult. Hahn and Tampe, 2021 argues market demand typically does not follow a systemic logic, meaning that businesses must be, e.g., proactive towards the system if they work with regenerative business practices, and not towards a future market.

It is likely to think that having a construction sector of regenerative business practices may be a bright outlook in the distant future. On the other hand, even though the regenerative business practices may only be wishful thinking in the construction sector, it points towards a necessary direction considering the sectors' impact on the planetary boundaries and the social foundation (cf. Chapter 1 'Chapter From degrenerative to regenerative business practices'). In the question of whether or not regenerative business practices are a solution to the impacts of the construction sector or wishful thinking. Thus, it is argued that having it as a goal sets a direction to guide changes in the construction sector.

8.2 The contributions of this study

This study adds to a new and growing field within *regenerative business management* that among others include recently published papers by Hahn and Tampe, 2021 focusing on regenerative business strategies, and Konietzko et al., 2023 focusing on regenerative business models. The latter, published within the timeframe of this study, has developed a framework of regenerative business models, and reviewed it in the context of sustainable- and circular business models (Konietzko et al., 2023). Konietzko et al., 2023 draws, similar to this study, the conclusion that mainly regenerative business is about creating benefits for the socio-ecological systems. Supporting the recommendations of this study, Konietzko et al., 2023 also recognise similar perspectives of the needed internal conditions by framing the need for organisations to have the element of both an organisational and demonstrated purpose including the core values, mission and vision – being guided by *"a clear, inspiring mission that embeds the well-being of individuals, communicates, and the environment"* (Konietzko et al., 2023).

Nevertheless, this study implicates a focus on business practices being arrays of businesses' activity centrally organised around shared practical understanding (cf. Chapter 6 'Businesses' systems-building activities'). Within the scope of business practices, the focus

has been on understanding how business activities and interactions build new systems to change current practices in the construction sector, and how these activities and interactions can be evolved to build systems to enable regenerative business practices. Thus, the focus moves from the managerial implications, like business models and development of strategy, to a focus on activities and interactions, to examine the shared practical understanding in the construction sector and how these shared understandings can be re-defined to enable new regenerative practices. When applying the practice theoretical understanding to the Multi-Level Perspective framework, niches are seen as *"emerging fluid practices"*. Thereby, the question becomes how these can become stabilised and routinised (Geels, 2011). The focus on practices can be a way to broaden the scope of influence, since the routinely reproduced actions of businesses can be difficult to change only by focusing on more intentional strategies.

Thus, this study adds to the field of regenerative business management a focus on interactions and relations of businesses in the Danish construction sector working towards a shift in practices.

8.2.1 Implications of the research design

This section includes reflections on the methodological decisions and approaches of this study. This includes reflections on the implications of the research design and approach to study business systems-building activities in the transition of the construction sector towards enabling regenerative business practices.

Firstly, it is relevant to reflect on this study's approach to developing the proposed recommendations for businesses to enable regenerative business practices. The recommendations are based on results from an analysis of interviews with front-running businesses, in combination with a conceptual understanding. All in all, the conceptualising of the complex concept, like regenerative business practices and systems-building activities, lacks a certain understanding of how the context of each business practice influences how the concept unfolds in reality. However, it is argued, that the experiences and learnings from the businesses are to some extent adding a practical understanding of reality, that was not given from the conceptualisation. On the other hand, the variety of businesses in the construction sector, (as established in Chapter 1 'From degrenerative to regenerative business practices'), have different roles, functions and relational powers, which potentially influence their practices. Thus, when basing the recommendations on practices of front-running businesses, without differentiating between them, but taking the point of departure in the businesses' perception of reality and experiences from their work, places a certain understanding of reality in the recommendations. One may question whether basing the recommendations on the businesses' experiences, in fact, narrows the focus, as it does not open up perspectives that would be more relevant to include. Combining the theoretical with the empirical understanding strengthens the proposed recommendations, although they are seen as generic processes offering a starting point for businesses to guide their journey of developing regenerative business practices. All in all, the contribution of this study is an initial understanding of how businesses can build new systems to enable regenerative business practices that need to be developed on.

To increase the reflections of practices within the recommendations, having the businesses more involved in the development of the recommendations is a potential future pathway. In a workshop, future practices and the challenges and opportunities they bring could be articulated (Pink et al., 2022). Deliberately engaging as researchers in the conversations, and being transparent about findings, the researcher could play a role in challenging the participating businesses' worldview, taking a scholarly stance towards *engaged scholarship* (Ergene et al., 2021). In fact, the idea of using Miro as an online whiteboard during the interviews with the stakeholders, to obtain an interactive conversation, was inspired by this reflection. Besides using Miro, experiences gained from the interviews conducted for this study make it clear, this process requires more time and a clearer alignment of expectations with the interviewees. Additionally, a workshop would benefit from having more participants, compared to the "one-to-one" set-up of an interview.

Finally, the whole understanding of regenerative business practices and systems-building activities is synthesised from the collected data by the research group – whom is influenced by the cultural engagement with nature in Denmark. On the 28. of Marts 2023, the world would have used the resources of the planet, if everybody lived like the Danish society. For a year, there would be a need for four planet earths ("Country Overshoot Days 2023", 2023). Inspired by Konietzko et al., 2023, adding perspectives of different indigenous communities with other interactions with nature, might had deepen the understanding of the socio-ecological system as well as the understanding of the relationships between businesses and the natural system.

Conclusion 9

This study looks into regenerative business practices as a way to move beyond limiting the impacts of human activity on ecological systems, and towards restoring and enhancing both the natural and human world through businesses' systems-building activities. This has been examined in the context of the Danish construction sector.

To do so, the rather undefined concept of *regenerative business practices in the construction sector* has been examined through a comprehensive state-of-the-art – including both a literature review and 11 interviews with stakeholders in the Danish construction sector. Moving beyond the concepts of sustainability and circular economy, the concept of regenerative business practice emphasises the need for businesses to acknowledge they are a part of – and a contributor to the socio-ecological system. Regenerative business practices focus on adaptive management approaches and collaborative processes, aiming to create value for both natural systems and human society. Thus, in the construction sector, regenerative business practices require a rethinking of needs, values, and the purpose of construction-related activities. All in all, the concept of regenerative business practices in the construction sector is defined by the following principles.

Principles of regenerative business practices in the construction sector

- Having a view on the business as a part of – and contributor to the socio-ecological system
- Focusing on value-creation for both the natural world and human society through a continuous cyclic process
- Developing the business from the outside to inwards deriving goals from the socio-ecological system
- Being adaptive to the needs of the socio-ecological system
- Focusing on the organisations rather than projects
- Creating holistic impacts from the beginning of any design process.

However, the concept of regenerative business practices is currently not reflected in the Danish construction sector, as a result of challenges with interrelated barriers that prevent less degenerative practices from developing. To overcome these barriers and transition to a regenerative construction sector, the potential of businesses in building new networks and practices is acknowledged, leading to a research question as follows:

How can businesses build systems to enable regenerative business practices in the construction sector?

A qualitative research design has been used to guide the research and answer the research question. In this context, a total of 13 interviews with front-running businesses has been conducted. A conceptual framework has been developed to establish a framework for assessing the businesses' systems-building activities in enabling regenerative business practices in the construction sector.

Defining the transition towards regenerative business practices exemplifies how socio-technical–natural systems are seen as networks constituted by both human actors, actors from the natural systems and their relations, influenced by a socio-technical–natural regime. The transition towards regenerative business practices in the construction sector requires changes in the underlying logic of the regime. Niche innovation development processes illustrate, how different configurations of actors, create a dynamic process, influenced by regime and landscape, to target the existing regime and enable new practices. In this transition towards regenerative business practices, businesses' systems-building activities are conceptualised as entailing collaborative processes and experimentation by being *systems builders* initiating collaborative *niche development processes* towards enabling *regenerative business practices*.

When mapping the interviewed front-running businesses' activities, in their attempts to change current practices in the construction sector, processes of experimenting and innovation, related to internal conditions, collaborative processes and strategic initiatives were revealed. This became evident seeing businesses prioritising personal motivation and placing a managerial and political emphasis on experimentation and innovation, which differentiates them from the more traditional, financially focused, and project-oriented construction sector. Moreover, strategic collaboration with selected stakeholders, early dialogues, alignment of values and long-term collaborations were observed as beneficial. Finally, strategical initiatives, dependent on the perspective were identified, such as setting a strategic direction as a property owner and defining a strategy to scale up innovations. Through experimenting and innovating focusing on these interrelated aspects, the front-running businesses are creating new understandings and underlying logics of practices in the construction sector, that are overcoming the barriers, identified for the Danish construction sector.

Based on learnings and reflections on how the front-running businesses are working with systems-building activities, and the established understanding of regenerative business practices, six recommendations were derived. These are seen as enhancements in terms of how businesses can strengthen their ability to work with regenerative business practices in the construction sector. The six recommendations are:

- Acknowledging the businesses' own role as a contributor and a part of the socio-ecological system
- Involve and engage natural systems
- Develop and engage in the non-monetary values
- Establish a shared clear vision and purpose – commit to make improvements
- Implement life-cycle-thinking in all decision making processes
- Experiment and learn from the socio-ecological system and adapt

These six recommendations are all interconnected. Thereby, adopting one of the recommendations will lead to reflections in relation to the others. All in all, these recommendations are proposed from the perspective of how businesses can build systems, not considering the external influences from regulative incentives.

Conclusively, businesses can build systems to enable regenerative business practices in the construction sector by establishing internal – and external conditions that allow for a continuous process of experimenting and innovating, to adapt to changes and benefit the socio-ecological system. Thus, the front-running businesses' systems-building activities has, together with the proposed recommendations to enable regenerative business practices, been synthesised to answer the research question.

Limitations to this result is that it can mainly be generalised for businesses with a certain mind-shift. Practicing systems-building activities to enable regenerative business practices requires a willingness to adjust or develop a certain practice on different premises than the current economic system – it requires devotion and resources. Building systems towards enabling regenerative business practices in the construction sector is an ongoing journey of experimenting and innovating in collaborative processes to continually create benefits for a changing socio-ecological system.

Bibliography

Aarhus Universitet Technical Sciences. (2023). *Ny professor inviterer byggebranchen til samarbejde* [Last visited: 09.02.23]. https://via.ritzau.dk/pressemeddelelse/ny-professor-inviterer-byggebranchen-til-samarbejde?publisherId=13559834&releaseId=13665272

Adams, R., Jeanrenaud, S., Bessant, J., Denyer, D., & Overy, P. (2012). *Innovating for sustainability: A Systematic Review of the Body of Knowledge* (tech. rep.). Network for Business Sustainability.

Adams, R., Jeanrenaud, S., Bessant, J., Denyer, D., & Overy, P. (2016). Sustainability-oriented Innovation: A Systematic Review [Publisher: John Wiley & Sons, Ltd]. *International Journal of Management Reviews*, *18*(2), 180–205. https://doi.org/10.1111/ijmr.12068

AKF. (n.d.). Hvem er vi. Retrieved May 20, 2023, from https://akf.as/hvem-er-vi/

AKF. (2023). AKF er klar til første byggeri i halm. Retrieved May 17, 2023, from https://akf.as/taet-paa/akf-er-klar-til-forste-byggeri-i-halm/

Andersen, J. (2023). Interview with Jesper Arent Andersen (Kingo Karlsen).

Andreasen, H. (2023). Interview with Henrik Andreasen (Woodfiber).

Awuzie, B., & McDermott, P. (2017). An abductive approach to qualitative built environment research: A viable system methodological exposé. *Qualitative Research Journal*, *17*(4), 356–372. https://doi.org/10.1108/QRJ-08-2016-0048

Bejder, A. (2023). Interview with Anne Kirkegaard Bejder (Frandsen og Søndergaard).

Bendtsen, K. A. F. (2023). *Linkedin profile* [Last visited: 02.05.23]. https://www.linkedin.com/in/kirstine-alr%5C%C3%5C%B8-fichtner-bendtsen/

Benites, H. S., Osmond, P., & Prasad, D. (2022). Inquiry on Perceptions and Practices of Built Environment Professionals Regarding Regenerative and Circular Approaches. *Buildings*, *13*(1), 63. https://doi.org/10.3390/buildings13010063

Bocken, N., Ritala, P., Albareda, L., & Verburg, R. (2019). Introduction: Innovation for Sustainability [Series Title: Palgrave Studies in Sustainable Business In Association with Future Earth]. In N. Bocken, P. Ritala, L. Albareda, & R. Verburg (Eds.), *Innovation for Sustainability* (pp. 1–16). Springer International Publishing. https://doi.org/10.1007/978-3-319-97385-2_1

Bocken, N. M. P., & Short, S. W. (2021). Unsustainable business models – Recognising and resolving institutionalised social and environmental harm | Elsevier Enhanced Reader. *Journal of Cleaner Production*, *312*. https://doi.org/10.1016/j.jclepro.2021.127828

Booth, A., Papaioannou, D., & Sutton, A. (2012). *Systematic Approaches to a Successful Literature Review*.

Bording, R. (2023a). Interview with Rasmus Bording (Greendozer).

Bording, R. (2023b). *Linkedin profile* [Last visited: 02.05.23]. https://www.linkedin.com/in/rasmus-bording-73b69a174/

Brinkmann, S., & Tanggaard, L. (2020). *Kvalitative metoder - en grundbog* (3. udgave). Hans Reitzels Forlag.

Brix, L. D. (2023a). Interview with Lene Damsbo Brix (MATTER by Brix).

Brix, L. D. (2023b). *Linkedin profile* [Last visited: 02.05.23]. https://www.linkedin.com/in/lenedamsbobrix/

Bro, P. (2023a). Interview with Per Bro (Boligselsskabet Sjælland).

Bro, P. (2023b). *Linkedin profile* [Last visited: 10.03.23]. https://www.linkedin.com/in/per-bro-391245b5/

Bruun, C. G. (2023). *Linkedin profile* [Last visited: 02.05.23]. https://www.linkedin.com/in/c-gjessing-bruun/

Bruun, C. G., & Bendtsen, K. (2023). Interview with Kristian and Christine (AKF).

Byggevirke & Datter. (2023). *Byggevirke & folk* [Last visited: 24.02.23]. https://www.byggevirke.dk/folk

Bygherreforeningen & Byggefakta. (2021). Bygherrebarometer 2021 - analyse af udvikling og trends i byggebranchen 2021 og 2022.

Caldera, S., Hayes, S., Dawes, L., & Desha, C. (2022). Moving Beyond Business as Usual Toward Regenerative Business Practice in Small and Medium-Sized Enterprises. *Frontiers in Sustainability*, *3*, 799359. https://doi.org/10.3389/frsus.2022.799359

Chirico, J. M., & Nystrom, A. M. (2018). The Living Company: A Systems Approach. In S. L. Steffen, J. Rezmovits, S. Trevenna, & S. Rappaport (Eds.), *Building Leadership Bridges* (pp. 221–235). Emerald Publishing Limited. https://doi.org/10.1108/S2058-880120180000007014

Christiansen, A. (2023). Interview with Alexander M. B. Christiansen (Dansk Standard).

Country Overshoot Days 2023. (2023). Retrieved May 31, 2023, from https://www.overshootday.org/newsroom/country-overshoot-days/

COWI. (n.d.). LCAcollect: Byggeriets værktøj til dokumentation af klimaaftrykket. Retrieved May 20, 2023, from https://www.cowi.dk/focus/lca-collect

COWI. (2023). *Nyt community skal sikre skalering af cirkulært byggeri* [Last visited: 02.05.23]. https://www.cowi.dk/om-cowi/nyheder-og-presse/nyt-community-skal-sikre-skalering-af-cirkulaert-byggeri

Creswell, J. (2009). *Research Design - Qualitative, Quantitative, and Mixed Methods Approaches* (Vol. Third edition). SAGE Publications, Inc. Retrieved April 5, 2023, from https://www.ucg.ac.me/skladiste/blog_609332/objava_105202/fajlovi/Creswell.pdf

Dagens Byggeri. (2023). Kan Green Hub House være opskriften på fremtidens boligbyggeri? Retrieved May 17, 2023, from https://www.dagensbyggeri.dk/artikel/120027-kan-green-hub-house-vaere-opskriften-pa-fremtidens-boligbyggeri?

Dansk Byudvikling. (2023). Home.Earth og Scandi Byg bygger træboliger i Hedehusene. Retrieved May 21, 2023, from https://dansk-byudvikling.dk/home-earth-og-scandi-byg-bygger-traeboliger-i-hedehusene/

Dansk Standard. (2023). *Medarbejdere hos dansk standard* [Last visited: 24.02.23]. https://www.ds.dk/da/om-dansk-standard/find-medarbejder

Delman, T. F. (2023). Interview with Thomas Fabian Delman (Twentyfiftyfutures).

Dougnut Economics Action Lab. (n.d.). About Doughnut Economics | DEAL. Retrieved March 24, 2023, from https://doughnuteconomics.org/about-doughnut-economics

Ellen McArthur Foundation. (2013). *Towards the circular economy - Economic and business rationale for an accelerated transition* (tech. rep.).

Enemærke & Petersen. (n.d.). Om Enemærke & Petersen. Retrieved May 22, 2023, from https://eogp.dk/ep/omeogp/

Ergene, S., Banerjee, S. B., & Hoffman, A. J. (2021). (Un)Sustainability and Organization Studies: Towards a Radical Engagement [Publisher: SAGE Publications Ltd]. *Organization Studies*, *42*(8), 1319–1335. https://doi.org/10.1177/0170840620937892

Falkenberg, R. (2023a). Interview with Rasmus Falkenberg (Upcycling Forum).

Falkenberg, R. (2023b). *Linkedin profile* [Last visited: 02.05.23]. https://www.linkedin.com/in/rasmus-falkenberg-ba92a82/?originalSubdomain=dk

Frandsen og Søndergaard. (2023). *Mød vores medarbejdere* [Last visited: 24.02.23]. https://frandsen-sondergaard.dk/medarbejdere/

Frederiksen, N., & Johansen, P. (2022). *Erfaringer og fakta om strategiske partnerskaber - fortalt af praktikerne.* 1.

Frisesdal, F. (2023). Interview with Feodora Olivia Frisesdal (Rådet for Bæredygtigt Byggeri).

Fullerton, J. (2015). *REGENERATIVE CAPITALISM* (tech. rep.).

Futas, N., Rajput, K., & Schiano-Phan, R. (2019). Cradle to Cradle and Whole-Life Carbon assessment – Barriers and opportunities towards a circular economic building sector [Publisher: IOP Publishing]. *IOP Conference Series: Earth and Environmental Science*, *225*(1), 012036. https://doi.org/10.1088/1755-1315/225/1/012036

Geels, F. W. (2004). From sectoral systems of innovation to socio-technical systems. *Research Policy*, *33*(6-7), 897–920. https://doi.org/10.1016/j.respol.2004.01.015

Geels, F. W. (2011). The multi-level perspective on sustainability transitions: Responses to seven criticisms. *Environmental Innovation and Societal Transitions*, *1*(1), 24–40. https://doi.org/10.1016/j.eist.2011.02.002

Geels, F. W. (2019). How can the transition towards regenerative businesses' practices in the construction sector be defined, to conceptualise businesses' systems-building activities? *Current Opinion in Environmental Sustainability*, (39). https://doi.org/https://doi.org/10.1016/j.cosust.2019.06.009

Ghazvinian, A., Link to external site, t. l. w. o. i. a. n. w., & Gürsoy, B. (2022). Mycelium-Based Composite Graded Materials: Assessing the Effects of Time and Substrate Mixture on Mechanical Properties [Num Pages: 48 Place: Basel, Switzerland Publisher: MDPI AG]. *Biomimetics*, *7*(2), 48. https://doi.org/10.3390/biomimetics7020048

Haddaway, N. R., Bethel, A., Dicks, L. V., Koricheva, J., Macura, B., Petrokofsky, G., Pullin, A. S., Savilaakso, S., & Stewart, G. B. (2020). Eight problems with literature reviews and how to fix them. *Nature Ecology & Evolution*, *4*(12), 1582–1589. https://doi.org/10.1038/s41559-020-01295-x

Hahn, T., & Tampe, M. (2021). Strategies for regenerative business [Publisher: SAGE Publications]. *Strategic Organization*, *19*(3), 456–477. https://doi.org/10.1177/1476127020979228

Haselsteiner, E., Rizvanolli, B. V., Sáez, P. V., Link to external site, t. l. w. o. i. a. n. w., & Kontovourkis, O. (2021). Drivers and Barriers Leading to a Successful Paradigm Shift toward Regenerative Neighborhoods [Num Pages: 5179 Place:

Basel, Switzerland Publisher: MDPI AG]. *Sustainability*, *13*(9), 5179. https://doi.org/10.3390/su13095179

Heggland, N.-O. (2022). Grøn omstilling har sat fart på innovation i byggesektor. Retrieved May 29, 2023, from https://www.licitationen.dk/article/view/872922/gron_omstilling_har_sat_fart_pa_innovation_i_byggesektor

Hessellund, S. (2023). Interview with Stig Hessellund (Realdania).

Himmerland Boligforening. (2023). *Find medarbejder* [Last visited: 02.05.23]. https://www.abhim.dk/kontakt/find-medarbejder

Hofstra, N. (2016). Eco-Spirituality and Regenerative Entrepreneurship. In M. Chatterji & L. Zsolnai (Eds.), *Ethical Leadership* (pp. 261–273). Palgrave Macmillan UK. https://doi.org/10.1057/978-1-137-60194-0_15

Honarvar, S. M. H., Golabchi, M., & Ledari, M. B. (2022). Building circularity as a measure of sustainability in the old and modern architecture: A case study of architecture development in the hot and dry climate. *Energy and Buildings*, *275*, 112469. https://doi.org/10.1016/j.enbuild.2022.112469

Ilie, M., Ilie, C., & Marin, R. (2019). Management Strategies in Circular Economy. (2).

Institute, I. L. F. (n.d.). What Is The Living Building Challenge? Retrieved May 31, 2023, from https://living-future.org/lbc/

International Resource Panel & One Planet network. (2020). Analysis of the Construction Value Chain. *2020*, 31. Retrieved May 9, 2023, from https://www.oneplanetnetwork.org/sites/default/files/value_chain_analysis_construction_-_draft_201210_-_for_inputs.pdf

IPCC. (n.d.). IPCC Reports. Retrieved May 30, 2023, from https://www.ipcc.ch/reports/

IPCC. (2023). *AR6 Synthesis Report: Climate Change 2023* (tech. rep.).

J. Jensen. (2023). *Medarbejdere* [Last visited: 02.05.23]. https://j-jensen.com/medarbejdere/

Jensen, K. L. (2023). Dansk Byggeri - Cirkulær ressourceeffektivitet i byggebranchen. Retrieved April 26, 2023, from https://ufm.dk/forskning-og-innovation/forsk2025/indkomne-indspil/organisationer/dansk-byggeri/cirkulaer-ressourceeffektivitet-i-byggebranchen

Kauschen, J. S. (2023). Interview with Jan Schipull Kauschen (Vandkunsten).

Kellerman, K. (2023). Interview with Klaus Kellerman (Roskilde Kommune).

Kellermann, K. (2023). *Linkedin profile* [Last visited: 02.05.23]. https://www.linkedin.com/in/klaus-kellermann-76aa9613/?originalSubdomain=dk

Kiesslinger, J. (2023). Interview with Jørn Kiesslinger (Lendager Architechts).

Kingo Karlsen. (2023). *Kontakt medarbejdere* [Last visited: 14.03.23]. https://kingo.biz/kontakt/medarbejdere/

Knudsen, M. (2023). Interview with Michael Knudsen (Himmerland Boligforening).

Konietzko, J., Das, A., & Bocken, N. (2023). Towards regenerative business models: A necessary shift? *Sustainable Production and Consumption*, *38*, 372–388. https://doi.org/10.1016/j.spc.2023.04.014

Krausing, J. (2022). Beskyttelsen af klima, natur og biodiversitet går hånd i hånd: Her er fem principper til at vise vejen | CONCITO. Retrieved May 29, 2023, from https://concito.dk/concito-bloggen/beskyttelsen-klima-natur-biodiversitet-gaar-haand-haand-her-er-fem-principper-til

Lendager. (n.d.). TRÆ – A circular carbon bank. Retrieved May 17, 2023, from https://lendager.com/project/trae/

Lendager. (2023). *Meet the team* [Last visited: 02.05.23]. https://lendager.com/contact/

Lu, Y., & Zhang, X. (2016). Corporate sustainability for architecture engineering and construction (AEC) organizations: Framework, transition and implication strategies. *Ecological Indicators*, *61*, 911–922. https://doi.org/10.1016/j.ecolind.2015.10.046

Mang, P., & Reed, B. (2015). The nature of positive [Publisher: Routledge _eprint: https://doi.org/10.1080/09613218.2014.911565]. *Building Research & Information*, *43*(1), 7–10. https://doi.org/10.1080/09613218.2014.911565

Mangor & Nagel A/S. (n.d.). P-Hus Indfaldet i Musicon.

Mercader-Moyano, P., Link to external site, t. l. w. o. i. a. n. w., Porras-Pereira, P., & Levinton, C. (2021). Circular Economy and Regenerative Sustainability in Emergency Housing: Eco-Efficient Prototype Design for Subaşi Refugee Camp in Turkey [Num Pages: 8100 Place: Basel, Switzerland Publisher: MDPI AG]. *Sustainability*, *13*(14), 8100. https://doi.org/10.3390/su13148100

Miljømærkning Danmark. (2023). Svanemærket strammer kravene til byggeri – klima og cirkularitet er i fokus. Retrieved May 29, 2023, from https://www.svanemaerket.dk/nyheder/svanemaerket-strammer-kravene-til-byggeri

Miljøministeriet. (2021). *Faktaark om bæredygtigt byggerie* (tech. rep.). https://mim.dk/media/222891/faktaark_byggeri_dadocx.pdf

Miro. (2023). What is Miro? Retrieved May 31, 2023, from https://help.miro.com/hc/en-us/articles/360017730533-What-is-Miro-

Mirsky, R., & Songer, A. D. (2009). Beyond Sustainability: The Contractor's Role in Regenerative System Design. *Construction Research Congress 2009*, 330–337. https://doi.org/10.1061/41020(339)34

Muñoz, P., & Branzei, O. (2021). Regenerative Organizations: Introduction to the Special Issue [Publisher: SAGE Publications Inc]. *Organization & Environment*, *34*(4), 507–516. https://doi.org/10.1177/10860266211055740

Myrdal, C. (2023). Interview with Christina Grann Myrdal (WeBuild Denmark).

Nielsen, I. B., & Hakala, H. (2022). Circular Business Strategies and Quality of Life. *Sustainability*, *14*(3), 1782. https://doi.org/10.3390/su14031782

Ogunmakinde, O. E., Sher, W., & Egbelakin, T. (2021). Circular economy pillars: A semi-systematic review. *Clean Technologies and Environmental Policy*, *23*(3), 899–914. https://doi.org/10.1007/s10098-020-02012-9

Olesen, G. G. H. (2023). Interview with Gitte Gylling Hammershøj Olesen (COWI).

Oyefusi, O. N., Enegbuma, W. I., Brown, A., & Zari, M. P. (2022). Regenerative-based green supply chain management model for the construction industry [Num Pages: 082028 Place: Bristol, United Kingdom Publisher: IOP Publishing]. *IOP Conference Series. Earth and Environmental Science*, *1101*(8), 082028. https://doi.org/10.1088/1755-1315/1101/8/082028

Perge, D. (2023). Interview with Ditte Perge Sørensen (Foreningen for Byggeriets Samfundsansvar).

Petrovski, A. A., Pauwels, E., & Galán González, A. (2021). Implementing Regenerative Design Principles: A Refurbishment Case Study of the First Regenerative Building

in Spain [Num Pages: 2411 Place: Basel, Switzerland Publisher: MDPI AG]. *Sustainability*, *13*(4), 2411. https://doi.org/10.3390/su13042411

Pink, S., Fors, V., Lanzeni, D., Duque, M., Sumartojo, S., & Strengers, Y. (2022). *Design Ethnography: Research, Responsibilities, and Futures*. Routledge. https://doi.org/10.4324/9781003083665

Rådet for Bæredygtigt Byggeri. (2023). *Medarbejdere* [Last visited: 24.02.23]. https://rfbb.dk/medarbejdere

Rahman, S., Pogutz, S., & Winn, M. (2020). Inventing Regenerative Sustainability: Theoretically, Empirically, Practically.

Raworth, K. (2017). Meet the doughnut: The new economic model that could help end inequality. Retrieved April 8, 2023, from https://www.weforum.org/agenda/2017/04/the-new-economic-model-that-could-end-inequality-doughnut/

Raworth, K. (2018). *Doughnut Economics*. Cornerstone.

Realdania. (2023a). *Om os - medarbejdere* [Last visited: 09.02.23]. https://realdania.dk/om-os/medarbejdere/medarbejder?medarbejder=she

Realdania. (2023b). *Roadmap for cirkulær økonomi i byggeriet i et 2030-perspektiv* (tech. rep.) [OCLC: 1377280098]. Realdania.

Regeringens Klimapartnerskaber. (2019). Anbefalinger til regeringen fra Klimapartnerskabet for bygge. Retrieved April 26, 2023, from https://www.ft.dk/samling/20191/almdel/KEF/bilag/393/2229190.pdf

Ritala, P., Bocken, N., & Konietzko, J. (2022). THREE LENSES ON CIRCULAR BUSINESS MODEL INNOVATION. https://doi.org/10.1515/9783110723373-014

Rockström, J., Steffen, W., Noone, K., Persson, Å., Chapin, F. S., Lambin, E. F., Lenton, T. M., Scheffer, M., Folke, C., Schellnhuber, H. J., Nykvist, B., de Wit, C. A., Hughes, T., van der Leeuw, S., Rodhe, H., Sörlin, S., Snyder, P. K., Costanza, R., Svedin, U., ... Foley, J. A. (2009). A safe operating space for humanity [Number: 7263 Publisher: Nature Publishing Group]. *Nature*, *461*(7263), 472–475. https://doi.org/10.1038/461472a

Roskilde Kommune. (n.d.). Musicon. Retrieved May 22, 2023, from https://www.roskilde.dk/da-dk/om-kommunen/udvikling-og-projekter/vi-udvikler-byerne-og-landdistrikterne/musicon/

Ryberg, M. W. (2023). *Linked-in profil* [Last visited: 09.02.23]. https://www.linkedin.com/in/morten-walbech-ryberg-7060b459/?originalSubdomain=dk

Sand, S. (2023a). Interview with Signe Sand.

Sand, S. (2023b). *Linkedin profile* [Last visited: 15.02.23]. https://www.linkedin.com/in/signesand/?locale=da_DK

Scandi Byg A/S. (2023). *Kontakt* [Last visited: 16.02.23]. https://www.scandibyg.dk/kontakt/

Schatzki, T. R., Knorr-Cetina, K. D., & Savigny, E. V. (2001). *The Practice Turn in Contemporary Theory*. Taylor & Francis Group. Retrieved May 27, 2023, from http://ebookcentral.proquest.com/lib/aalborguniv-ebooks/detail.action?docID=235322

Sertyesilisik, B. (2017). A preliminary study on the regenerative construction project management concept for enhancing sustainability performance of the construction industry [Publisher: Taylor & Francis _eprint: https://doi.org/10.1080/15623599.2016.1222665].

International Journal of Construction Management, *17*(4), 293–309. https://doi.org/10.1080/15623599.2016.1222665

Sinding, T. S. (2023). Interview with Thomas Søgaard Sinding (J. Jensen).

Smitha, J. S., & Albert, T. (2021). Integrated Model and Index for Circular Economy in the Built-Environment in the Indian Context [Number: 3]. *Construction Economics and Building*, *21*(3). https://doi.org/10.5130/AJCEB.v21i3.7684

Snyder, H. (2019). Literature review as a research methodology_ An overview and guidelines. https://doi.org/10.1016/j.jbusres.2019.07.039

Social-, Bolig- og Ældreministeriet. (2023). Nye beregningsprincipper skal fremme genbrug i nybyggeri. Retrieved May 29, 2023, from https://sm.dk/nyheder/nyhedsarkiv/2023/maj/nye-beregningsprincipper-skal-fremme-genbrug-i-nybyggeri

Sørensen, A. S. (2023a). Interview with Anders Strange Sørensen (Enemærke & Petersen).

Sørensen, A. S. (2023b). *Linkedin profile* [Last visited: 14.05.23]. https://www.linkedin.com/in/anderssoerensen/?locale=da_DK

Sørensen, D. P. (2023). *Linkedin profile* [Last visited: 24.02.23]. https://www.linkedin.com/in/ditte-perge-457042107/

Stappmanns, F. V. (2022). *Truly Sustainable Business Models Ideal Types for Sustainable Production and Consumption* (Doctoral dissertation). University of St. Gallen.

Syddansk Universitet. (2023). *Forskere* [Last visited: 09.02.23]. https://portal.findresearcher.sdu.dk/da/persons/morb

Talamo, C., Lavagna, M., Monticelli, C., Zanelli, A., & Campioli, A. (2021). Remanufacturing: Strategies to enhance the life extension of short-cycle building products. *TECHNE - Journal of Technology for Architecture and Environment*, 71–78. https://doi.org/10.36253/techne-10591

træ.com. (n.d.). Træ.com. Retrieved May 17, 2023, from https://xn--tr-2ia.com/

twentyfiftyfutures. (2023). *About* [Last visited: 02.05.23]. https://www.twentyfiftyfutures.com/about

UNEP. (n.d.). Major Groups & Stakeholders. Retrieved April 12, 2023, from http://www.unep.org/civil-society-engagement/why-civil-society-matters/major-groups-stakeholders

Upcycling Forum. (n.d.). Nyt bæredygtighedscenter i Horsens bygges med 65% genbrugsmaterialer. Retrieved May 20, 2023, from https://www.upcyclingforum.dk/cases/stablen-genbrugscenter-i-horsens-med-cowi-og-arkitema

VCØB Community. (2022). *Barrierer for cirkulært byggerie* (tech. rep.).

VELUX. (n.d.). Living Places – a new way of thinking about buildings. Retrieved May 25, 2023, from https://buildforlife.velux.com/en/livingplaces?consent=none&ref-original=

Vendena, G. (2023). Interview with Greg Vendena (Byggevirke & Datter).

WeBuild Denmark. (2023). *Mød holdet* [Last visited: 16.02.23]. https://webuilddenmark.dk/nyheder/moed-holdet-christina-grann-myrdal/

WeBuildDenmark. (n.d.). NETVÆRKSGRUPPEN GREEN HUB HOUSE. Retrieved May 19, 2023, from https://webuilddenmark.dk/netvaerksgruppen-green-hub-house/

Woodfiber. (n.d.-a). Samarbejdspartnere. Retrieved May 20, 2023, from https://woodfiber.dk/samarbejdspartnere/

Woodfiber. (n.d.-b). TRÆFIBERISOLERING. Retrieved May 19, 2023, from https://woodfiber.dk/

Woodfiber. (2023). *Om woodfiber* [Last visited: 02.05.23]. https://woodfiber.dk/om-woodfiber/

Zetland. (n.d.). Good Tape. Retrieved May 31, 2023, from https://www.mygoodtape.com/?gclid=Cj0KCQjw4NujBhC5ARIsAF4Iv6d7sKKGc1uKVkW9YXKmdWycMgQpFa_TewaBFd1-280t12RLPcJ7D50aAvaCEALw_wcB

Individual analyses A

A.1 AKF – Experimenting with the scale-up of straw houses

AKF's intentions: AKF is a real-estate company that maintains and develops its buildings, while also working as investors. It is owned by a group of unions (AKF, n.d.; Bruun & Bendtsen, 2023). AKF's overall goal is to *"go all the way back to basic"* by building with breathable materials and learning from older building traditions (Bruun & Bendtsen, 2023). AKF wants to learn and show good examples to the rest of the sector, giving them a role in pushing the agenda to change the current limiting building regulations (Bruun & Bendtsen, 2023).

Front-running activities: The interview with AKF focused on a project seen as front-running having the aim of testing construction elements made of straw in two communal buildings. The project, developed in collaboration with the carpentry and construction company JDH-Byg and the material supplier EcoCocon, is still under construction and is seen as a preliminary exercise to building terraced houses with straw elements incorporated, which is a part of the Realdania and Villum Fonden funded project "Building housing from 4 to 1 planet". Being a part of this '4 to 1 planet', they are financially supported in this learning process, and the learnings are shared with the rest of the construction sector. With this project, AKF has an ambition and expectation to significantly reduce their climate impact from construction, while gaining knowledge and experience on how to construct healthy housing of higher quality than conventional housing (AKF, 2023). The buildings with straw construction elements are the first of its kind professionally build in Denmark. According to Bruun and Bendtsen, 2023, the collaboration between the stakeholders engaged in the project was very strategic with the aim of testing these solutions before scaling up, resulting in a strong trust and engagement in the project. Thus, AKF works with building systems to gain knowledge and experience in implementing straw construction elements in the construction sector.

Reflections on systems building processes: From the analysis of AKF's work with building systems to change current practices, the following points are derived as the result of overcoming a challenge or helping the activity to become successful – influencing their ability to build systems:

Taking the main part of the responsibility in the process by developing their in-house competencies.
Bruun and Bendtsen, 2023 highlighted the first step in the process of their project was to develop their *'in-house'* competencies to ensure internal support. AKF have their own construction managers and architects whereas they collaborate with contractors, material producers and consultancies. Developing *'in-house'* competencies have given AKF, the ability to take the main part of responsibility in building the new system, and overcome the barrier of different stakeholders, especially the consultancies, not being willing to take a risk by challenging the conventional practice. Thus, AKF has acknowledge their own responsibility in building the system around the straw elements.

Using a small consultancy as both architect and contractor, sharing the values and engagement.
Another aspect from the analysis of AKF building new systems was they choose to work with a smaller consultant business than usual who was very interested in their agenda. The require-

ments from the consultant business were that they could be both the designer and builder with straw construction elements. Both due to finical reasons arguing that their usual *big* consultancy would to expense to pay learning working with this new material (Bruun & Bendtsen, 2023). On the other hand, AKF allowed the smaller consultant to have this new role seeing resulting in a benefit because the consultancy has until now been highly engaged throughout the whole process. Bruun and Bendtsen, 2023 highlights that having the same values and engagement in the process is very important in a collaboration pushing a certain agenda in the construction sector.

Experimenting with the solution on a small scale, gathering learnings to scale up.
Bruun and Bendtsen, 2023 emphasised that the small scale and low level of complexity of the project made it easier to keep the number of stakeholders low, thereby decreasing the chance of different expectations and values in a project. However, succeeding with this small-scale project is a key to scale-up the straw-insulated buildings. AKF plan to utilise the gained knowledge, and invite the same stakeholders to be a part of the project. Nevertheless, the experiences gained are also used to convince more stakeholders, both internal and external, *"it can indeed be done"* (Bruun & Bendtsen, 2023).

A.2 J. Jensen, twentyfifty futures, MATTER – re-thinking the value of materials with an online tool (Circle Bank)

Circle Bank's intentions:
The demolishing company J. Jensen, and the advising companies twentyfifty futures and MATTER by Brix are all engaged in the development of the online platform 'Circle Bank', which aims to strengthen the demand for recycled materials with 'Circle Bank' as a decision support system.

Front-running activities:
The interviews all focused on the Circle Bank – the platform consists of a mapping function, with the idea to give an easy overview of the materials placed in the existing building stock, a market tool working as an umbrella platform for other online markets, and integration into AutoCAD/Revit to enable the re-used materials and their data to be integrated into the design phase. Furthermore, the plan is to enable LCA of the construction projects, through the tool. The aim of the project is to support the development of the market for re-used materials, as well as valuing materials in the existing building stock, in order to push for more transformation of buildings rather than building new ones. The project is a part of the 'Grand Solutions' program, funded by the Danish Innovation fund. A wide range of partners, besides the above-mentioned, are engaged, such as architects, knowledge institutions, public and private developers and public authorities. Aside from developing the platform, the focus is also on lobbying, among others in European networks, in order to push the agenda in the sector. Notably, the platform is still under development and currently the focus is funding, to continue the development (Brix, 2023a; Delman, 2023; Sinding, 2023).

All in all, with these businesses' engagement in 'Circle Bank', they work with building systems to influence the value-orientation of materials, both recycling and general usages, in the construction sector focusing on involving stakeholders in the development.

Reflections on systems building processes:
From the analysis of these businesses' work with the project Circle Bank building systems to enable trading with recycled materials in the construction sector, the following aspects are derived as the result of overcoming a challenge or helping the activity to become successful – influencing their ability to build systems:

Balancing between being 100 % value-based and focusing on being commercial
Delman, 2023 emphasis for Circle Bank to become successful, it needs to become a commercial activity. Delman, 2023 and Sinding, 2023 argues aligning the value-orientation with the bigger system of the construction sector, requires a consideration of the economic aspect to reaches the biggest impact and ensures the

larger system – however the system shall still change the value-orientation of materials, both recycling and general usages, where the businesses practices including an economic aspect play a central part in making it happen (Delman, 2023; Sinding, 2023).

Ensuring shared values with collaborative stakeholders

Additionally, to establish this greater system through Circle Bank, Sinding, 2023 argues an important aspect is to ensure shared values with collaborating stakeholders. Circle Bank reach out to create collaborations with, for instance, demolisher, politicians, knowledge institutions and material suppliers, to establish a greater foundation of know-how for Circle Bank. In these collaborations, communication and shared values are key aspects as the current state of Circle Bank requires motivation and engagement to be able to see the future vision. Sinding, 2023 highlights this alignment requires time, however in some collaborations the alignment is never found and the collaboration to not lead to the purpose.

Having strategic collaborations sharing resources and creating changes

Establishing these collaborations is for Circle Bank a vital element to continuing their development and building the greater system. Brix, 2023a argues Circle Bank is systematic and has to include all the different stakeholders from demolishing, politicians and users. Moreover, strategic collaborations provide resources across the different professional groups, for instance from a collaboration with the university, they establish know-how to build their intended system. Furthermore, Circle Bank collaborates with architects, engineers, property developers and contractors as their practices have to change accordingly to the material supply (Brix, 2023a; Sinding, 2023). All in all, 'Circle Bank' having long-term collaborations contributes with resources and know-how across different fields, which Brix, 2023a, Delman, 2023 and Sinding, 2023 emphasis leads to competencies, knowledge and networks are brought together, creating a *"vital"* understanding and support for the project from all aspects of the sector.

The personal motivations and values of the partners in Circle Bank

Another notable aspect identified from the analysis of building systems through Circle Bank, is the personal motivation and values of Sinding, 2023, Delman, 2023 and Brix, 2023a. During the interviews, they all emphasised that they are not invested in the 'Circle Bank' to earn money and create a profit but to create a solution to help the construction sector move in a better direction for society and the planet (Brix, 2023a; Delman, 2023; Sinding, 2023). Nevertheless, the personal motivation and values of the partners in Circle Bank are assessed as an important aspect in helping the project to become successful in building systems as they drive the agenda and have to ensure it is accomplished.

A.3 COWI – Re-thinking the roles of stakeholders

COWI intention's:

COWI is a consultancy, with the strategic aim of integrating sustainability in all that they do. In COWI's new overall strategy, they have chosen to focus on not wanting to work with anything that is dependent on fossil fuels. In addition, Olesen, 2023 emphasised that COWI intend to challenge their customers and partners regarding sustainability – and furthermore working on more transformation and renovation projects within the construction sector (Olesen, 2023).

Front-running activities:

The interview with COWI focused on their development of tools to benefit the whole sector – seen as their front-running activity. In March 2023, COWI released a free tool called 'LCA Collect', as a supplement to the existing free tool 'LCA Byg' developed by AAU Build, with the aim of standardising data-handling all over the sector, making it possible to *"compete on ambition and quality of the actual solutions"* (COWI, n.d.; Olesen, 2023). Further, COWI is working on a tool enabling the mapping of materials in the existing building stock. Despite that, the interview with COWI primarily revolved around the project 'STABLEN', where COWI, in collaboration with Architema, Horsens Municipality and Upcycling Forum, experi-

mented with developing a building made of 65 % recycled materials. The interview focused on the first processes of the project since the project is currently paused due to circumstances such as Covid-19 and political prioritisation, meaning that the materials for the new building are currently put in stock. According to Olesen, 2023, this project exemplifies how collaboration between stakeholders is required, in the process of finding out if a requirement of 65 % recycled materials can be complied.

All in all, COWI aims to build systems for developing tools that can be used in the whole construction sector as well as having experimentation and forms of collaboration in focus when they work on a project like 'STABLEN'.

Reflections on systems building processes: From the analysis of COWI's project building systems to develop tool, experimenting and collaborating towards changing the practices, the following points are derived as the result of overcoming a challenge or helping the activity towards becoming successful – i.e., influencing their ability to build systems

Creating new processes
One specific learning from the project 'STABLEN' is the need for processes including new roles and responsibilities of existing stakeholders, such as the demolisher being also a *"knowledge bank"* and a material supplier. This requires new processes when tearing down a building in terms of mapping materials, finding buyers, carefully separating the construction and defining a price for the service.

Creating a collaboration in the initial phase of developing the project
Based on the project, Olesen, 2023 argues the communication between the property owner, demolisher and COWI as a consultant has been key in defining the ideas and starting the process of realising them. Moreover, having the public authorities onboard to get the dispensations on e.g. fire requirements when during something outside the scope of the current practices has been adding to the success of the project. Finally, Olesen, 2023 stresses the importance of the property owner taking responsibility for setting the strategic direction and ensuring all professional groups are involved in the initial phases.

Having strategic collaborations for more than one project
Additionally, a notable aspect identified from the interview with Olesen, 2023 is an emphasis on gaining knowledge from more than one learning process, meaning both sharing knowledge during the project and also for more than one project with the same collaborations. Thus, the transfer of knowledge is, according to Olesen, 2023, easier and the innovation process is strengthened.

A.4 Enemærke & Petersen – Prioritising innovation and long term collaboration

Enemærke & Petersen's intentions: Enemærke & Petersen see themselves as the leading contractor in terms of renovation in Denmark. A main focus for them is collaboration, furthermore developing and *"implementing skilled crafts that creates remarkable results"* (Enemærke & Petersen, n.d.; A. S. Sørensen, 2023a).

Front-running activities:
In the interview with Enemærke & Petersen, it was highlighted that they focus on collaboration and conflict management, e.g. by forming strategic partnerships – long-term collaborations with property owners such as Copenhagen Municipality over more than 50 projects. In addition, they invest in development and innovation. This is seen in their prioritisation of time searching for funding and hiring industrial PhDs, with a long-term perspective that stands in contrast to the short-term perspective of construction projects, and participating in advisory boards and projects focusing on lowering the risks of using reused materials and developing processes of *"gentle demolishing"*. Finally, they have invested in 'Genbyg', an online platform for re-used materials similar to GreenDozer as a part of this project (A. S. Sørensen, 2023a). One specific construction project highlighted in the

interview was the project 'LEVEsteder', where Enemærke & Petersen have contributed in collaboration with Effect Architects, the consultancies MOE and the product company Velux Gruppen. The project focuses on finding solutions to lower the CO_2 emissions per m^2 per year from a lifecycle perspective and improving the indoor climate (A. S. Sørensen, 2023a; VELUX, n.d.). All in all, Enemærke & Petersen work to systems build by developing new ways of forming partnerships and engaging in innovation processes.

Reflections on systems building processes:
From the analysis of Enemærke & Petersen's activities with building systems to change current practices in building processes, the following points are derived as the result of overcoming a challenge or helping the activity to become successful – influencing their ability to build systems:

Having a focus on conflict management starting with their role – related to strategic partnerships
Forming strategic partnerships has enabled better communication about risks and rights. More specifically these long-term partnerships result in going from being *"rights-based to the trust-based to the interest-based".*

It is important for them to be invited early into the process
A further aspect of strategic partnerships is the possibility to engage in early dialogue. As a turnkey contractor, Enemærke & Petersens argues for their responsibility in inviting specialised contractors to early dialogue, in order to *"get those rings in the water"* (A. S. Sørensen, 2023a). A. S. Sørensen, 2023a emphasised that cooperation and partnerships must be created to make it easier and thus also develop better solutions.

Being more open and interest-based creates more prominent changes
Their interest-based approach has led to them being invited to work on projects such as 'LEVEsteder'. Here, the early dialogue in collaboration was practised, and in combination with the interest-based approach, it strengthened the focus on finding smart and realisable solutions, instead of only focusing on productivity and economic optimisation (A. S. Sørensen, 2023a).

A.5 GreenDozer – Scaling up the market for re-used materials

GreenDozer's intentions:
GreenDozer is the name of an online platform to connect suppliers of reused and leftover materials with users. The overall aim and goal of GreenDozer is to fight waste and scrap. In contrast to Upcycling Forum offering counselling, the focus of GreenDozer is primarily to build up a market platform, that can scale up the trade with re-used materials. GreenDozer is trying to set up some strategic collaborations that can remove some of the barriers to working with recycled materials (Bording, 2023a).

Front-running activities:
One activity supporting this is a partnership with Brabrand Boligforening, helping to ensure that the materials from torn-down apartment blocks in Gellerup are preserved and will be available for purchase by construction companies and private individuals. This includes amongst others the 20.000 square metres of 50-year-old wooden flooring, that will be recycled and resold for the construction of the high-rise wooden building 'TRÆ' in Aarhus (Lendager, n.d.; træ.com, n.d.). By engaging in this process, GreenDozer wishes to develop knowledge and experience in reusing materials from one construction project to another. Through these experimenting processes, Greendozer aims to show possible processes with recycled materials leading to more stable processes of trading with recycled materials (Bording, 2023a). Previously, a barrier has been insurance companies not wanting to insure recycled materials. GreenDozer has focused on overcoming this by partnering with Willis an insurance company, which in collaboration with GreenDozer, has created an insurance policy for recycled materials. Therefore, stakeholders have the opportunity to minimise the risks (Bording, 2023a) – leading to a greater incentive uptake of recycled

materials in new projects. All in all, GreenDozer works with building systems to gain knowledge to enable processes of trading with recycled materials in the construction sector.

Reflections on systems building processes:
From the analysis of GreenDozer's work with building systems to enable trading with recycled materials in the construction sector, the following points are derived as the result of overcoming a challenge or helping the activity to become successful – influencing their ability to build systems:

Experimenting and learning to enable future systems
A central aspect of GreenDozer's practices is the idea of showing a successful process helping them enable future processes trading with recycled materials. Bording, 2023a argues the experimenting and learning processes help to create know-how overcoming the challenge of the uncertainty of stakeholders in the decision-making processes like property owners, architects and consultants.

Creating strategic collaborations
Additionally, the focus on creating strategic collaborations with central stakeholders influencing the process of trading with recycled materials is deemed relevant. Bording, 2023a highlights GreenDozer have generally experienced difficulty in reselling recycled materials, because of stakeholder fearing liability. By collaborating with Willis the liability is reduced. Furthermore, GreenDozer has planned the process from demolishing to reuse, which ensures a shared goal throughout the process, however, it has not occurred yet.

A.6 Himmerland Boligforening – Gaining experience on using screw-foundations in construction projects

Himmerland Boligforening's intentions:
Himmerland Boligforening is a public housing association meaning their financial framework is defined by Aalborg Municipality influencing their possibilities regarding construction – i.e. the money they have available to build. Himmerland Boligforening is a property owner working with various framework agreements with, for example, consultants and architects, which means that their projects are in a tendering round for selected companies in the framework agreement (Knudsen, 2023). Himmerland Boligforening intends to be a public housing association having sustainable – and high-quality buildings (Knudsen, 2023).

Front-running activities:
The activity focused on in the interview with Himmerland Boligforening was the development of 'Green Hub House'. Green Hub House will be constructed over the next 12 years with 40-50 homes in the eastern part of Aalborg. The project will be developed in collaboration with the architects: C.F Møller and the consultants: Niras as they were chosen from the current framework agreement as well as Aalborg University (Knudsen, 2023). The aim of Green Hub House is to try to identify and exploit opportunities through among others, reducing the need for living space and use of building materials and construction methods with low climate impact. The Green Hub House is, like the previously presented case of AKF, a part of the funded project "Building housing from 4 to 1 planet", receiving finical support in this learning process, thus the learnings are shared with the rest of the construction sector.

One particular part of the project highlighted in the interview was the planned experimenting with using screw foundations in residential buildings up to five storeys high, and also the intentions of starting partnerships that can develop different solutions to get below the target of 2.5 CO_2 emissions per m^2 per year (Dagens Byggeri, 2023; Knudsen, 2023). Currently, Himmerland Boligforening and Aalborg University have formed a networking group with support from WeBuild Denmark and Green Hub Denmark (WeBuildDenmark, n.d.). The purpose of this network is to create a collection of developers, consultants, contractors, researchers and others who want to develop a manifesto that can set the framework for concrete recommendations for the future of climate-friendly multi-storey housing in Aalborg (WeBuildDenmark,

n.d.). All in all, Himmerland Boligforening is in the initial phase of building a system around Green Hub House, nevertheless with the intention it will create learnings about new practices through collaborations with other stakeholders sharing the same vision.

Reflections on systems building processes:
From the analysis of Himmerland Boligforening's initial work with building systems, the following aspects are derived as the result of overcoming a challenge or helping the activity to become successful – influencing their ability to build systems.

Having a financial framework allows for innovation and experimentation to build new systems.
According to Knudsen, 2023, the financial framework defined by the municipality has a significant impact on Himmerland Boligforening's innovation processes concerning changing their own current practices. Being part of the '4 to 1 planet' has given them financial support to start innovating on their own practices towards evolving a system of others, however, this is in the initial phase.

Developing partnerships because network, know-how and financial support are key tools in trying new things.
For an organisation such as Himmerland Boligforening to do new things, like Green Hub House, it is a central aspect for them to develop partnerships helping them overcome barriers of lack of know-how about screw foundations and financial support. Himmerland Boligforening being in the early phase, developing the partnership with '4 to 1 planet' and Aalborg University have started the journey of building systems around developing Green Hub House.

A.7 Lendager Architects – Reusing materials in new constructions and pushing the limits for re-use

Lendager's intention:
Lendager is an architectural company. Besides designing buildings, they offer advising on circular processes through 'Lendager Circular Advising'. The re-used material supplier 'a:gain' has also derived from the activities of Lendager and is still influencing the work of Lendager. Kiesslinger, 2023 argues that Lendager is a front-runner in the construction sector in terms of their work with *"up-front circularity"* when constructing with re-used materials. Lendager wants to contribute to reducing the use of materials and the climate impact of the construction sector (Kiesslinger, 2023).

Front-running activities:
The primary activity highlighted in the interview with Lendager was the construction of 'Svanen', a kindergarten built of materials from an old school that was torn down. The project focused on circular environmentally friendly construction, and was also given the Danish ecolabel 'Svanemærket'. The reuse of materials from the old school in the new project required close collaboration between the two 'tracks': The demolition and the construction, being an alternative to the conventional linear life cycle process of a construction project. It required close collaboration between Lendager, the consultancy; NIRAS, and the demolisher; Tscherning to ensure the demolishing process was integrated into the tendering round of the construction project. The collaboration lead to adequate tender documents describing with pictures small details of when materials should be used in the construction project (Kiesslinger, 2023). When re-using the materials after mapping the environmentally dangerous substances, a main argumentation was the materials could have an extra life cycle, before being handled properly in consideration of the environment. Close collaboration with Miljømærkning Danmark and the municipal authority (Gladsaxe Kommune) was highlighted as necessary for this part of the project, in order to make it possible to reuse, the materials were tested positive for heavy metals and still obtain the 'Svanemærket' ecolabel. Without early dialogue with Miljømærkning Danmark, making a strategy for use and further testing of the materials, Kiesslinger, 2023 argued that the process would be too risky for the turnkey contractor, resulting in a higher price not making it realistic to use re-used materials. All in all, Lendager is with 'Svanen' trying

to build systems in the construction sector to challenge the current building processes focusing on enabling the use of re-use materials by rethinking the expectations of the process and communication between stakeholders, and likewise the existing regulations making it difficult to re-use materials containing heavy metals.

Reflections on systems building processes: From the analysis of Lendagers project with building systems to ensure the reuse of materials in 'Svanen', the following points are derived as the result of overcoming a challenge or helping the activity towards becoming successful – i.e., influencing their ability to build systems:

Early dialogue to find new solutions
To handle the risks in the process of developing 'Svanen', the early dialogue was emphasised as important, making it possible to take a stand on the different materials, whats what was needed in terms of testing and how and who could take the responsibility. According to Kiesslinger, 2023, this is *"above all, a question of will"*. The early dialogue ensured, that Gladsaxe Kommune had in-depth tendering material containing inputs across different professional groups providing a realistic process and transparency in the demands of the building process.

Creating a shared strategic direction between stakeholders
Kiesslinger, 2023 highlighted the early dialogue can be supported with a sustainability strategy developed from the beginning, but to function it requires a willingness from all stakeholders and some kind of *"safety mechanisms"* in order to secure it is priorities throughout all phases of the project (Kiesslinger, 2023). The property owner has a leading role in ensuring this willingness (Kiesslinger, 2023). With willingness from the involved stakeholders, this can function as a platform ensuring learning processes and achieving knowledge to set realistic goals for the project.

Desire and willingness of stakeholders to participate in new processes are also a big part of being able to work in different ways
The municipality being *"visionary and ambitious"*, and willing to test new ways of approaching the process was highlighted by Kiesslinger, 2023 as a parameter leading to the success of 'Svanen'. Similarly, the demolisher has also functioned as both a contributor with know-how and a material supplier for the construction project.

All in all, Kiesslinger, 2023 sees collaboration and shared learning processes as very important, since setting up requirements without understanding other stakeholders' processes is not helping anything further. However, a challenge occurs when the stakeholders *"don't dare to share knowledge with others"*, when seeing knowledge as something that can be owned.

A.8 Roskilde Municipality – Taking responsibility as a public role-model

Roskilde Municipality's intentions: The Municipality of Roskilde is emphasised by several, as one of the municipalities in Denmark that are working hard to develop the construction sector in a more sustainable direction (Andersen, 2023; Bejder, 2023; Bro, 2023a; Myrdal, 2023). Roskilde Municipality has the role of the property owner when constructing and renovating public buildings. Being a front-runner is directly *"written into the strategy"* and reducing CO_2 emissions below the legislative standards is defined as a political goal (Kellerman, 2023). Instead of only *"browsing through the regulations"* making sure they complied, Roskilde Municipality has started to engage in producing laws on a national and European level. Internally, the municipality has worked with organising an open forum for sustainability, an *"incubator for new solutions in the municipality"*, given the shared awareness of the political goal (Kellerman, 2023).

Front-running activities
In Roskilde Municipality, an area characterised by former industrial buildings called 'Musicon' is under transformation. The Musicon area is now known as, among other things, a sustainable, creative and artsy neighbourhood allowing for

experimentation (Bro, 2023a; Kellerman, 2023; Roskilde Kommune, n.d.). Two specific projects were highlighted as activities by the municipality, related to this transformation. The first was the construction of a parking house 'Indfaldet' designed with the principles of *design for disassembly* and with the potential to transform into a youth residence. The project is a part of the European project 'CityLopps' (Mangor & Nagel A/S, n.d.). A specific focus was to identify potential risks in the early stages of the project, related to constructing a building on a former industrial area. Another project highlighted was the transformation of the skate hall 'Hal 12' focusing on following waste hierarchy. This entailed early engaging the users of the skate hall to rethink their needs – in order to simplify the transformation, not requiring unnecessary resources (Kellerman, 2023). Kellerman, 2023 emphasised that it is important to be willing to be part of the process from the start as a property owner. This means, for example, not letting it up to the consultancy firms to engage in dialogue and communicate with the turnkey contractor, but seeing dialogues as an important part of the task as a project owner (Kellerman, 2023). All in all, the municipality works to systems build by changing the views on processes and roles of stakeholders.

Reflections on systems building processes: From the analysis of Roskilde Municipalities' work with building systems to enable new understandings of processes and views on roles in the construction sector, the following points are derived as the result of overcoming a challenge or helping the activities to become successful – influencing their ability to build systems:

The importance of early dialogue between all actors involved in the project. Inviting users of the 'Hal 12' project and turnkey contractor from 'Indfaldet' into dialogue early in the process was highlighted as playing a key role in the development of the projects. In contrast to AKF, the degree of *"in-house"* competencies is lower, and Kellerman, 2023 argues for this being a reason for the municipality to focus on wide collaborations, opening up for other inputs from other professions.

The importance of taking responsibility as a property owner The municipality's role as a public property owner and developer, was emphasised as a key factor for their front-running activities, resulting in them taking responsibility for taking more risks than a commercial developer would do (Kellerman, 2023). It can be argued, that being a property owner taking responsibility for dialogue and seeing all inputs as relevant, removes some of the hierarchies between stakeholders.

Political prioritisation. According to Kellerman, 2023, the municipalities' approach to testing new methods and forms of collaboration, and thereby building foundations for partnership, is the result of political prioritisation, supporting the municipality's room for manoeuvre. Additionally, he argues that the results of this - their projects and ways of carrying out collaborating - are what invite them to the table in contributing to legislative discussions. The political prioritisation thereby opens up for the municipality to engage even stronger in systems building.

A.9 Upcycling Forum – Advising and connecting producers and users of re-used materials

Upcycling Forum intentions:
Upcycling Forums platform aims to create a digital tool to upcycle materials, being both a bank of materials in existing buildings and of upcycled materials that are in stock and for sale. In connection with the platform, they offer counselling on the use of upcycled materials, focusing, among other things, on making CO_2 calculations showing the savings from the use of these materials (Falkenberg, 2023a).

Front-running activities:
The interview with Upcycling Forum focused on their platform and services with the aim of creating the development of new processes in the construction life cycle, defined as the 'materials before pen' strategy, where the design of the building takes a point of departure in the material bank. The 'materials before pen' strategy was developed in the project 'STABLEN'. When working with recycled materials, there

are several aspects that need to be taken into account. Being a partner in the project 'STABLEN', the 'material before pen' strategy was challenged when realising first of all the materials in larger quantities have not been easily accessible, and secondly that some of the materials were not of the quality expected when they arrived. Therefore, it was emphasised that the materials have to be assembled in advance in order for the architects to know what to build with – but also to let the architects be part of the initial process so there is the possibility to fulfil the 'materials before pen' principle and create the questioned involvement (Falkenberg, 2023a; Upcycling Forum, n.d.). On the other hand, it can also be argued that the design phase has to be more flexible, to be able to handle a variation of materials, in order to succeed with the strategy, which according to Falkenberg, 2023a requires an early dialogue between the project owner and the consultants (both architects and engineers). Moreover, Falkenberg, 2023a emphasises that the main challenge for the construction sector is having a project mindset – only focusing on one project at a time. Falkenberg, 2023a highlights that to enable more upcycled materials, Upcycling Forum advocates for thinking more than one project ahead and being aware of how the materials can be used the next time. All in all, Upcycling Forum wants to build new systems enabling the use of upcycled materials by changing the mindset and influencing the current processes in the construction sector.

Reflections on systems building processes: From the analysis of Upcycling Forum activities building systems focusing on creating new processes and mindset of upcycled materials, the following points are derived as the result of overcoming a challenge or helping the activity towards becoming successful – i.e., influencing their ability to build systems:

Having a strategic framework to guide actions, like the 'materials before pen'-strategy The analysis of Upcycling Forum's activities emphasises the aspect of having a strategic framework guiding the actions as an essential element in building new systems. The framework aligns the expectations of stakeholders to the process and creates awareness of the scope.

Removing risks by having an early dialogue between stakeholders Falkenberg, 2023a highlights an important aspect identified from their learning processes has been the importance of early dialogue with stakeholders – especially the property owner and consultants – there is a need for the property owner to clarify the ambition level and the risk they are willing to take with reused materials. Moreover, the early dialogue needs to focus on which materials are available to define the scope of the project leading to a need to establish a more extensive database of recycled materials. The database can provide knowledge of which materials is available to minimise the risk of not having any available materials (Falkenberg, 2023a). All in all, the early dialogue has initiated a collaboration leading to a shared goal of the process and a certain flexibility in the design phase according to the quantities and qualities of materials.

A.10 Vandkunsten – Only working on projects that have the 'right' aim

Vandkunsten's intentions:
'Vandkunsten' is an architectural company. Kauschen, 2023 emphasised one of the main goals of Vandkunsten is challenging the size and sharing potential of dwellings, which is related to their principal rule of never designing individual dwellings. Vandkunsten intends to help ensure greater community development in construction, such as co-housing, housing communities and student housing (Kauschen, 2023). Vandkunsten intends to mainly work on projects supporting the same value-orientation.

Front-running activities:
The interview with Vandkunsten focused on various projects, seen as front-running – especially wooden-based projects. Similar to these projects, that they are developed in collaboration with property owners that intend to keep the buildings. One project example mentioned as being the first dwellings covered with untreated wood – a case to show the politi-

cians that *"it can actually be done"* (Kauschen, 2023). Another one was the ongoing project constructed out of wooden modules from ScandiByg with Home.Earth as the developer, with a goal of lowering the CO_2 emissions to 6 kg per m^2 per year. The project is called 'Nærheden' and comprises 158 homes and almost 1.500 square metres of commercial space in Hedehusene (Dansk Byudvikling, 2023). In this project, they emphasised the focus on challenging the 'typical phase model', in order to fully succeed in keeping the emissions from the designed construction as low as possible, and also within the building regulations. Challenging the phase model entails gaining a more detailed level of information from the beginning of the design phase (Kauschen, 2023). In this connection, Kauschen, 2023 highlighted, through these projects a focus for Vandkunsten is to test and develop tools enhancing the procedural producers in the building projects. For instance, they developed a piece of software to add descriptions in Revit-models, a drawing program, thus a discussion proposal of the project, drawings and technical information about quantities of materials is included from the beginning of the project phase. Usually, a discussion proposal of the project is the first phase, followed by drawings and lastly the technical information is added in the end (Kauschen, 2023). Kauschen, 2023 emphasises that one way they can continue as architects to, for instance, lower the climate impact is by adding a higher information flow from the beginning, which the software can help achieve. In addition, Kauschen, 2023 adds the early in-depth information flows enabling better collaboration and early dialogue developing the projects across professional groups – all competencies can come into play. Moreover, another noteably aspect of Vandkunsten's projects identified in the interview, is they do not work with sustainability as a separate department. In the company, they are all responsible for incorporating sustainability into their projects and thus making it a fundamental part of their business without having to write it down in a manifesto – thus avoiding it is *"forgotten in a corner"* (Kauschen, 2023). All in all, Vandkunsten focus on building systems focusing on their own role in building processes and thinking about their own responsibility. By delivering a high information flow at the beginning of a building process, they enable the opportunity to build a system across competencies utilizing knowledge and creating room for innovation processes.

Reflections on systems building processes: From the analysis of Vandkunsten's work with building systems to change current practices in building processes, the following points are derived as the result of overcoming a challenge or helping the activity to become successful – influencing their ability to build systems:

Working on projects with a long-term property owner supporting their value-orientation of dwellings

A notable aspect of the practices of Vandkunsten is the type of property owner that is very important. For example, there is Home.Earth and pension funds build for themselves – that is, they build buildings that are not intended to sell but to rent out. Kauschen, 2023 emphasises that these property owners have a completely different interest in robustness and quality than the property owners who want to make a profit from the buildings through sales. The difference lies in the fact that the long-term property owners often have to maintain their buildings themselves, and thus see a point in having good quality from the start, which can save them money in the long run (Kauschen, 2023). Furthermore, it influences the engagement of the property owner and allows the room for Vandkunsten to have room to innovate.

Creating high information flows from the beginning to involve the different professional groups in the building process in the initial phase

Another notable aspect is how Vandkunsten as architects focuses on creating a high information flow in the initial phases of the project to build a system enabling all the different competencies from the different involved professional groups. Kauschen, 2023 argues this practice creates an innovation potential and misunderstandings and disagreements may be avoided. (Kauschen, 2023). Vandkunsten has generally learned that a lot of money can be saved if there is early dialogue across the actors from the start of a project. This means that the focus should be on finding excellent solutions together, rather than discussing responsibility between partners (Kauschen, 2023).

Experimenting and testing tools in building processes
Lastly, the practices of Vandkunsten also emphasise the importance of experimenting and testing to evolve on the current practices allowing to reach for instance shared goals of lower climate impacts. By spreading the responsibility among all employees, they are encouraged to have an *"innate curiosity"* and be experimental in incorporating and developing sustainability in all their projects (Kauschen, 2023). Notably, Vandkunsten recognises their own role in experimenting with the processes in their field resulting in concrete tools to enhance their own practice in bigger building systems.

A.11 Woodfiber – Documenting the use of biogenic materials

Woodfiber's intentions:
Woodfiber is a material manufacturer mainly selling wood fibre insulation, but also other products under the wood fibre category. The purpose of Woodfiber is to bring healthier biogenic materials back into construction and *"thus contribute to the climate"* (Andreasen, 2023; Woodfiber, n.d.-b).

Front-running activities:
In the interview with Woodfiber, different activities were highlighted, all primarily revolved around increasing the demand for their products and making the construction sector turn to biogenic materials. To enable this, they focus on creating documentation on their products in collaboration with the architects; Nikolava Årsøe and the property owner; Boligselskabet Sjælland, especially when it comes to fire safety and indoor climate. This can be seen as a way to create new understandings of what is possible – thus a main activity of Woodfiber is communicating their products as the barrier of 'documentation' or rather 'fire safety' stands in the way of the use of the materials. Amongst other things, in connection with their products, they have developed a building system in the form of raw houses that makes it more straightforward to communicate how to work with their products. If the building system is used, specific methods are included and if the specific methods are followed, a system guarantee is given by Woodfiber. By developing building systems with a building guarantee, Woodfiber has tried to overcome the barriers of lack of knowledge about the products and the risk and uncertainties of working with new products. The building system is based on the knowledge that Woodfiber itself has helped to develop, among other things regarding fire requirements. In continuation, Woodfiber has tried to spread knowledge about its products. Andreasen, 2023 explains that there is a mindset in the construction sector that it is more difficult and expensive to use biogenic products than those used in the conventional sector. Efforts are being made to make their products more integrated into the general construction sector. In addition to its building systems, Woodfiber collaborates with various companies in Denmark (Woodfiber, n.d.-a). They do this to make their products and thus knowledge about their products more accessible. Therefore, work is also being done to create sufficient documentation to enable them to fulfil the legal requirements, such as fire requirements, thus the uncertainty regarding this can be removed. In addition, Woodfiber has also worked on becoming a part of various element factories, but the existing element factories do not seem to be interested in cooperating with Woodfiber – therefore, Woodfiber tries to create their own element factory with their own products. Finally, it is also on Woodfiber's agenda to try to create cooperation with HedeDanmark, so the wood from their forests can be used for building products instead of being burned. (Andreasen, 2023). All in all, the activities of Woodfiber show their practices are mainly focused on building a new system around biogenic materials by documenting and scaling up to change the current practice of what is seen as possible.

Reflections on systems building processes:
From the analysis of Woodfiber's work with building systems to change current practices around biogenic materials, the following points are derived as the result of overcoming a challenge or helping the activity towards becoming successful – i.e., influencing their ability to build systems:

Collaborating with other stakeholders having the same agenda while to some extent adjusting to the current scope of the construction sector
A notable aspect is Andreasen, 2023 argued collaborations with stakeholders sharing the same agenda are necessary to achieve changes in the current practices of the construction sector. It demands more energy working with stakeholders who mainly *"wants to do what they did yesterday"*. However, Andreasen, 2023 emphasis, he finds that these collaborations to some extent have to adjust, to the

scope of the current construction sector. For example, Andreasen, 2023 believes if they shall succeed with their agenda of changing the practices towards biogenic materials, it has to be able, as a minimum to keep the same building speed.

Creating a building system with a guarantee, so the feeling of uncertainties and risk is removed from other stakeholders in the system

Additionally, Andreasen, 2023 highlighted stakeholders' lack of know-how and uncertainties in the process of building with Woodfibers materials as a challenge. To overcome this, they have built a system of knowledge around the projects to enhance the interactions with the stakeholders. This has eliminated confusion around the use of the materials in their systems.

Interviewguides B

B.1 Example of interviewguide (state-of-the art)

The starting point for the various initial interviews has followed the interview guide below. There are, of course, different modifications for the different organisations, individuals and companies. The presented interview guide was prepared in connection with the interview with Rådet for Bæredygtigt Byggeri.

SPØRGSMÅL TIL RÅDET FOR BÆREDYGTIGT BYGGERI

Indledende snak:

- Hvem er vi...
- Konteksten for snakken: Vi vil i vores speciale gerne arbejde med doughnut økonomien, som er den her forståelse af at alle aktiviteter i samfundet skal holde sig inden for de planetære grænser - altså et bredere perspektiv end at begrænse CO_2 udledninger. Vi er interesserede i virksomhedernes rolle, og regenerative forretningsmodeller. Hvor målet for en virksomhed er at bidrage positivt til miljøet og samfundet. Vores fokus er byggebranchen. Vi vil gerne blive klogere på udfordringerne og mulighederne for absolut bæredygtighed og regenerativitet i byggebranchen.
- Må vi optage?

Præsentation af interviewperson:

- Kan du kort præsentere dig selv og Rådet for bæredygtig byggeri's arbejde?

Selve spørgsmålene:

- Hvad er det nuværende fokus inden for udvikling af en bæredygtig byggebranchen?
- Hvad forstår du ved regenerativitet i byggebranchen?
- Kan du fortælle mere om DGNB Planet?
  - Hvad har ledt op til udviklingen af denne certificering?
  - Hvad kan denne certificering bidrage til?
  - Hvad er fremtidsperspektivet?

- Hvilke barrierer og udfordringer for at blive regenerativ møder byggeriet og dets aktører i dag?
- Hvilke muligheder og potentialer ser du?
- Hvilken rolle har forskellige aktører i omstillingen af byggebranchen?
- Hvad skal der til for at påvirke aktørerne?
- Betydningen af EU taxonomien for fremtidens byggeri?
- Minimere mængden af at bygge nyt, renovere mere - arbejder I med det?
- CE - arbejder I med det?
- Fremtiden?

Afsluttende:

- Er der noget vi ikke har spurgt ind til som du ser som relevant?
- Hvis det er tid: Kender du nogle, vi kan kontakte om emnet?
- Tak for at tage dig tid. Må vi eventuelt kontakte dig senere, når vi er blevet endnu klogere?

B.2 Example of interviewguide (analysis)

Intro

- Kort introduktion: *Vi læser miljøledelse og bæredygtighed på Aalborg Universitet. Vi skriver speciale om omstillingen til den regenerative byggebranche. Vores fokus nu er at tilegne os viden gennem dem, som prøver at gøre det anderledes (frontløber) ift. at forstå hvilke udfordringer og muligheder virksomhederne møder. Vi fokuserer særligt på samarbejde i disse "frontløber" aktiviteter - aktiviteter, som adskiller sig fra "den konventionelle praksis". Fokus på at gå fra det konventionelle til det regenerative (vis figur i Miro). Vi har kortlagt nogle barrierer, og vil gerne forstå, hvordan man kan arbejde med at overkomme dem*

- Må vi optage?

- Præsentation af miro board: *Vi har forsøgt at gøre dette interview lidt inddragende, så du skal forestille dig at vi sidder foran en stor whiteboard tavle som vi sammen kan udfylde. I løbet af samtalen vil vi skrive posts, og I har mulighed for at flytte dem rundt. I må endelig kommentere, og rette os. Du kan også skrive posts, og er meget velkommen til at tilføje. I kan også overlade det til os.*

Forstå virksomhedens arbejde og front-løber aktiviteter

- Hvilken rolle ser I jer selv som virksomhed have i byggebranchen?
  - Ser I jer selv som frontløbere i omstillingen af byggebranchen?

- Kan du nævne 2-3 eksperimentelle projekter eller aktiviteter I arbejder med, der understøtter jeres rolle som frontløber? *(forklar gerne at det ikke behøves at være stabile aktiviteter, men noget de har gjort som virksomhed i forsøget på at gøre noget anderledes, der har en påvirkning på omstillingen af byggebranchen)*

- Hvilke værdier ønsker I at skabe med disse projekter?

Samarbejde i relation til aktiviteterne

- Hvilke aktører (virksomheder, myndigheder, organisationer...) har betydning for, at I gennem jeres projekter kan skabe den ønskede værdi?
  - Hvordan påvirker i dem samarbejde mod jeres mål?

- Hvilken betydning har dette samarbejde? Hvad resulterer det i?
  - For virksomheden

  - For byggebranchen

- Hvilke udfordringer og muligheder oplever I med samarbejdet omkring at opnå det I gerne vil med frontløber-projekterne?

  - For virksomheden
  - For byggebranchen

- Hvorfor prioriterer I dette samarbejde som virksomhed?

  - Hvorfor samarbejder I ikke med andre aktører?

- I forhold til at samarbejde med andre aktører, hvad ville I gerne gøre mere af, hvis I kunne? Hvad står i vejen for dette?

At etablere samarbejde

- Hvordan er jeres samarbejder blevet etableret?

  - Har I et fælles værdigrundlag?
  - Hvilken betydning har dette for jeres samarbejde?

- Har I skulle ændre noget i jeres arbejde/virksomhed/tilgang til jeres opgave for at få samarbejdet til at fungere?

- Hvordan skal byggebranchen ændres for at understøtte jeres virksomheds frontløber aktiviteter?

Fremtiden

- Vi er nået til år 2050, og du kigger tilbage på de sidste 30 år.

  - Hvordan har den regenerative byggebranche udviklet sig?
  - Hvad har I gjort mere af, for at bidrage til den udvikling?

Afsluttende spørgsmål

- Er der noget vi ikke har spurgt ind til, som du ser som relevant?

- Har du forslag til andre aktører som kunne være relevante at tale med?