THE CIRCULAR INFLUENCER

A research into the impact of incentives in the circular strategic decision-making processes within project management stakeholders

Nina Annefleur Verschoor

‘’Circulaire economie vraagt een daadwerkelijk echte toepassing van circulaire economie. En dit vraagt naar een gedragsverandering en die gedragsverandering komt niet op het moment dat men blijft zeggen:

‘’Ja, Ik wil gewoon alles kunnen blijven doen en realiseren, zoals we dat nu ook al doen (op het gebied van architectuur, comfort, planning, kosten en functionaliteit), alleen dan op een circulaire manier.
Dat is gewoon vragen naar een soort magie.’’

Interviewee case A I Circular Advisor

Delft University of Technology

Master of Science in Architecture, Urbanism and Building Sciences

•

The Circular Influencer

•

Nina Annefleur Verschoor I June, 2023

MSc Graduation thesis

Nina Annefleur Verschoor
4556585

Institution Delft University of Technology
Faculty Architecture and the Built Environment
Track Management in the Built Environment

Theme Circular and adaptable property and real estate development

Mentors Prof.dr.ir. J.W.F. (Hans) Wamelink
Dr. H.T. (Hilde) Remøy
Company Marc Hopman I Turner & Townsend

Organization Turner & Townsend

PREFACE

It is with great pleasure that I present this master thesis, *"The Circular Influencer"*, as a culmination of my masters in the Management in the Built Environment program at Delft University of Technology. This thesis represents the culmination of months of dedicated research, analysis, and exploration in the fields of real estate project management, behavioral change, incentives, and the circular economy.

From an early stage in my life, I was deeply fascinated by the profound influence that buildings have on individuals and communities. This initial fascination sparked an enduring curiosity that propelled me towards a profound interest in architecture and the built environment. However, during the bachelors I realized that pursuing a career as an architect did not align with my true aspirations. Towards the end of my bachelor's degree, I embarked on a journey of self-discovery and exploration, leading me to recognize that my true passion lies within the realm of real estate management, consultancy, and creative problem-solving thinking.

Throughout the course of my master's studies, my awareness grew regarding the urgent need to integrate sustainable practices and circular principles into the field of real estate project management. Recognizing the pressing environmental challenges we face today, I became deeply committed to examining how behavioral change can facilitate the adoption and implementation of these principles within the built environment.

At first, I would like to express my gratitude to my supervisors, Hans Wamelink and Hilde Remoy, for their invaluable guidance, insightful feedback, support, and enthusiasm throughout the research process. Their expertise and dedication have played a significant role in shaping the direction and quality of this thesis.

Also, I would also like to express my sincere appreciation to Turner & Townsend, the company where I completed my graduation internship, and particularly to Marc Hopman. The engaging in stimulating discussions and sparring sessions has provided me with practical insights and a real-world perspective, enriching my understanding of the implications of my research.

Not to forget, my full appreciation goes to all the professionals who graciously dedicated their time to participate in the interviews conducted for this research. Their willingness to share their expertise and insights has been invaluable in shaping the findings and enriching the depth of this study.

To my roommates, friends, and my master friends, I am profoundly grateful for your unwavering support, encouragement, and camaraderie. This presence has made this academic journey an enjoyable and memorable experience. The countless hours spent discussing ideas, sharing insights, and providing emotional support have been instrumental in shaping this thesis.

Last but certainly not least, I want to extend my deepest appreciation towards my parents for their unwavering belief in me, their continuous encouragement, and their unwavering support throughout my entire academic journey.

Enjoy reading.

Nina Annefleur Verschoor
June 2023

ABSTRACT

The increasing significance of the circular economy in the real estate construction industry is driven by evolving environmental, social, political, and economic factors. While there is increasing pressure for a national transition to a circular building economy, the sector continues to confront numerous challenges, risks, and uncertainties. To promote pro-circular decision-making among project management stakeholders, this research investigates how incentives need to be implemented in order to be an effective strategy to encourage project management stakeholders in making pro circular project decisions.

During the research an overall research strategy, the systemic design toolkit, has been used. This method integrates systems thinking with a human-centered, multi-stakeholder focus, by addressing the intricate social, economic, and environmental aspects of the issue at hand. The study comprises two sections: a theoretical segment employing quantitative research and an empirical segment employing qualitative research.

The theoretical phase explores the interorganizational dynamics that influence circular decision-making, delves into the roles and perspectives of project management stakeholders, and examines the concept of incentives. The empirical phase starts with semi-structured interviews to gain insights into the behavior, intentions, interrelationships, interests, and influence of relevant actors involved in decision-making processes. Subsequently, unstructured brainstorming and validation interviews are conducted to identify and develop effective incentives within the financial, social, and moral clusters.

The research findings proves that incentives can serve as an effective strategy to encourage project management stakeholders to make pro-circular strategic project decisions. These incentives are translated into an overall incentive scheme, represented at the end of the findings. By adopting these incentives, stakeholders can be incentivized to embrace circular principles and contribute to the realization of a circular building economy.

Keywords - Circular economy, Built environment, Incentives, Project management stakeholders, and decision-making processes

EXECUTIVE SUMMARY

Introduction

The transition from linear to circular building methods is crucial for addressing economic, social, and environmental challenges in the construction industry. However, project management stakeholders face various obstacles, conflicts, and barriers to adopting circular practices. These challenges exist at multiple levels, including the organizational, project, and individual levels.

At the organizational level, differences in organizational cultures and ambitions influence project outcomes and can lead to conflicts (Roeder, 2011). Private organizations, in particular, prioritize financial interests and often overlook the benefits of circular building practices (Boyne, 2002, Gibbons & Roberts, 2012). Circular initiatives are perceived as costly, resulting in a reduced commitment to circularity. Private organizations focus on individual ambitions and profit margins, disregarding the broader societal implications of their actions (Eberhardt et al., 2019). They see circular construction as complex, time-consuming, and less lucrative in the short term, leading to its neglect (Eberhardt et al., 2019; Leising et al., 2018; Munaro et al., 2020).

On the project level, stakeholders encounter barriers related to goal prioritization and stakeholder perspectives. The success of a building project relies on the engagement and satisfaction of project management stakeholders and the project's beneficiaries (Roeder, 2013). However, certain ambitions may not be feasible or considered as important by stakeholders (Winch, 2010). Circular ambitions are often not prioritized, and the success of the project is not solely determined by non-built circular characteristics (Corvellec et al., 2020). Additionally, clients, who play a significant role in shaping project objectives and integrating circular practices, often revise their objectives, leading to reduced circular ambitions due to higher costs. Other challenges in constructing circular buildings include a fragmented supply chain, limited market mechanisms for resource recovery, unclear financial incentives, and insufficient considerations for the end-of-life phase (Eberhardt et al., 2019; Kooter, van Uden, et al., 2021).

At the individual level, project management stakeholders face challenges in integrating circular measures due to limited information, expertise, and innovative solutions. Furthermore, the stakeholders exhibit a lack of commitment and engagement with the circular economy. Overcoming these challenges requires a behavioral shift among individuals to foster a more positive perception and adoption of the circular economy (Adams et al., 2017).

However, the limited adoption of circular practices not only affects stakeholders but also hinders the progress of the circular economy and creates conflicts with national targets and environmental pressures.

To overcome these challenges and promote the circular economy, it is recommended to reassess the roles, responsibilities, behaviors, and to investigate encouragement strategies to project management stakeholders (Hart et al., 2019). This study aims to examine how incentives can be used in motivating project management stakeholders to adopt and implement circular building practices. To achieve this, the following questions will be answered:

How can incentives be an effective method for the pro-circular strategic decision-making processes of project management stakeholders?

i. Which project management stakeholders are involved in the decision-making processes and who affects the outcomes the most?

ii. How do the decision-making processes currently operate between these project management stakeholders?

iii. Which incentives can have an influence on the pro-circular strategic decision-making processes of project management stakeholders?

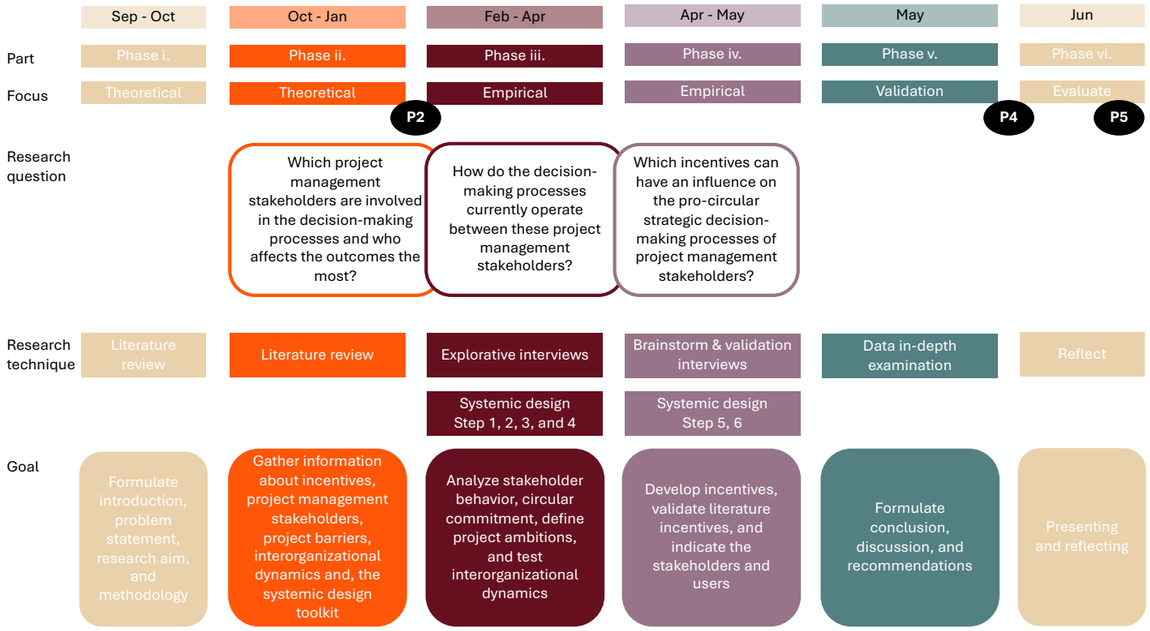


Figure 0.1: Research plan (own figure)

Methodology

This research is stakeholder (multi stakeholder) centered whereas a complex service (incentives) will be examinated if it can lead to a system/ behavioral change (circular building decisions). To tackle this complex circular decision-making issue, the systemic design thinking toolkit has been chosen.

The systemic design toolkit is developed to response to very complex social, economic, and environmental challenges, systemic design is a method that combines systems thinking and system methods to design for complex sociotechnical and human, multi-stakeholder social-centered systems.

Via the systemic design toolkit steps one until six, the different research quesions will be answered. This will be accomplished via explorative interviews and brainstorm and validation interviews. The results obtained from these interviews will be utilized in various methodologies that align with the objectives of each step, as illustrated in Figure 0.2. The complete research plan, encompassing the research focus, techniques, and goals, is presented in Figure 0.1. (Jones & van Ael, 2022)

[1] Framing the system I analyzing the current situations in the case study.
Define the scope and boundaries of the current system throughout the full design lifecycle process
Methods: actor mapping, niche discovery, and riche context

[2] Listening to the system I analyzing the current situations in the case study.
Observation of behaviors in the system
Methods: interviews about current experiences, and observing workshops

[3] Understanding the system I analyzing current situations in the case study.
Examines the factors that determine system behaviors
Methods: social ecosystem map, influence map, multicapitals model, and causal loop diagram/ story loop diagram

[4] Envisioning desired futures I future vision
Possible futures desired by system stakeholders
Methods: system value proposition, and synthesis map

[5] Exploring the possibility space I exploring viable effective transformation solutions
Explores the most effective design interventions/incentives
Methods: interventions/incentives strategy map

[6] Planning the change process I exploring viable effective transformation solutions
(re)Organize, govern, and deliver
Methods: process enneagram, and theory of systems change and action

Figure 0.2: Systemic design toolkit (Jones & van Ael, 2022)

By conducting semi-structured interviews with a total of 23 project management stakeholders representing public and private organizations involved in three distinct project cases, an extensive assessment of the current situation will be examined. This assessment encompasses a thorough analysis of various aspects, including bottlenecks, stakeholder empowerment, influences, processes, and non circular behavior. Subsequently, the same group of participants will engage in a unstructured brainstorming and validation interview. The overarching objective of these interviews is to delve into stakeholder-specific needs, preferences, and requirements relevant to the circular decision-making transition process, while also examining the incentives identified in the literature review. The outcome of this research will be a comprehensive scheme of a diverse range of incentives that can be effectively employed during the initiation and design phases of real estate development projects.

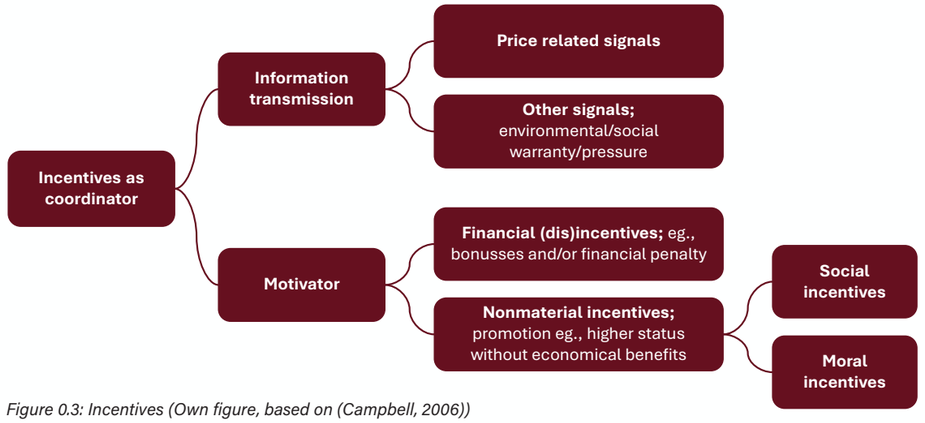


Figure 0.3: Incentives (Own figure, based on (Campbell, 2006))

Literature

Incentives and disincentives (rewards and penalties) often drive, affect, and motivate people's behavior. Analyzing the various incentives may lead to better appreciation of the behavioral drivers of individuals. This knowledge may aid in incorporating specific incentives to attain a goal. This reseach focuses on three main incentive clusters:
(Levitt & Dubner, 2005)

Financial incentives: acting in the best financial interests.

Social incentives: operating in a manner that will get social approval/acceptance .

Moral incentives: behaving in accordance with what is seen as the correct action.

Secondly, project management stakeholders are defined as team members who engage in the decision-making processes of the project. Based on the information gathered from other stakeholders and resources, project management stakeholders make final project decisions for the development of constructions. Alongside these formal members, there are pertinent members who have a less formal and directing position, known as consultants. These members offer information to enhance the other members' decision-making processes. (Aminoff et al., 2016; Olander & Landin, 2005; Winch, 2010).

Table 0.1: Project management stakeholders (Aminoff et al., 2016; Olander & Landin, 2005; Winch, 2010).

Project management stakeholders	
Demand (formal)	**Supply (informal)**
Client	Architect
(Property owner)	Designers
(Financers / shareholders)	Engineers
Client's employees	Contractor(s)
Client's suppliers	Trade contractors
Project manager	Material suppliers
	Other consultants

Findings

Case A involves a public organizations, and case B & C are involves both private organizations.

The study conducted by Corvellec et al. (2020) investigated the prioritization of circular ambitions in projects and the impact of non-built circular characteristics on project success and evaluation. The research confirmed that circular ambitions were ranked relatively low in terms of relevance, indicating that they were not given high priority in the projects examined.

The study also explored the behavior of private organizations in relation to circular practices. It found that private organizations tend to prioritize their own financial advantages and make decisions based on financial considerations. In one of the case studies (case B), the primary objective of a real estate project was to adhere to the predetermined budget, leading to the rejection of circular alternatives with higher costs. However, in another case (case C), there was a stronger intrinsic motivation towards the circular economy, with the organization closely monitoring circular decisions. In this case, long-term financial benefits played a more significant role in decision-making.

The findings confirmed the hypothesis that private organizations exhibit self-interested behavior and prioritize short-term financial considerations. However, the study emphasized the importance of distinguishing between short-term and long-term financial decisions within the context of circular project objectives.

Divergences in the level of dedication to the circular economy were observed between public and private organizations. Public organizations, exemplified by the case study of organization A, exhibited a higher level of commitment to circular practices, influenced by factors such as mission and goals, long-term perspectives, and the regulatory environment. The real estate business strategy of organization A placed a significant emphasis on social and environmental objectives, and its board of directors established ambitious environmental goals.

Moreover, the findings highlighted the role of formal and informal stakeholders in project decision-making processes. While formal stakeholders, such as clients and project managers, are typically considered to have the final decision-making authority, the research revealed that informal stakeholders, including consultants and architects, possess significant impact, influence, and authority. The project manager, in particular, played a crucial role in project steering and oversight, and even occasionally made micro design decisions. Additionally, clients were found to have a considerable influence on the decision-making process and often modified their objectives during circular projects, resulting in a decrease in circular ambitions. Encouraging clients to make more pro-circular decisions was identified as a priority in promoting the circular economy.

Regarding project ambitions, architectural objectives, such as functionality, quality, and aesthetics, were of considerable importance in all examined project cases. As a result, certain circular design opportunities that contradicted these objectives were rejected. Additionally, technical, functional, and safety requirements contributed to the disregard of circular measures. The study proposed several potential solutions to address these challenges, including engaging consultants at earlier stages of the process, fostering the development of new circular products, and modifying building regulations to align with circular practices.

Moreover, the research has identified barriers stemming from a lack of understanding, awareness, and urgency regarding the circular economy within the industry. Clients, designers, and consultants in the supply chain encounter constraints due to limited access to information and innovative solutions for effectively integrating circular measures.

Furthermore, this research underscores the significance of various contextual factors. Factors such as flexibility in planning and budget, professional and practical expertise, trust, transparency, leadership, and shared circular ambitions were found to influence the level of circular involvement within a project team.

Overall, the study provided insights into the prioritization of circular objectives, the behavior of public and private organizations, the influence of stakeholders, barriers to circular implementation, and the role of incentives in promoting circular project decisions.

Table 0.2: Incentive scheme based on the perspectives of the participants (own figure)

Incentives		
FINANCIAL	**SOCIAL**	**MORAL**
Financial bonus: via a set percentage of higher circular ambitions are achieved or increased project participation	**Promotion:** receive social recognition for implementing circular building ideas	**Self-justification:** attend workshops on the negative effects of linear building methods
Financial penalty: if circular regulations and/or targets are not met	**Social warranty:** developing a culture in which everyone becomes socially accountable	**Self-interest:** have innovation or brainstorm days with the project management team
Financial governmental help: via subsides and/or tax breaks	**Social pressure:** Actively communicate the supporters of each project decision and provide underlying justifications	**Self-transcendent:** start believing that the circular built environment is the new "norm"
Marketing strategy: leverage circular expertise as a marketing strategy to secure additional projects	**Desire to proof:** add a circular expert, organize circular rehearsals, or use a competetive tendering procedure	**Intrinsic motivation:** focus on the positive environmental impact of circular building decisions
Reciprocal: attain future alliances or win-win deals through the achievement of additional circular targets	**Reputational value:** give organizational recognition or publicy acknowledgements during project meetings	
Contractual: develop contractual agreements which highlights the circular targets, ambitions, and benchmarks	**Lacking behind:** develop an organizational circular culture via trainings, seminars, lectures etc.	
	Actively monitoring: discuss quarterly design reports and actively monitor and evaluate the decision-making processes	

Conclusion

This research further supports the notion that incentives can positively influence the decision-making processes of project management stakeholders in the real estate sector.
Throughout the course of this research, various incentives have been examined and discussed. A concise summary of all the incentives explored can be found in table 0.2.

Nonetheless, the selection and implementation of appropriate incentives depends on a variety of contextual factors related to the project and its stakeholders, such as organizational and individual positions, responsibilities, contextual factors, influence ability, and ambitions. Firstly, proper supplying and targeting of incentives towards specific stakeholder audiences is essential for achieving desired effect, an overview is giving from supplying to the targeting audience in figure 0.4.

Secondly, as certain circular decisions may encounter resistance or rejection due to various reasons, aligning incentives with the underlying factors contributing to such behavior is imperative. Additionally, power dynamics among the project management stakeholders should be taken into account, consequently in the end decision-makers should be influenced.

To conclude, incentives can serve as an effective approach to promote pro-circular decision-making among project management stakeholders if they are appropriately targeted, aligned with the underlying reasons for resistance or rejection of circular decisions, and the power dynamics of project management stakeholders are considered. This research contributes valuable insights into the implementation of incentives within the real estate industry and underscores their potential to drive the transition towards a circular building economy.

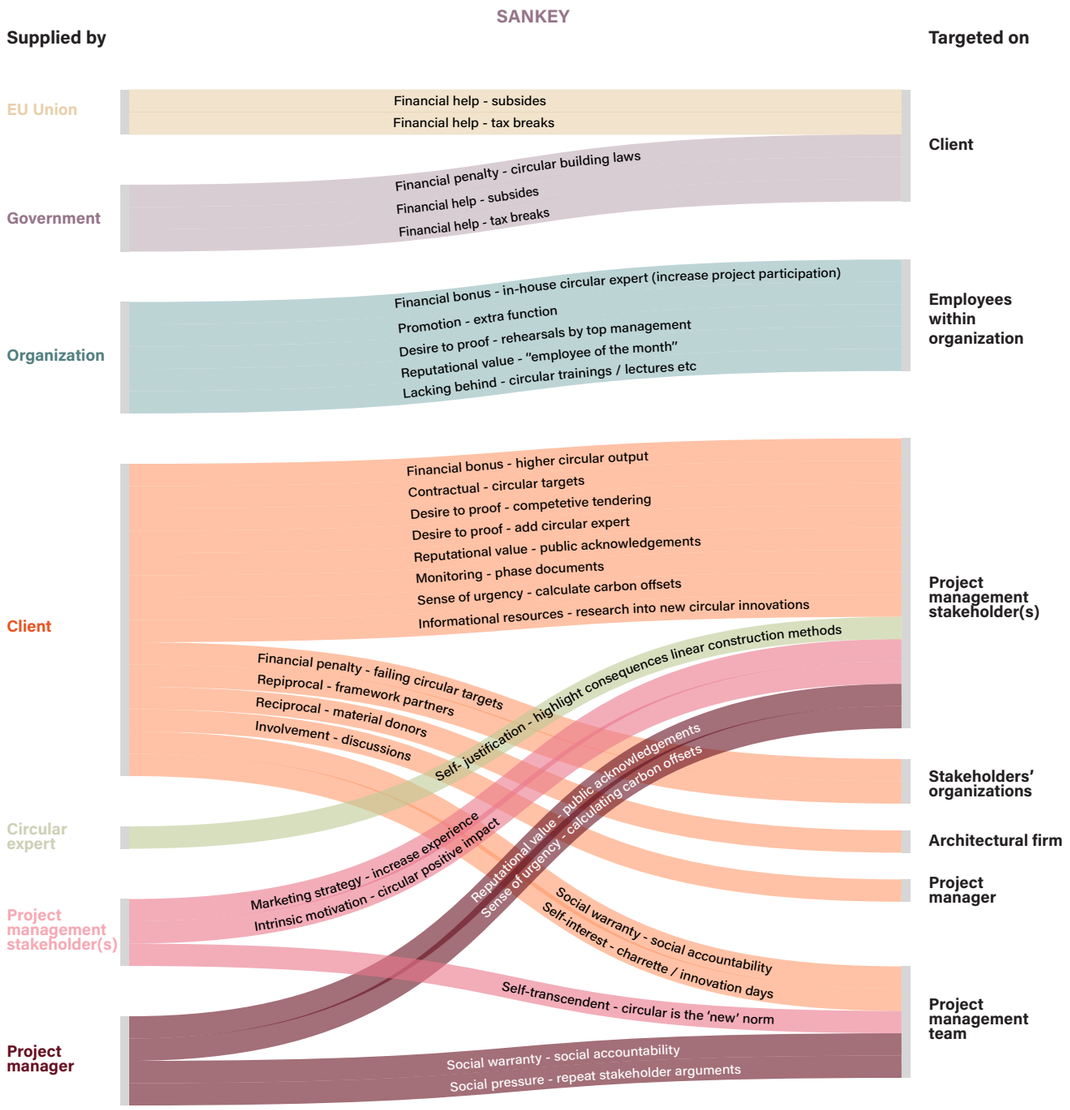


Figure 0.4: Sankey diagram with the suppliers and targeted audience (own figure)

Recommendations future research

i. Conduct a comprehensive case study analysis on a larger scale to explore additional incentives, their effectiveness, associated risks, and outcomes.

ii. Further research is needed to examine the impact of contractual models, such as the bouwteam model, on integrating circular objectives and potential conflicts with early stakeholder involvement.

iii. Further research should explore the potential of new contractual relationships with manufacturers where materials and construction components are rented instead of purchased.

iv. Conduct research to explore changes in the role, resources, and characteristics of the government in promoting circular practices.

v. It is recommended to analyze the contractor's function, impact, and potential incentives to understand their involvement in promoting circular practices.

vi. Investigate long-term strategies to foster a pervasive adoption of circularity in decision-making processes of real estate initiatives.

vii. Further research is needed to understand the influence, implications, and constraints of BREEAM certification on circular project objectives.

LIST OF TABLES

LIST OF FIGURES

TABLE OF CONTENTS

READERS GUIDE

i. Introduction
Introducing the problem, main concepts, research aim and methodology

ii. Theoretical
Literature review into the contextural factors of this study

iii. Empirical part I
The first interviews evaluate the project management stakeholders, the current project and process dynamics, and non-circular behavioral factors

iv. Empirical part II
The second brainstorm interview for validating the literature-based and stakeholder-created incentives

v. Conclusion and discussion
The research conclusions, recommendations, limitations, and analysis with literature

vi. Reflection
A reflection on the product, process, relevance, and, ethical considerations

GLOSSARY

With respect to this thesis, several concepts, and definitions must be defined.

Table 1: Glossary (own figure based on different resources)

Concept/word	**Source**	**Definitions**
Circular economy	(Eberhardt et al., 2019; Ellen MacArthur Foundation, 2013; Hossain et al., 2020)	A circular economy is an industrial system that is intended and designed to be restorative or regenerative. It replaces the idea of 'end-of-life' with restoration, moves towards circular (reduce, reuse, recycle, and recover) economic models.
Decision makers/ decision-making processes	(Beach, 1993; Elwyn et al., 2009)	The process of considering available possibilities, to select the most suitable/ appropriate option (based on stakeholders' subjective opinions). The individuals who make choices are referred to as decision makers.
Project management	(Winch, 2010)	The use of established concepts, methods, and policies to manage a project from conception to execution.
Project manager	(Winch, 2010)	The role of the project manager is to act as the interface between the client's desires and the capabilities of the resource bases.
Project management stakeholders	(Aminoff et al., 2016; Gerding et al., 2021; Roeder, 2011)	Project management stakeholders are defined as team members who engage in the decision-making processes of the project. In addition to these formal members, there are more pertinent members who have a less formal and directing position, known as consultants. These members offer information to enhance the other members' decision-making processes. Stakeholder list: client, (financiers), client's employees, client's customers, client's tenants, client's suppliers, project manager, architects, engineers, principal contractors, trade contractors, material suppliers and other consultants.
Interorganizational relationships	(C. Jones et al., 1997; Kooter, Uden, et al., 2021)	Interorganizational project relationships are identified as a group of organizations that interact reciprocally to coordinate their efforts for a complex service or product during a finite period.
Incentives	(Cambridge University Press, n.d.)	''Something that encourages a person to do something. Examples are tax incentives, these have been offered to attract industry to the region, and bonus payments provide an incentive to work harder.''

i. INTRODUCTION

This chapter provides an overview of the introduction, problem statement, societal and scientific relevance, and the resulting research questions and conceptual model.

This study aims to examine how incentives can be used in motivating project management stakeholders to adopt and implement circular building practices.To achieve this, the following questions will be answered:

How can incentives be an effective method for the pro-circular strategic decision-making processes of project management stakeholders?

INTRODUCTION

In recent years, the circular built environment has gained importance due to the growing significance of environmental, social, economic, and political goals (van Bueren et al., 2022). The construction industry, according to Hamilton (2021), represents a significant share of total raw material consumption, comprising fifty percent, and a substantial portion of global energy consumption, amounting to thirty-six percent. It has become apparent that the unrestricted utilization of raw materials is approaching its limits, primarily due to resource scarcity and the ensuing environmental impact. Consequently, this scarcity has resulted in increasing pricing of these materials, exerting an economic impact, which, in turn, has slowed the progress of the building sector. (Kylili & Fokaides, 2017). In recent years, it has become evident that the building and construction sector is compelled to undergo a paradigm shift, transitioning from linear economic models characterized by a "take, create, use, and discard" approach to circular economic models that prioritize "reduce, reuse, recycle, and recover." This imperative arises from several interrelated factors, including population growth, heightened demand for housing, and a deceleration in the building industry (Eberhardt et al., 2019; Hossain et al., 2020).

In addition to these environmental, social, and economic motives, governmental constraints are gradually increasing pressure on the construction industry to become circular. The European Union and national governments have adopted several regulations and laws to encourage the construction sector to participate in more sustainable and circular practices. This has been detailed in the circular economy action plan. Below are listed three regulations specific for the building and construction industry. (European Commission, 2020)

• The European Union agreed on achieving a climate neutral environment by 2050.

• The "Renovation Wave" project needs to lead to considerable gains in energy efficiency in the EU which will be executed in accordance with the circular building economy principles, including optimized lifetime performance and extended life expectancy for built assets. As part of the revision of the recovery objectives for building and demolition waste.

• Evaluating a modification of the material recovery goals established by EU law for building and demolition waste and its material-specific fractions.

Despite the efforts made by these agreements to align the construction industry with circular principles, the ultimate decisions regarding building projects rest with stakeholders involved in real estate project management. Presently, a disparity exists between the circular aspirations set forth by the European Union and national governments, and the final decisions pertaining to (re)development real estate projects, which are influenced by the stakeholders involved in project management. This misalignment arises due to the diverse challenges and barriers confronted by these stakeholders in their decision-making processes. (Hart et al., 2019; Hossain et al., 2020; Leising et al., 2018). It is important to define this term.

Project management stakeholders are defined as team members who engage in the decision-making processes of the project (Aminoff et al., 2016). Based on the information gathered from other stakeholders and resources, project management stakeholders make final project decisions for the development of constructions (Roeder, 2011). Alongside these formal members, there are pertinent members who have a less formal and directing position, known as consultants. These members offer information to enhance the other members' decision-making processes (Gerding et al., 2021).

This thesis encompasses a range of project management stakeholders, including the following entities involved in the demand side: the client, the client's employees, the client's tenants, the client's suppliers, and a project manager. On the supply side: architects, engineers, contractors, material suppliers and other consultants (Winch, 2010).

Currently, only a minority of the construction projects are developed circular. (Eberhardt et al., 2019). As previously mentioned, the decision-making processes of project management stakeholders are confronted by different challenges, conflicts, and barriers. Literature highlights that these barriers and conflicts manifest at three discernible scale levels, which are subject to researcher interpretation. These levels include the organizational level (e.g., interorganizational conflicts), project level (e.g., insufficient stakeholder commitment and empowerment), and individual level (e.g., limited circular knowledge and expertise among stakeholders). By employing these aforementioned scale levels, shown in figure 1, a comprehensive and in-depth analysis will be provided.

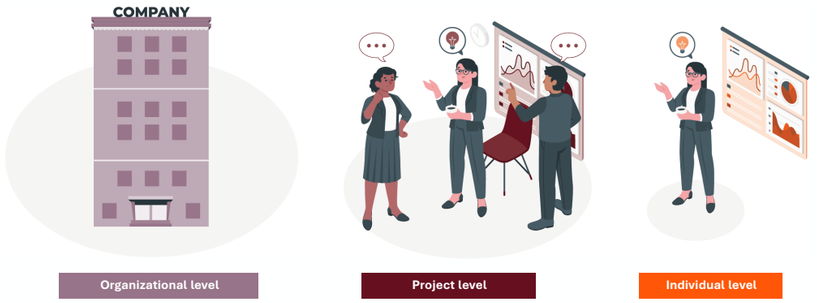


Figure 1: The three scale levels utilized in this research (own figure)

Scale 1: Organizational level

In the context of this study, the organizational level pertains to the broader organization that an individual represents in their role. Specifically, within the scope of this research, the organizational level corresponds to the employers of the project, where the stakeholder assumes the position of an employee within this particular organization.

Organizational cultures and ambitions have a high influence on the processes and outcomes of projects (Roeder, 2011). Differences in the mindsets and attitudes of organizations can lead to interorganizational conflicts (Kooter, Uden, et al., 2021). Organizational conflict in this research is reflected as an active disagreement within the represented organizations of the project management stakeholders, concerning the building specifications and outcomes of a project. Consequently, the employee activities and choices are coordinated and supported by the larger, represented organizations.

Private organizations typically allocate ownership to entrepreneurs and shareholders. In these entities, executive compensation is often dependent upon performance, thereby private organizations are likely to benefit from enhanced operational outcomes. (Boyne, 2002). Consequently, private organizations often exhibit a bias towards self-interested financial behavior. At present, circular building initiatives are perceived as costlier, leading to a lack of motivation and commitment towards circular practices (Eberhardt et al., 2019). These organizations tend to prioritize choices that generate suboptimal outcomes for different parties (e.g. society), thus Pareto efficient decisions for own. This divergence from optimality has socially and ecologically detrimental implications for individuals, resulting in outcomes that are less favorable from a broader societal perspective. These organizations place a greater emphasis on individual ambitions and goals centered around profit margins (Gibbons & Roberts, 2012).

In addition, private organizations have tended to perceive the circular construction sector as very complex, time-consuming, costlier supply chain operations, and as being less lucrative based on short-term revenues. As a result, circular perspectives are often disregarded during the initial stages of project development (Eberhardt et al., 2019; Leising et al., 2018; Munaro et al., 2020).

Scale 2: Project level

Projects are completed by people (the project management team) and created for people (the society). Although building and decision-making tools, methodologies, and technology are undoubtedly crucial, the success or failure of a building project is ultimately determined by the engagement of project management stakeholders, their perspectives on the project, and their satisfaction with the project deliverables. As a result, the project's success hinges on the stakeholders' assessment, as well as the beneficiaries of the project's outcomes, who may consider a project successful if the deliverables align with their ambitions, even if the project's construction does not strictly adhere to the traditional project goals of "full scope, on time, within budget." (Roeder, 2013)

Within the realm of project management, it is important to recognize that not all articulated ambitions can be feasibly accomplished. Prioritization of ambitions becomes necessary, and there may arise situations where certain ambitions cannot be achieved due to unforeseen circumstances (Winch, 2010). Furthermore, project management stakeholders may not perceive certain ambitions as crucial for the successful delivery of the project (Roeder, 2013). Likewise, the circular ambitions are now not valued as project's top priority and and the project's success is not influenced by non-built circular characteristics (Corvellec et al., 2020).

During the later stages of the decision-making process, clients frequently exhibit a propensity to revise their perspectives regarding the overall objectives of a project. Clients assume a crucial decision-making role in determining the project's objectives, budgetary considerations, allocation of responsibilities, and integration of circular practices within their organization. The successful implementation of circular building practices hinges upon active engagement with construction chain partners, particularly in terms of incorporating repurposed materials, a commitment that ideally should be established from the project's inception. However, it is common for clients to modify their objectives during the course of circular projects, leaving partners with limited options but to conform to the new objectives. Due to the substantial influence wielded by clients in the decision-making process, their alterations frequently result in a reduction of circular ambitions, much to the dissatisfaction of other project management stakeholders. This phenomenon is primarily driven by the higher costs associated with circular construction techniques, which currently tend to be more expensive compared to conventional linear construction methods (Eberhardt et al., 2019; Kooter, van Uden, et al., 2021).

Adams et al. (2017) conducted a study that shed light on the numerous challenges encountered by project management teams in their pursuit of constructing circular buildings. While individuals within these teams possess some level of awareness regarding the importance of circular construction, the broader industry and profession still lack a comprehensive understanding. The research highlighted several factors, a fragmented supply chain, a lack of market mechanisms to facilitate enhanced resource recovery, ambiguous personal financial incentives, and a lack of considerations and incentives for the end-of-life phase of buildings.

Scale 3: Individual level

Although individuals possess some level of awareness regarding the significance of the circular economy, they face challenges due to limited information and innovative solutions for effectively integrating circular measures (Adams et al., 2017). Moreover, recent research suggests that project management stakeholders also exhibit a lack of commitment and engagement towards the circular economy (Munaro et al., 2020). Consequently, Hart et al. (2019) emphasize the need for a behavioral shift among individuals to foster a more positive perception and adoption of the circular economy.

The aforementioned challenges have a direct impact on the decision-making processes and, consequently, the project decisions made by project management stakeholders. Figure 2 offers a concise overview of these components.

Figure 2: The current challenges within the circular decision-making processes (own figure, based on previous resources)

Step 1 Systemic design toolkit: Framing the situation

In order to facilitate the transition towards a circular construction economy, Barbaro et al. (2022) and Hossain et al. (2020) have identified a range of long-term trends, goals, and strategies. Figure 3 provides a comprehensive overview of the aforementioned challenges, encompassing economic factors, practical individual expertise, project culture, institutional practices, as well as the proposed long-term trends, goals, and strategies outlined by Barbaro et al. (2022) and Hossain et al. (2020). The figure, derived from the systemic design toolkit developed by P. Jones and van Ael (2022), serves as a valuable tool for understanding and defining the current situation while shedding light on potential solutions.

Within the scope of this study, the primary focus will be on circular engagement, circular commitment, and behavior change as critical aspects within the context of circular construction.

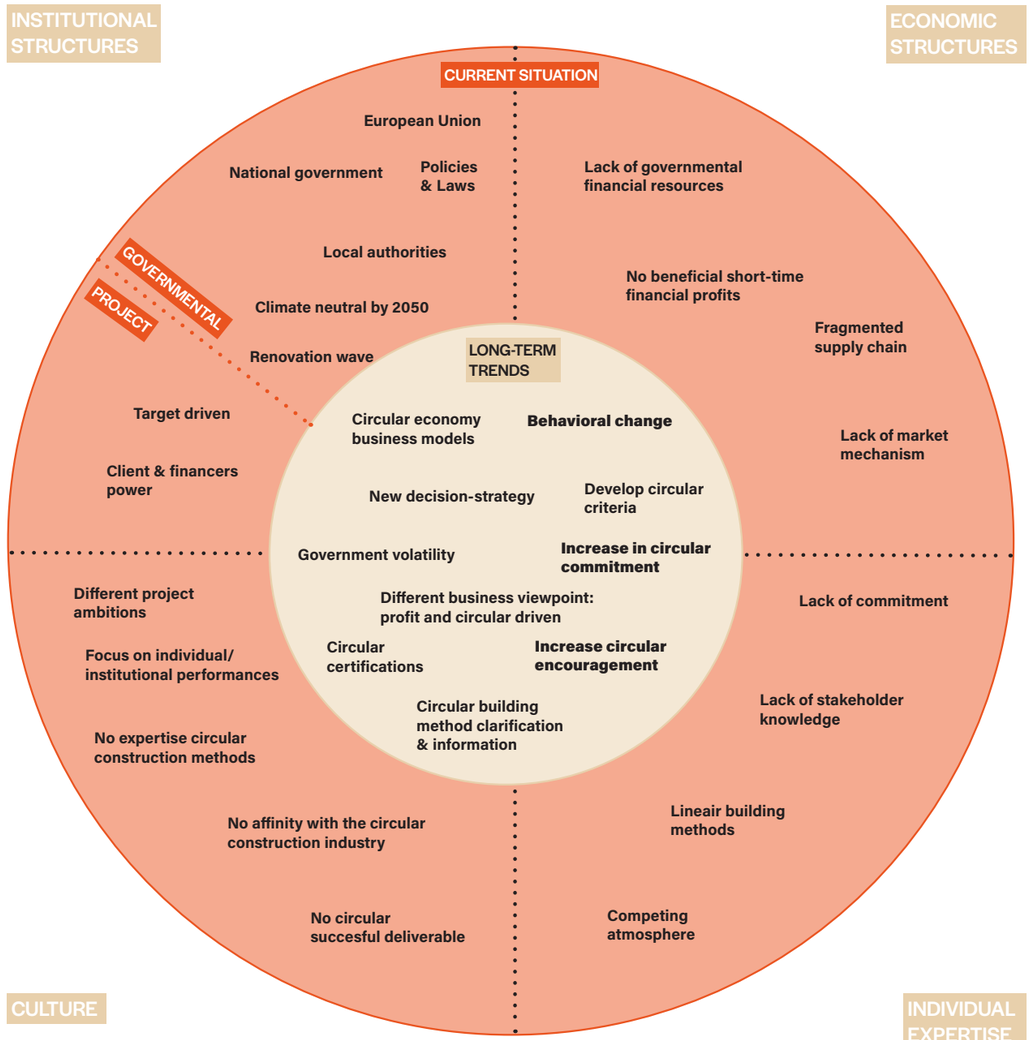


Figure 3: Rich context (own figure, based on (P. Jones & van Ael, 2022)) and resources from (Barbaro et al., 2022; Hossain et al., 2020).

PROBLEM STATEMENT

The transition from linear to circular building methods is essential to address economic, social, and environmental challenges. However, various challenges, conflicts, and barriers hinder project management stakeholders from making circular building decisions Eberhardt et al., 2019; Leising et al., 2018; Munaro et al., 2020). Financial objectives, supply chain dynamics, and perceptions of additional work and costs contribute to the reluctance in adopting circular practices (Roeder, 2013, Adams et al., 2017, Corvellec et al., 2020) This restricted adoption not only impacts stakeholders but also hinders the progress of the circular economy and exacerbates conflicts between national targets and environmental pressures.

Recent studies have revealed that the lack of commitment to circularity in the construction industry stems from differing financial objectives among stakeholders. Specifically, supply chain stakeholders often prioritize short-term financial goals and profits, overlooking the evaluation of long-term cost-profit ratios and disregarding the potential benefits of circular building approaches (Adams et al., 2017). Furthermore, interorganizational stakeholders with diverse objectives and priorities frequently engage in competitive behaviors, aiming to maximize individual organizational profit margins within construction projects (Boyne, 2002, Gibbons & Roberts, 2012). These tendencies hinder the adoption of circular practices despite the sector's potential for greater long-term profitability. (Boyne, 2002, Gibbons & Roberts, 2012, Eberhardt et al., 2019)

Additionally, project management stakeholders perceive sustainable and circular activities as burdensome and time-consuming, leading to a perception of unnecessary additional work, increased complexity, and unrewarding. Consequently, this perception undermines teamwork and trust within project environments, intensifying the competitive atmosphere within the industry (Eberhardt et al., 2019).

Accordingly, despite the growing demand for circular construction prompted by environmental, economic, social, and political factors, project management stakeholders face obstacles and conflicts at multiple levels, including organizational, project, and individual levels. As a result, the adoption of circular building decisions remains limited Eberhardt et al., 2019; Leising et al., 2018; Munaro et al., 2020). This limited adoption not only affects the stakeholders themselves but also has wider implications for the living environment and climate, causing misalignments between national circular targets, environmental and social pressures, and the building industry.

To address these challenges and promote the circular economy, it is necessary to reassess the roles, responsibilities, and behavioral aspects of project management stakeholders (Hofstetter et al., 2021). Although previous research has explored changes in roles and responsibilities, there has been limited investigation into different strategies for encouraging project management stakeholders to embrace and implement circular building practices, thus fostering a circular built environment (Hart et al., 2019). Therefore, this study aims to examine how incentives can be utilized to motivate project management stakeholders to adopt and execute circular building practices, thereby stimulating the development of a circular building environment. Hereby, the effectiveness of incentives will also be addressed.

Academic research has demonstrated that incentives can serve as effective strategies for encouraging a diverse range of actions, target groups, contexts, and environments. However, there is currently a lack of research on the implementation of incentives in this specific context. This research will contribute by developing an incentive scheme that encourages a wide range of project management stakeholders to make more circular building decisions.

The successful implementation of incentives
Various researchers have highlighted the efficacy of using incentives to drive decision-making. One notable investigator in this area is Steg (2018), who conducted research specifically on the application of incentives to motivate individuals to transition to sustainable energy sources. From her study, several key conclusions emerged.

Steg (2018) identified three incentives that had a positive impact on the desired behavior. Firstly, the adoption of sustainable habits was facilitated by reducing costs (financial incentives). Secondly, minimizing the difficulty of taking action or making adjustments (nonmaterial incentives) proved to be effective. Additionally, addressing human factors such as knowledge and motivations (informational resources) played a significant role in supporting sustainable behaviors and influencing individual behavior

Furthermore, Steg identified the implementation of social and moral incentives as inspiring and motivating factors for engaging individuals in sustainable energy practices. Factors such as personal environmental concerns, emotional connections, changes in social status, and considerations of identity played crucial roles. By influencing and stimulating these factors, individuals demonstrated a greater inclination towards choosing sustainable energy sources. Additionally, the study revealed that people are more likely to engage in pro-environmental behavior if they associate significance with their sustainable actions and observe direct improvements in their living environment's quality.

Lastly, tailored techniques and strategies (information transmitters) that consider individuals' motivations and limitations have proven to be more effective. When sustainable behavior and lifestyle changes are designed to enhance rather than diminish the quality of life for individuals, they are more likely to be embraced.
(Steg et al., 2018)

(The literature review provides additional scholarly insights and information on incentives)

Research note
In the context of this study, an assumption is made regarding the stakeholders involved, suggesting that they have a limited level of intrinsic motivation to engage in environmentally responsible and friendly behaviors. Intrinsic motivation refers to the motivation that originates from within individuals or their organizations, rather than being driven by external influences (Frey, 1997). Therefore, in such cases, additional factors, such as incentives, become necessary to promote and encourage the desired behavior.

Research aim
The primary aim of this research is to explore how the project management team influences prospective circular design-related activities, and whether incentives can induce behavioral changes in this context. In order to foster the expansion of the circular construction economy, it can be helpful to investigate novel strategies or persuasive approaches for facilitating pro-circular project decisions. Consequently, this research will focus specifically on evaluating the influence of incentives and their potential to significantly impact the decision-making processes among project management stakeholders.

The overarching aim of this research is to promote the adoption of more circular building practices among project management stakeholders through the utilization of incentives. The intention is to use incentives as a means to encourage short-term behavioral changes that align with circular principles, with the ultimate goal of fostering a long-term shift towards circular behaviors.

RELEVANCE

Societal relevance
In recent years, the circular built environment has gained significant importance as environmental, economic, and political goals have become increasingly prominent (van Bueren et al., 2022). The construction industry, which consumes fifty percent of total raw materials and accounts for thirty-six percent of global energy consumption, has reached a critical juncture (Hamilton, 2021). The scarcity of raw materials and resources has become evident, signaling an imminent end to their unrestricted use. And this shortage has resulted in higher material prices and has consequently hindered the progress of the construction industry (Kylili & Fokaides, 2017). In light of population growth and the growing demand for housing, the building and construction industry must undergo a paradigm shift from linear economic models (characterized by the take, create, use, and discard approach) to circular economic models (marked by the reduce, reuse, recycle, and recover approach) (Hossain et al., 2020; Eberhardt et al., 2019).

Furthermore, the adoption of a circular economy holds long-term benefits for both the environment and human living conditions. Circular buildings have the potential to significantly reduce CO2 emissions, promote the recycling of waste, and increase the utilization of renewable energy, among other advantages (Hart et al., 2019).

Scientific relevance
Despite the high pressure to embrace circular building practices, the current results in this regard are still limited (Eberhardt et al., 2019). The decision-making processes of project management stakeholders face various challenges, which manifest at three different scale levels: conflicts in interorganizational ambitions (organizational level), insufficient stakeholder commitment and empowerment (project-related level), and a lack of stakeholder circular information and expertise (individual level).

To encourage the adoption of the circular economy, it is necessary for various individual, project and organizational aspects to undergo a transition. Existing literature identifies three contextual factors that are crucial in this regard. Firstly, Munaro et al. (2020) argue that a significant shift in mentality is required within the building and construction industry. Additionally, Hart et al. (2019) emphasize the imperative need for substantial transformation in behaviors and attitudes within the construction industry. Furthermore, Hofstetter et al. (2021) highlight the fundamental importance of reevaluating the roles, responsibilities, and incentivization aspects of project management stakeholders to facilitate the promotion of the circular economy.

By exploring the application of incentives, this research will try to assist the shift in the behavior, attitude, and mindset of the project management team towards pro-circular activities. This will facilitate team members' coordinated efforts toward a circular economy. And so has this research proposal a scientific relevance.

RESEARCH QUESTIONS

How can incentives be an effective method for the pro-circular strategic decision-making processes of project management stakeholders?

i. Which project management stakeholders are involved in the decision-making processes and who affects the outcomes the most?
• How much influence does each stakeholder have over the decision-making process?

ii. How do the decision-making processes currently operate between these project management stakeholders?
• What are the stakeholder-specific, and project-specific ambitions regarding the circular ambitions?
• Who determines, directs and oversees the decision-making processes?
• Why are non-circular decisions chosen instead of circular ones?

iii. Which incentives can have an influence on the pro-circular strategic decision-making processes of project management stakeholders?
• What are the types of incentives based on social, technological, and economic factors as opposed to rewards, sanctions, and information?

CONCEPTUAL MODEL

The conceptual model for this research is illustrated in Figure 4. A short description of this model is provided below.

Based on literature that there is a current economic, political, social, and environmental **drive** to build circular. Within this literature different circular contextual factors for the development of buildings are discussed. It becomes evident that these circular contextual factors should **drive** the project management stakeholders to design and build circular building projects, and it ultimately tries to **influence** the decision-making processes. The project management stakeholders act in accordance with organizational, individual, and project specific ambitions, among others. And from here, the stakeholders **create and shapes** the decision-making processes, with their knowledge, expertise, and commitment. The goal of this research is to examine if incentives can **contribute** to the circular contextual factors by **striving** stakeholders towards pro-circular decisions. This will all **impact** the decision-making processes. Whereas incentives can be characterized into four subdomains: economic, social, moral, and information transmitters incentives. Hereby, the strategy of the incentives are that it **attemts to exert infleunce** on circular project decisions.

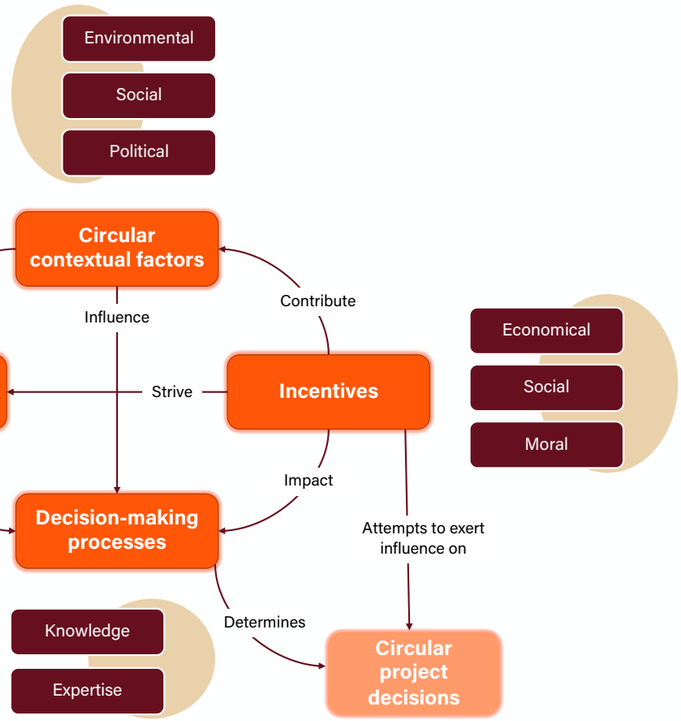


Figure 4: Conceptual model (own figure)

i. METHODOLOGY

This chapter provides an overview of the research methodology, plan, framework, the ethical considerations, and research output and data collection.

This research is stakeholder (multi stakeholder) centered whereas a complex service (incentives) will be examinated if it can lead to a system/behavioral change (circular building decisions). To tackle this complex circular decision-making issue, the systemic design thinking toolkit has been chosen.

SYSTEMIC DESIGN TOOLKIT

Context information and argumentation for the different types of studies: the introduction of the systemic design toolkit
This study aims to provide a framework of incentives for different project management stakeholders that encourages them to construct in a circular building environment. This research consists of two sections: a theoretical part (quantitative research) and an empirical part (qualitative research). During the theoretical phase, the research gap and its concepts were defined and studied. After this, a research strategy and planning have been developed to align the theoretical with the empirical components of this project: from a theoretical list of incentive features to a framework that has been empirically tested.

Where deductive and retroductive logics may be used to answer the “why” questions, and inductive logic can be used to answer the “what” questions, the abductive logic of inquiry is used when both the ‘’why’’ and ‘’what’’ questions need to be answered. However, a distinction must be made, it responds to “why” questions by fostering understanding rather than explanation and by presenting reasons rather than causes.
This abductive logic of inquiry includes the construction of theories drawn from the language, meanings, obligations, and aspirations of social actors. Such study starts by defining these behaviors and meanings, and then derives categories and notions from them that serve as the foundation for comprehending the problem at hand. Abductive logic combines and raises to the center of social theory and study the meanings and interpretations, the reasons and intents that govern their conduct. (Blaikie & Priest, 2019, p. 114)

In this research proposal, several research methodologies are considered. Overall within this research a strategy was considered that preferably is stakeholder centered (analyzing behaviors), with an emphasis on building problem-solving solutions that handle complex challenges while considering the interactions and relationships between various stakeholders and systems. To acquire insight into the interactive cooperation and behavior of stakeholders, as well as to determine whether prospective incentives may be applied, interviews will be held to reveal information on the proposed strategy. Within these methodologies, a research strategy can be included. For this study a strategy will be included to create insightful information with the use of the methodology and steps. Based on (DeSarbo et al., 1993; Dorst, 2015; P. Jones & van Ael, 2022; Miller, 2020; Stickdorn et al., 2018) an overview of research strategies is made, table 2.

Table 2: Advantages and disadvantages research strategy (based on (DeSarbo et al., 1993; Dorst, 2015; P. Jones & van Ael, 2022; Miller, 2020; Stickdorn et al., 2018)

Research strategy	Short description	Advantages and disadvantages	Focus
Frame innovation method	This strategy emphasizes problem re-framing to provide new solutions. The objective is to discover novel perspectives to current challenges that result in creative solutions that are more effective, sustainable, and user-centric.	+ Aids in identifying and challenging underlying assumptions + Adresses complex problems - Solutions may surpass the problem-reframing procedure - Does not take the interorganizational and project relationships into account	▪ Bottom-up ▪ Organizational change management ▪ User perspective
Effective plans for change	This strategy examines the project's strategic and project objectives in further depth. It analyzes if the project's stakeholders, team, and organizations are aligned with the project's objectives and KPIs. The future actions for the project case will be assessed with a focus on the accountable party.	+ Top-management change in role / perspective is effective strategy for organizational ambition change - Only forward thinking, does not consider the current situations, issues and challanges - Put high emphasis on the prefessional views of the top-management	▪ Top-down ▪ Organizational change management ▪ KPI/ ambition thinking ▪ Client perspective
Conjoint analysis	Conjoint analysis is a research strategy used to study how individuals make choices about complicated products and services by analyzing the trade-offs they are willing to make between the many qualities or characteristics of such items or services.	+ Focus both on current and potential future systems/preferences + Solutions based on potential future trends - The focus on the solutions relies on hypothetical service ideas - Does not take the interorganizational and project relationships into account	▪ Bottom-up ▪ Hypothetical change service solutions and management ▪ User perspective
Systemic design toolkit	This is a design strategy that aims to foster systemic change by addressing complex environmental, economic, and social issues. It involves identifying the underlying structures, processes, and relationships that contribute to the problem and developing ideas that may address its fundamental causes.	+ Identifies the current problems and give tools to find solutions (incentives) + Concentrates on improving services by understanding behavioral choices and underlying systems - It is challenging to understand and create all the different content for the strategy	▪ Bottom-up ▪ Stakeholder and organizational change management ▪ Multiple stakeholders perspective
Service design	This is a design strategy that prioritizes the establishment and improvement of stakeholder centric services. It involves examining the end-to-end service experience, identifying stakeholder issues and improvement opportunities, and developing solutions that meet the needs of the parties involved.	+ Involvement of both client as user experiences and collaboration + Holistic approach of service delivery and service experience - Product/service focused - Focuses mostly on solutions and scarcely examines present challenges	▪ Bottom-up ▪ Improving services for specific stakeholder ▪ Particularly user and client focused/ perspective

Systemic design toolkit

As the conceptual model in the previous chapter showed, this research is stakeholder (multi stakeholder) centered whereas a complex service (incentives) will be examinated if it can lead to a system/behavioral change (circular building decisions). To tackle this complex circular decision-making issue, the systemic design thinking toolkit has been chosen.

A lack of awareness of analysis and problem-solving processes is one of the most significant obstacles to the alignment and engagement across stakeholders. In response to very complex social, economic, and environmental challenges, systemic design is a method that combines systems thinking and system methods to design for complex sociotechnical and human, multi-stakeholder social-centered systems (P. Jones & van Ael, 2022). Before delving further into the systemic design toolkit, we will elaborate on the distinctions between design and system thinking.

System thinking offers a holistic and multidisciplinary approach to understanding and resolving complex issues, considering the interactions and interdependencies among the system's many components. It examines how the components are identified and how they interact. A fundamental objective of systems thinking is to understand the flows, interactions, and behavior of a system's components to allow the possibility for adjustments or enhancements to successfully create the desired behaviors and results. (Rubenstein-Montano et al., 2001).

Second, the design thinking strategy entails a set of iterative and collaborative procedures that prioritize the stakeholder centered understanding and resolution of complicated challenges via a bottom-up approach. It is the process of developing meaningful solutions to individual, organizational, and societal problems. To lead in the face of these obstacles, designers must listen to, learn from, envision with, and create and iterate solutions with stakeholders. The design process always begins with a comprehensive grasp of the stakeholders' needs, viewpoints, and interests. (Plattner et al., 2018). The model for systemic design was created using both design and systems thinking.

''System thinking is an interdisciplinary field for seeing the world in terms of connections and interactions. Design thinking is an interdisciplinary tradition of situated learning through action." (Ryan, 2016)

There are systemic designs for all social, economic, and environmental problems. With the main goal of developing instruments for culturally and nationally specific systemic transformation on a wide scale.
One of the five primary objectives of design journeys is:

Develop instruments for intervention/ changes/ incentives in complicated systems

(P. Jones & van Ael, 2022)

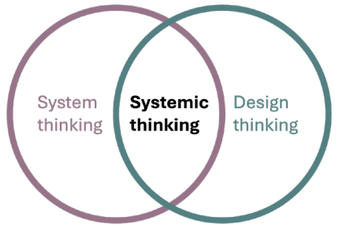


Figure 5: Visualization systemic thinking (own figure)

(P. Jones & van Ael, 2022) have developed seven stages for the systemic design toolkit. Each step generates novel insights and eventually aids in the resolution of the underlying problem. The first three steps investigate how and why we are in this situation. And the last three phases are devoted to creating solutions to this problem. A brief summary of each stage is provided below, figure 6. Later, a more research specific timetable is provided

Important note:
Within the explanation of this research strategy, we often refer to the "system." The system we referring to are the project cases and so its stakeholders which we will be analyzed in a later stadium.

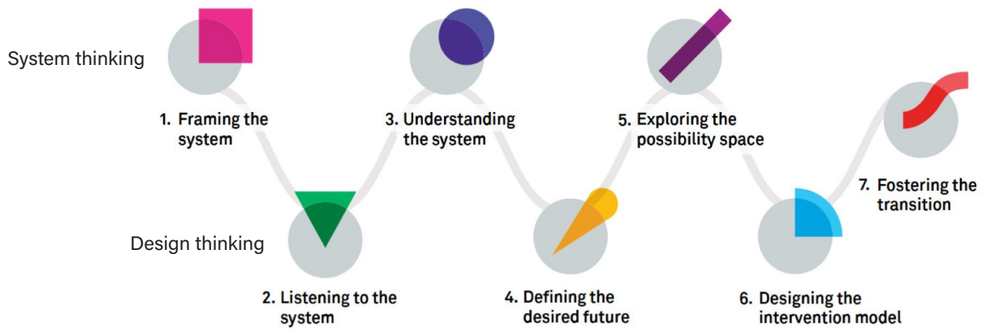


Figure 6: The seven stages of the systemic design (Jones & van Ael, 2022)

[1] Framing the system I analyzing the current situations in the case study.
Define the scope and boundaries of the current system throughout the full design lifecycle process
Methods: actor mapping, niche discovery, and riche context

[2] Listening to the system I analyzing the current situations in the case study.
Observation of behaviors in the system
Methods: interviews about current experiences, and observing workshops

[3] Understanding the system I analyzing current situations in the case study.
Examines the factors that determine system behaviors
Methods: social ecosystem map, influence map, multicapitals model, and causal loop diagram/ story loop diagram

[4] Envisioning desired futures I future vision
Possible futures desired by system stakeholders
Methods: system value proposition, and synthesis map

[5] Exploring the possibility space I exploring viable effective transformation solutions
Explores the most effective design interventions/incentives
Methods: interventions/incentives strategy map

[6] Planning the change process I exploring viable effective transformation solutions
(re)Organize, govern, and deliver
Methods: process enneagram, and theory of systems change and action

[7] Fostering the transition I exploring viable effective transformation solutions
Enables the actions towards change interventions/incentives and strategy for system transition
Methods: stakeholder mobilization

Figure 7: Systemic design toolkit steps with short explanation (own figure, based on (P. Jones & van Ael, 2022)

Limitations of the systemic design toolkit
As with any research methodologies, systemic design toolkit has limits and disadvantages that must be considered. Among the most significant negative effects of this approach are:

At first, the systemic design toolkit implementation may be challenging, especially for people or organizations with minimal expertise in multidisciplinary and collaborative techniques. This may lead to poor outcomes or a lack of engagement from stakeholders. The required commitment in collaboration, stakeholder involvement, and iteration might result into a time-consuming process. Compared to other research approaches, this might result in delays and decreased efficiency. To find the possible incentives, the organizer/ researcher needs to analyze the reactions, and behaviors of the participants. Reading the complexity and wickedness of networks, interrelated challenges, relationships, behavior, and intentions is a complicated process. These elements may seem to be misinterpreted, resulting in incorrect conclusions. To organize the different workshops, multiple resources are required, and so this approach is resource intensive. Likewise, this method assumes that both the participants and the organizer have a wide range of skills, understanding, and experiences. When not, this can result into restrictions within the implementation of the research method. Besides, measuring the effectiveness of a systemic design toolkit may be challenging, since it often includes several stakeholders, interconnected and complex systems, and long-term consequences that may not be readily apparent. This might result in minimal proof of the project's performance and less sufficient outcomes. (Battistoni et al., 2019; Vandenbroeck, 2016)

Important to this research strategy is the researcher's capacity to guide and direct the group and the workshops. This individual must be able to interfere, exert influence, and seize power as required (P. Jones & van Ael, 2022). When the researcher is unable to do so, the results and progress may be affected.

RESEARCH PLANNING

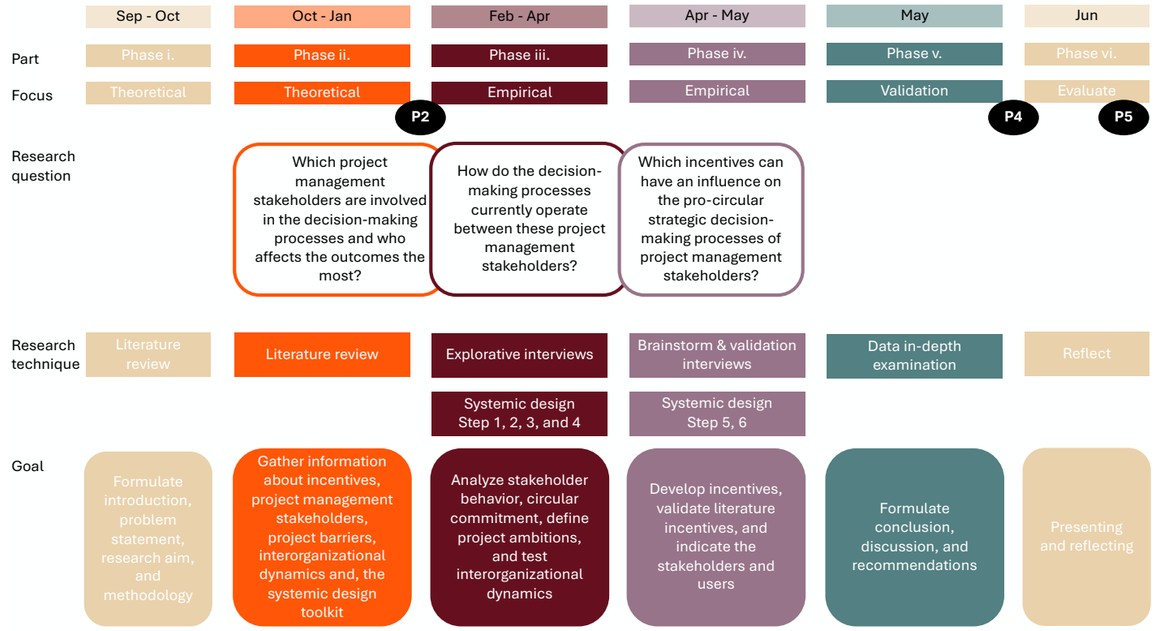


Figure 8: Research planning (own figure)

Figure 8 presents the research plan for this thesis, outlining the focus, methodology, and goals. The plan consists of six distinct phases. The initial two phases encompass the introduction and literature review. The theoretical phase will delve into exploring various concepts.

The empirical sections, which make up phases three and four, will be conducted through stakeholder interviews. Stakeholder analysis via interviews has been identified as a valuable method for gathering key information on stakeholders, enabling a better understanding of their behavior, interests, activities, and influence on decision-making processes (Brugha & Varvasovszky, 2000).

Wheras phase three will delve deeper into the current situation via explorative interviews with an interview protocol. And phase four will involve conducting brainstorm interviews to identify the incentive gap. These interviews will involve open-ended questions that build upon the answers and factors derived from the initial stakeholder interviews. The purpose of brainstorm interviews is to encourage interviewees to generate new and innovative ideas in response to complex problems (Stolterman et al., 2009).

Throughout the validation phase (five) conclusions and recommendations will be developed.

Figure 9, provides a more detailed depiction of the research framework, focusing on the systemic design steps employed in this thesis.

DETAILED RESEARCH PLAN

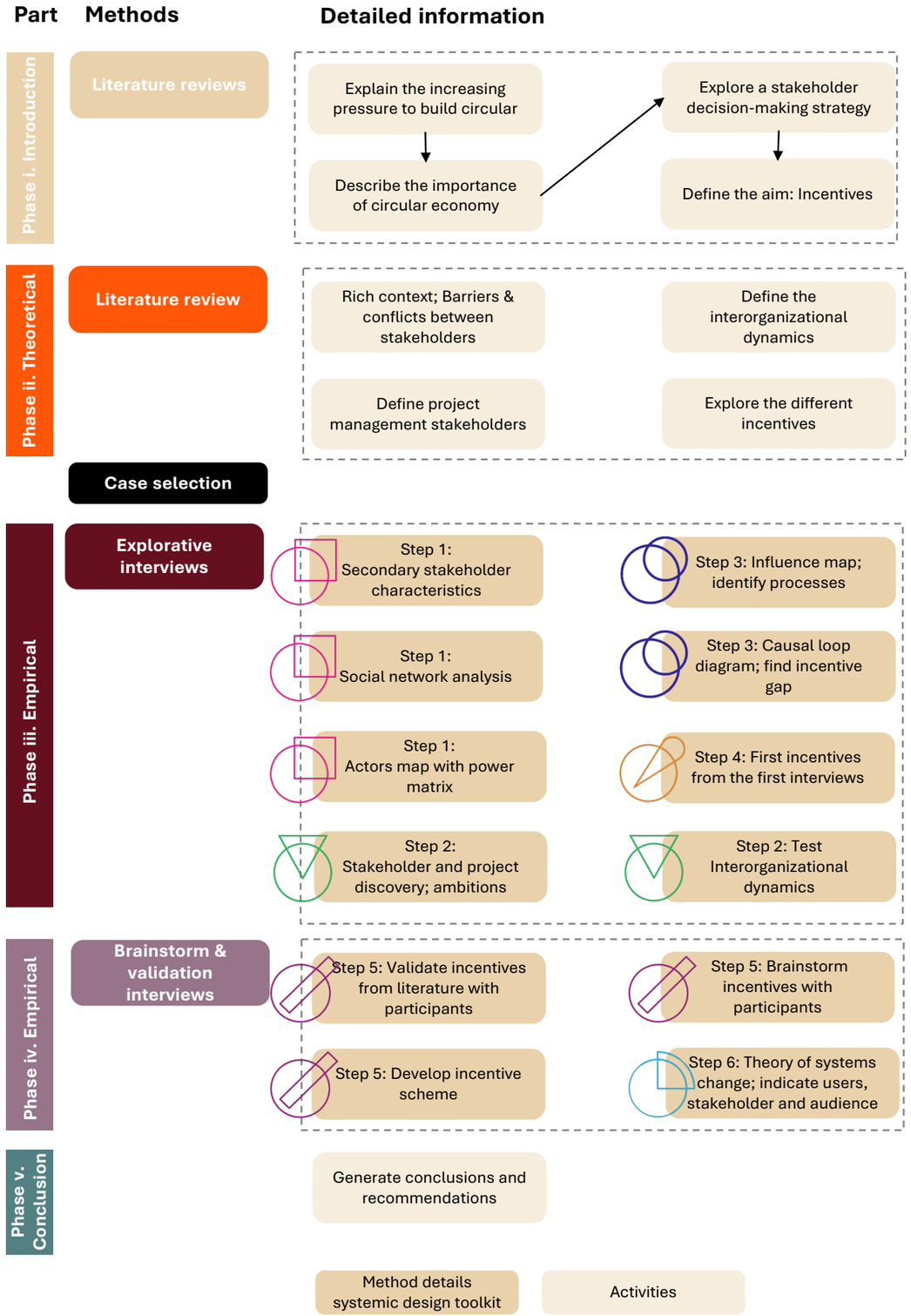


Figure 9: Detailed research framework including the research methods (own figure)

Phase i. - ii.
On environmental, economic, government, and social levels, a thorough literature assessment was conducted to address the rising significance and pressure of circular development. If we want to encourage the circular building environment, research have indicated that we need a new stakeholder decision-making strategy. The initial phase of systemic design, the finding of the present system and its boundaries, was accomplished by identifying the stakeholders' current barriers and conflicts. By defining the various organizational goals, culture, and behavior of particular stakeholders, a rich background for the present disputes is outlined (P. Jones & van Ael, 2022). Thereafter, the different project management stakeholders are defined. And lastly, the various interorganizational dynamics are identified: their successful implementation results into increased circularity building constructions. Therefore, an interorganizational dynamics checklist have been made, appendix A. When these dynamics are not protected throughout the collaboration phases, they might become a source of bias during the empirical stages. Bias is defined as any inclination that precludes impartial evaluation of a procedure (Pannucci & Wilkins, 2010).

Team & case selection
From this literature review, the first step towards the empirical phase is to identify the team and case selection for this research. Since for this study the decision-making processes and the behavioral factors of the stakeholders, the team and organizations are important. Some contextual factors of (Gehner, 2008) have been included.
At first, organizational criteria are set. One of the criteria is the organization's track record or performance, this is seen as a reflection of its capacity to handle the inherent risks of real estate development (Gehner, 2008). Currently, circular construction developments pose more risks than linear building developments (Donner et al., 2021; Hossain et al., 2020; Norouzi et al., 2021; Venselaar et al., 2010). To determine if the business has the financial resources to assume the risk, the organization's performance is crucial. This particularly applies to the client (financiers), the architect, the engineers, and the contractors.

Secondly, contextual criteria are established, with the portfolio's size and composition identified as influential factors. Both the scale of the project and the portfolio are considered, since they show whether or not an organization is familiar with certain projects and has relevant expertise (Gehner, 2008). The project management team should have no more than fifteen members in order to prevent the study from becoming too complicated (Krueger, 1994). To decline or exclude the 'ordinary' project complexity, other interdependent factors should be avoided, such as historical or monumental buildings, absence of asbestos (when this affects the ambitions), external financiers, (socio) political significance and views (misaligned interests) and a practice of constantly replacing project management stakeholders (Bolzan de Rezende et al., 2022).

Phase iii.
After the initial phase of theoretical research, the empirical phase commences. In this phase, two qualitative data analyses will be conducted to ensure comprehensive data inputs. The first data source will be an exploratory interview, followed by a brainstorm interview. The analyses of these data sources will be presented using different frameworks and diagrams, based on distinct research methodologies.

Explorative interviews
Initially, the explorative interviews should provide more exploratory information on the stakeholders, the social network analysis, the many ambitions on scale levels 1 to 3, and its power index and their ability to influence. Both responses correspond to systemic design steps 1 and 2. By recognizing the boundaries imposed by power influences (Chinyio & Olomolaiye, 2009; Olander & Landin, 2005; Reed et al., 2009; Schmeer, 2000; Winch, 2010) and learning the system by identifying the many project and process ambitions on scales 1 to 3 (P. Jones & van Ael, 2022). As

part of phase 2 of the systemic design, the organizational checklist (appendix A) will be assessed during the interview. As previously stated, it is crucial to determine if the fourteen organizational dynamics, identified by Kooter et al. (2021), are maintained throughout the processes.

Prior to conducting interviews, an interview procedure, appendix C, is established. This interview protocol of the semi-structured interview acts as a guide, but gives room for flexibility to guarantee that the whole narrative of the stakeholders are disclosed (Turner III & Hagstrom-Schmidt, 2022).

Later, this phase will start with the third step of the systematic design toolkit, within this step the different behaviors of the project cases will be examined (P. Jones & van Ael, 2022). At first, an influence map will be created. This map will enhance comprehension of how diverse decision-making processes unfolded and by whom they were directed and influenced (Frooman, 1999). Additionally, the causal loop diagram will be made. This map facilitates cross-boundary discussion and collaboration, as well as prospective views and design possibilities for complex sociotechnical systems and system transformation (Haraldsson, 2004). During the interview, the fourth step of the systemic design will be addressed as the rationale for non-circular decisions is discussed.

Phase iv.
The fourth phase will analyze step 5, 6 and 7 of the systemic design approach. These steps concentrate on modifying the system. With the brainstorm interviews, an incentive scheme will be developed, using a framework from Jones & van Ael's (2022) pages 156-157 as a reference.

Brainstorm interviews
In the initial interview with a project management stakeholder, the current situation of the project cases is examined. The second interview will focus on innovative, exploratory perspectives regarding the potential implementation of incentives. For this, an individual brainstorm interviews method is chosen. When brainstorm interviews are conducted collectively, individuals are less likely and willing to give answers that have a negative impact on others (social pressure), start stereotyping answers, some stakeholders will not contribute ideas (free-riders), resulting in decreased productivity, and feel less comfortable providing honest responses (Paulus & Dzindolet, 1993).
Individual brainstorm interviews allow for the formulation of targeted, open-ended questions. Interviews that facilitate brainstorming are an effective method for generating new ideas. Therefore, open-ended questions (with an emphasis on "how" inquiries) are posed, and interviewees are guided and assisted in formulating creative and unconventional responses (based on the answers of the first interviews). This method allows for a high degree of flexibility in the discussion and a deeper delve into the personal experiences discussed in the first interview; by establishing a more intimate situation, a higher level of participant engagement can be achieved (Stolterman et al., 2009). Lastly, the various incentives will be put into a framework; step 6 of systemic design: the theory of systems change model.

Phase v. – vi.
In the fourth phase, conclusions and recommendations will be formulated. In the fifth and final phase, the research will be presented and evaluated.

Data analysis

In this research proposal, explorative interviews will be employed. For the explorative interview data analysis, a semi-structured interview procedure will be used, appendix C (Blaikie & Priest, 2019). The interviews will be recorded, transcribed, and key findings and quotes will be included into method frameworks and examples from (P. Jones & van Ael, 2022). During workshops, participants will fill out these documents personally. Other approaches, such as the checklist in Appendix A, will be applied to gather additional relevant data.

For both the first and second interviews, the analysis is based on the understanding of social interaction and cognition, which is necessary when researchers have to investigate how people behave and communicate (Anthony Onwuegbuzie et al., 2009). In general, this type of analysis involves selecting representative or unique or specific components or aspects of language use (e.g., a few lines from an interview transcript) and analyzing them in detail in order to examine how versions of elements such as society, team, organizations, experiences, and situations emerge in discussion and debate (Phillips & Jorgensen, 2002).

Data plan

(Wilkinson et al., 2016) provides four ethical considerations for scientific research. The four FAIR data principles give data producers and publishers a set of benchmarks. They assist researchers to comply with the expectations and standards of their funding agencies by guiding the execution of the most fundamental levels of effective data management. By urging all data producers and publishers to review and follow these principles, and to engage actively in the FAIR initiative. These four principles are shown in figure 10.

Due to the language barrier, however, interviews may be conducted in Dutch. Otherwise, there is a risk that stakeholders would not be able to convey their feelings effectively, which might lead to misinterpretation (Blaikie & Priest, 2019). Consequently, it is possible that meeting recordings and notes will be in Dutch. In all other documents, however, English will be used.

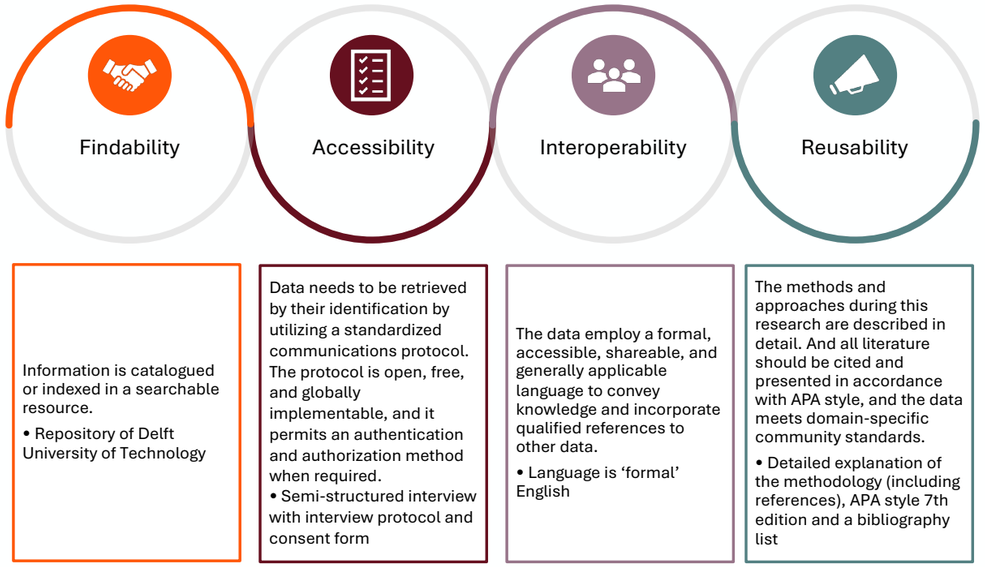


Figure 10: Ethical considerations (own figure based on (Wilkinson et al., 2016))

Ethical considerations

This research outcome is entirely dependent on the project management stakeholders' incorporation willingness. The participants will be required to sign an informed consent form ,appendix B, in order to get their permission to engage in specific research aspects, to evaluate the research objective, to agree to the terms and conditions, and to be recorded (Blaikie & Priest, 2019; Diener & Crandall, 1978). To protect the participants' privacy, they participate anonymously and in confidence, and this will be maintained throughout the procedure.

The Delft University of Technology regulations on Human Trials (2016), the Human Research Ethics Committee (HREC) requires approval for Human Research, in which its screening service is essential for every research using data received from Human Research Subjects. The HREC documents include an evaluation of possible risk assessments, ethical issues, and a data management plan applicable to the project. The HREC application needs three documents: a completed HREC checklist, an informed consent form, and a data management strategy. These documents can be reviewed in the appendix. All documents have been approved by the HREC.

Research limitations

During the human interactions within the interviews or focus/discussion groups, many constraints might develop during the investigations. Participants may feel compelled to provide politically, morally, and socially acceptable responses. In addition, it is difficult to determine whether they answer honestly. Consequently, they may provide an inaccurate image of the circumstance or occurrence.

Moreover, throughout the study, a particular project case and team will be selected, the contextual circumstances, project-specific features, and personal individual factors may also impact the outcomes.

Furthermore, each stakeholder in project management has their own position, status, and power index. All these variables may affect the responses provided. Moreover, there is a social position and status disparity between the interviewer and interviewees, which may also influence the responses.

RESEARCH OUTPUT AND DATA COLLECTION

Research output

Prior to addressing the main research question, several sub-research questions are explored and analyzed. The systemic design toolkit has been employed to structure the various research outputs, which are presented in Figure 9.

In order to address the main research question, two specific research outputs will be examined. One of the intended research outputs is an incentive scheme that encompasses the various incentives identified during the literature review, as well as incentives recognized by project management stakeholders. This scheme will assist stakeholders in promoting a circular building environment by providing an overview of economic, social, and moral incentives that impact specific stakeholders. The scheme will include relevant data such as:

- Incentive cluster (financial, moral, or social)
- Stakeholders (targeted audience and suppliers)
- The source of the incentive
- Additional literature: opportunities, positive effects, potential risks, and negative effects

Once the different incentives that can serve as effective encouragement strategies are identified, the next part of the research aims to determine how this strategy can be implemented by different users. To visualize this, a Sankey diagram will be created, displaying the different stakeholders (suppliers and targeted audience). This approach is intended to be implementable by all project management stakeholders, including decision-makers and policy-makers, regardless of their position, power index, or impact.

Data collection

To achieve this goal, the following research outputs will be utilized:

- A theoretical framework that includes incentives, interorganizational dynamics, and contract models.
- Qualitative data sources structured and analyzed using the systemic design toolkit, which will involve:

1) explorative interviews
2) brainstorm and validation interviews

The participants for these interviews will be selected from different project cases and will be contacted through the graduation internship company.

ii. THEORETICAL

This chapter provides an analysis of various research concepts, including project management stakeholders, the disparity in circular commitment between public and private organizations, the influence of interorganizational dynamics, and the research gap concerning incentives.

THE GROWING IMPORTANCE OF THE CIRCULAR ECONOMY

First, we shall expound on the environmental, economic, social, and political requirement for circular buildings. While the construction sector must gradually transition to a circular economy, the European Union enacted stricter and more extensive regulations. Rather than expanding the number of building renovations, the construction sector should increase its support for building renovations. In addition, by 2030, a new energy efficiency benchmark with an ambitious goal of 49 percent renewable energy in buildings will be implemented.
The 2020 launch of the new European Bauhaus intends to speed the transformation of our society and economic sectors in terms of building and lifestyle, providing people with access to circular, inexpensive, and less carbon-intensive products and services. This transforms the European Green Deal into real measures that will enhance the quality of life in buildings and public places. Consequently, the Green Deal also encourages architects to contribute to the transition. (Directorate-General for Communication (European Commission), 2022)

But what are the ramifications for the Netherlands? By 2050, the Netherlands want to have a fully circular economy. Currently, the building industry accounts for fifty percent of raw material use in the Netherlands, a substantial percentage of which is demolition waste. New innovations in the building industry are required to accelerate the processes of the circular economy. The government has developed several initiatives and interventions. One of them is that, beginning in 2023, all national, provincial, and local government procurement shall be circular, unless this is not (completely) practicable. All government procurement will be circular by 2030, which will be reflected in the contract forms and models. In addition, to assist the circular economy, the federal government will provide a subsidy option for temporary financial support at the level of the individual enterprise for circular business and revenue models. Governments and market participants will examine collaboratively which models may be used for various product categories or conditions. (Ministerie van Algemene Zaken, 2018).

The transition towards a different stakeholder decision-making approach
To enlarge the circular building economy a paradigm change is necessary. This requires a fundamentally different approach to stakeholder management, decision-making procedures, and potential incentives to specific project stakeholders. The major players, or the actors who oversee decision-making processes, need to alter their conduct (Hart et al., 2019; Hofstetter et al., 2021; Munaro et al., 2020).
According to the problem statement, these project management stakeholders are described as team members who participate in the project's decision-making procedures (Aminoff et al., 2016). In the next chapter, an elaborative overview of the different stakeholders is given.

However, as stated in the problem statement within these project management stakeholders an interorganizational conflict appears. A lack in mentality, behavior and attitude on organizational level causes a lack in commitment towards the circular building environment (Hart et al., 2019; Munaro et al., 2020). As part of this research, the third sub chapter will dive deeper into the interorganizational relationships to better understand the interorganizational conflict that currently arises (Kooter, Uden, et al., 2021). To develop a shared circular vision, figure 13.

THE PROJECT MANAGEMENT STAKEHOLDERS

The definition of project management is the internal integration of managing team members (Copping & Davies, 2016; Winch, 2010). Project management is both structural as project process driven. (Hjelmbrekke et al., 2017) explains various factors that affect this process. These include leadership (motivation and incentives), resource distribution, alliances, stakeholder participation, and informal contacts and communication. Various internal project management stakeholders are included in this procedure.

At first, a stakeholder is defined as actors who will "directly gain (benefits) or lose " from project actions (Winch, 2010). Project management stakeholders are defined as those who make (final) project choices about the construction/ building development (Roeder, 2011). Nevertheless, not only the stakeholders but also the overarching organizations are represented. The project management stakeholders can be seen as the individuals or groups who have a vested interest in the success of the project and its operating environment. The term 'vested interest' is synonymous with the crucial term 'stake' in this context. Stake might be described as real or perceived advantages, risks, or damages resulting from project and/ or organizational activity. (Olander & Landin, 2005)

Notably, project management stakeholders are those who participate in decision-making processes (Aminoff et al., 2016). This team includes both formal and informal stakeholders. Consultants are those who participate in decision-making processes but have a more directing and supportive role (supply), these members are resourceful. Oppose to the less formal stakeholders, are the formal stakeholders. These members make final project decisions, an example of a formal stakeholder is the client (Gerding et al., 2021). The role of the project manager is to act as the interface between the client's desires and the capabilities of the resource bases (Winch, 2010).

(Aminoff et al., 2016; Olander & Landin, 2005; Winch, 2010) have made a list of project management stakeholders. This is shown in table 3.

In terms of circular ambitions, however, different distinctions should be established across different client and organization types. Since the scope and number of circular ambitions might vary based on the organization structure. First, a contrast is drawn between public and private organizations. Later, a quick explanation of the divergent circular perspectives of client owners (financiers) and client users will be given.

Table 3: Internal stakeholders project management team
(own table, based on (Aminoff et al., 2016; Olander & Landin, 2005; Winch, 2010).

Project management stakeholders	
Demand (formal)	**Supply (informal)**
Client	Architect
(Property owner)	Designers
(Financers / shareholders)	Engineers
Client's employees	Contractor(s)
Client's suppliers	Trade contractors
Project manager	Material suppliers
	Other consultants

CIRCULAR COMMITMENT PUBLIC VS PRIVATE ORGANIZATIONS

The primary difference between public and private organizations is their ownership (Perry & Rainey, 1988). Unlike private companies, which are owned by entrepreneurs or shareholders, public agencies are jointly held by political communities. This concept is related to two further public/private distinctions. Firstly, unlike their commercial equivalents, governmental organizations are primarily supported by taxes rather than customer-paid fees (Niskanen, 2017; Wamsley & Zald, 1973). Since executive compensation is often dependent on performance, private businesses are likely to profit from improved performance. Thus, private businesses place a greater emphasis on financial assets (Boyne, 2002). Secondly, the majority of public sector organizations are governed by political factors, not market forces. In other words, the political system rather than the economic system imposes the major limits (Dahl & Lindblom, 1954).

Overall, public, and private organizations may approach circular ambitions differently due to differences in funding, mission and goals, resource allocation, long-term perspective, and regulatory environment (Klein et al., 2020; Levering & Vos, 2019; Owojori & Okoro, 2022). Private organizations can prioritize financial returns and rely on market incentives to support circular initiatives, whereas public organizations may prioritize social and environmental objectives, be subject to government mandates and policies, and have access to governmental funding (Boyne, 2002). This may also have an impact on the circular ambitions and decision-making processes. During this research, this difference should be kept in mind and to do so, some different circular approaches and viewpoints have been examined, in figure 11 some of these aspects have been highlighted.

Long-term perspective

Public organizations may be more likely to take a long-term perspective in pursuit of circular ambitions, as they often have a mission that extends beyond short-term financial gains. Profit-minded organizations may be more focused on short-term results and may need to balance circular ambitions with financial performance.

Funding

Public organizations may have access to government funding or other resources that can help them achieve their circular goals, whereas private organizations may need to rely on market incentives or need to invest own capital to support circular goals. However, both organizations may be eligible for tax incentives or grants to pursue circular goals.

Mission and goal

Public organizations typically have a mission that emphasizes social and environmental objectives, whereas private organizations are more profit-driven and focused on making revenue. Moreover, in order to encourage other stakeholders, government entities are frequently required to impose their own laws and policies on the built environment.

Figure 11: Different circular mindset regarding circular ambitions between private and public organizations own figure based on (Klein et al., 2020; Boyne, 2002; Levering & Vos, 2019; Owojori & Okoro, 2022)

Generally, both public and private organizations prioritize circular ambitions, but the emphasis may vary (financial vs social – political). As private organizations often place a greater emphasis on enhancing their financial situation, circular objectives are often eliminated from projects. In contrast, private organization prioritize and safeguard circular ambitions since these organizations reflect and feel more pressure to replicate governmental rules and regulations (Bolderdijk et al., 2011; Directorate-General for Communication (European Commission), 2022; Hossain et al., 2020; Klein et al., 2020; Levering & Vos, 2019; Owojori & Okoro, 2022).

THE CHALLENGING PROCESS OF A FINANCER INVOLVED

Between development projects, a distinction can be made between the clients-owners and the client-users. In certain instances, an asset, client-owner (financier) is involved in a project. They retain ownership but rent their property to a particular user (s). Within these types of construction projects, various considerations must be evaluated.

It is well-known that decision-makers commonly choose the option that is most advantageous to them, and that they rarely opt for the alternative that is less attractive (Beach, 1993). This behavior is also visible within the redevelopment's financial choices of asset owners. (Bon & Hutchinson, 2000; Zhou & Lowe, 2004) assert that the incurring higher short-term capital costs and the inadequate of market value are the primary obstacles to the implementation of sustainable and circular measures in the building. On the long-term, it has been proved that these sustainable and circular choices provide a longer life cycle and a greater return, despite their higher upfront costs (Bordass, 2000). Therefore, financiers should be able to rely on the positive impact of sustainable and circular building techniques on the building's market value and/or use. However, it is challenging to persuade a financier to support this option since the increase in market value may be difficult to quantify because it is not reflected in short-term costing plans, and financiers are highly preoccupied on the short-term profits (Häkkinen & Belloni, 2011). However, (asset) owners become increasingly interested in investing in more sustainable solutions when they see direct benefits from doing so. Moreover, there is a current trend in which owners are charging higher rents for green buildings with certifications as ESG, LEED, BREEAM, Green Globes, etc. (Giorgi et al., 2022; Kibert, 2016). The applicability of this to circular building techniques and procedures should be investigated further.

Therefore, it can become more challenging to implement circular building techniques in cases where a financier is involved. Moreover, these stakeholders may require other incentives than client owners and direct users to implement these methods.

REAL ESTATE CONTRACT DELIVERY MODELS

In addition to the aforementioned contextual project elements, this study should additionally include the impact of specific procurement models, contractual project elements. Since not only the presence of a financier may complicate the process, but also the selected contract procurement model can affect the integrated circular building's progress and outcomes. This chapter provides a quick overview of the differences between traditional and integrated procurement models and their possible influence on circular decision-making processes.

In a traditional procurement contract, the client employs an architect and other consultants to design the project. This traditional contract structure is typically more rigid and hierarchical. This contract type is also known as design-bid-build and is typically governed by the standard terms and conditions of New Rules 2011. The client then hires a construction company to execute the project, which may result in a lack of innovation and incorporation of the contractor's expertise. Overall, this is a linear process in which each entity works independently and within their own area of expertise. This contract model places a great deal of control, liability, and risk on the client. This provides the client with a high level of control and steering, but this may be a disadvantage due to the client's inexperience. In addition, the various project management stakeholders are less integrated in comparison to integrated contract models. (Hobma & Jong, 2016)

In an integrated contract, the project owner, contractor, and potentially other parties such as architects, engineers, and consultants, enter into a single contract or a set of interconnected contracts. The purpose of this arrangement is to foster collaboration, communication, and joint decision-making among the involved parties. This type of contract is also referred to as "design-and-build" and "turnkey" contracts. This contract model is based on high levels of collaboration and partnership, and it incorporates the diverse disciplines of the project management stakeholders throughout the various design phases. This strategy establishes a collaborative environment in which all parties work toward a single objective. Additionally, it encourages the exchange of knowledge and expertise, resulting in improved decision-making and project outcomes. In contrast to the traditional contract, the contractor (along with other project management stakeholders) is involved early, allowing this entity to actively participate in the creation of opportunities (Hobma & Jong, 2016)

During the empirical study in which cases will be analyzed, the impact of contract models on circular project outcomes should be considered.

THE IMPACT OF INTERORGANIZATIONAL DYNAMICS

Kooter et al. (2021) conducted research on the understanding of interorganizational initiatives to encourage the transition towards a circular building industry. She identified an interorganizational project as a group of organizations that interact reciprocally to coordinate their efforts for a complex service or product during a finite period.
This study led her to the conclusion that there are fourteen dynamics associated with the implementation of circular projects. And that when these dynamics are maintained during a project, higher circular building outcomes are realized. In this chapter, the following dynamics are summarized, along with the affected scale, table 4.

Table 4: The interorganizational project dynamics (own table, based on (Kooter et al., 2021)

Dynamic	Short explanation	Scale
Top-down support	Initially, it is essential that the management team be amenable to change. Secondly, the more formal and informal support top management may provide for circular goals, the more likely circular measurements are to be implemented. Lastly, the official circular documentation (policies) should align with the project's culture.	1
Organizational and sectoral cultures	This sector's culture is seen to be technology-driven rather than strategy-driven, risk-averse, and heavily focused on short-term cost reduction. The construction industry has also been described as a culture, while fresh innovative ideas are developing slowly. The most effective approaches to promote circular mindsets, are to create attractive examples, create a circular mindset, and encourage innovative solutions.	1
Power and tensions	During the prerequisite phase, the client is in the pilot's seat, and they may simply change from an ambitious circular aim towards other values. Therefore, a recursive link between top management and the permanent organization is essential for the success of circular building projects, which may need the hiring of personnel with a distinct profile, more focused on maintaining relationships between temporary and permanent organizations.	1
Staffing continuity	Staffing between projects, across projects, and organizations is advantageous for maintaining circular knowledge within the team.	1 2
Partnership based on more equality	Create a contract that allocates the risks between the client and the contractor, since circular construction elements carry more risk. Financially distributing the risks via the use of partnerships, a shared budget for unforeseen hazards, or an alliance contract will boost the desire to establish a circular organization.	2

Table 4: The interorganizational project dynamics (own table, based on (Kooter et al., 2021)

Dynamic	Short explanation	Scale
Project team identity	Significant to the decision-making processes is the establishment of a project's identity. This increases transparency among stakeholders. Identity is the alignment of project participants with the aims, values, and standards of the project.	2
Reciprocal leadership	Partners maintain a close check on the trade of resources, recognize each other's efforts in implementing circularity measures, and assist each other in finding solutions to difficulties.	2
Transparency and trust	The formation of openness and trust is one of the most important supporting qualities of the dynamics seen in circular building projects, which is required to generate flexibility, attain greater quality, and eliminate greenwashing.	2 3
Shared circular ambitions	Contrary to projects where objectives are defined by a single partner, it seemed that reaching a shared circular ambition via dialogue was the preferable method, with the notion that communication would result in superior planning.	2 3
Pioneering leadership	To attain circular goals, it might be advantageous to assign a project member the duty of putting circularity on the agenda; this raises awareness.	2 3
The struggle of new roles	The construction of circular buildings necessitates more knowledge and responsibilities. Individuals should assign these various roles and responsibilities. Within the context of this thesis a stakeholder should be assigned to specific circular role and responsbilities.	2 3
Knowledge flows	The following factors will help to continuously apply circular measurements in projects. Enlarge the knowledge streams, document useful knowledge, monitor the circular construction industry and find reference projects.	2 3
Shared circular ambitions	Contrary to projects where objectives are defined by a single partner, it seemed that reaching a shared circular ambition via dialogue was the preferable method, with the notion that communication would result in superior planning.	2 3
Genuinely driven individuals	When circular development is not yet the norm, genuinely driven individuals are a necessity for establishing and achieving circular goals. Working with similarly minded individuals will increase transparency and confidence, hence increasing the likelihood that circular initiatives will be implemented.	3

According to Kooter et al. (2021), for the execution of circular projects, the fourteen preceding dynamics should be integrated, sustained, and supported. Based on these considerations, incentives impacting scales 1, 2, or 3 may be devised. Additionally, the following variables may introduce bias into the research: for example, transparency and trust between stakeholders highly impact the project outcomes. When this is not sufficient, incentives on other aspects within the project team will not become a successor. Meaning that, these fourteen dynamics should be well monitored during phases of the research.

In recent years, several researchers have identified various metrics and ways for achieving the goal of the circular economy. Multiple studies have shown that, for instance, transparent cooperation and communication between players leads to more circular practices. Due to recent changes in circular economy initiatives, several factors must be reviewed to allow circular construction choices. Examining and developing a technique to assure the circular decision-making processes amongst actors will be a component of this endeavor. (Hossain et al., 2020)

From this perspective, a research gap has been identified. This study will delve further into the influence of different incentives on project management stakeholders during the decision-making processes.

THE RESEARCH GAP: INCENTIVES

Incentives and disincentives (rewards and penalties) often drive, affect, and motivate people's behavior. Analyzing the various incentives may lead to better appreciation of the behavioral drivers of individuals. This knowledge may aid in incorporating specific incentives to attain a goal. But first, we must first elaborate on the three sorts of incentives:

- **Financial incentives:** acting in the best financial interests.
- **Social incentives:** operating in a manner that will get social approval/acceptance .
- **Moral incentives:** behaving in accordance with what is seen as the correct action.

(Levitt & Dubner, 2005)

Diverse economists have studied the effect of incentives on a vast array of organizations and economic activity. (Campbell, 2006) determined that incentives operate as a coordinator throughout individual decision-making processes, with information transmissions and motives serving as their primary coordination variables. Figure 12 provides a concise summary of these variables with examples. Part of the financial theory of incentives is dedicated to the creation of systems that incentivize decision makers to utilize knowledge concerning benefits. Incentives may be utilized for a variety of purposes, including to promote an organization's own welfare and profitability, nonmaterial incentives, and other socially linked signals.

Incentives may result in long-term behavioral changes, even when this incentive is eliminated after a period. Incentives are proven to be a successful strategy since they push individuals to try out the new or non-preferable action and they discover that it has more positive and fewer negative repercussions than expected, or when the new behavior/habits are created. There is evidence that incentivizing a behavior over a reasonable amount of time may result in more favorable evaluations and long-term improvements in the behavior. (Bolderdijk et al., 2011; Gibbons & Roberts, 2012; Steg et al., 2014; Zeiske et al., 2021)

Below are research-based examples of the financial, societal, and moral incentives given.

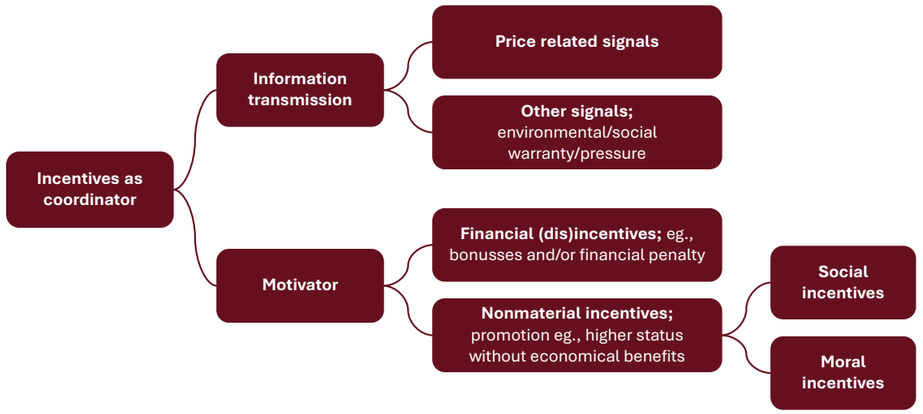


Figure 12: Examples and factors of incentives as a coordinator (Own figure, based on (Campbell, 2006))

FINANCIAL INCENTIVES

Regarding the financial and economic incentives, different research has been done particular on the encouragement of stakeholders to the circular economy. As indicated before, the government has established a variety of objectives and legislation to encourage the construction sector to develop in a circular pattern. To promote this, the government and EU is giving a variety of supportive methods to expand this industry. One of them are economic incentives including such subsidies and taxes, for example the EU taxonomy given by the European Union (European Commission, n.d.). It has been shown that this economic gain assists decision-makers in constructing circular buildings (Munaro et al., 2020).
While such tactics do encourage environmentally sustainable and circular behavior on the short term (Zeiske et al., 2021). Other studies has shown, however, that acting economically for environmentally friendly is not an effective strategy for altering behavior (de Groot & Steg, 2009). Different research has concluded that it does not always provide the expected consistent, long-term behavioral mentality (Bolderdijk et al., 2011; Steg et al., 2014; Zeiske et al., 2021). Besides, individuals are predisposed to see these indicators differently if they are incentivized to engage in sustainable behavior via subsidies and taxes. Many see it as economically beneficial rather than ecologically favorable. They have a tendency to forget the original motivation for the economic incentive (de Groot & Steg, 2009).

Financial incentives are often associated with other non-financial characteristics, such as the ease of program participation and marketing strategies. Marketing strategies as implementing specialized tactics as a marketing strategy to attract (new) stakeholders. This can also occur at the project level when specific project members are recruited. Participation in the program might also occur at the user level. (Jakobsson et al., 2002; Laffont & Martimort, 2001; Steg et al., 2018)

Another financial incentive might be carbon offsets. A disadvantage of this type of financial incentives is that the intrinsic drive for sustainable/circular actions may be substituted by extrinsic motivation. It may even give the impression that one may buy the right to pollute, as people no longer feel regret when engaging in environmentally harmful behavior after having paid for it. As a result, financial incentives may increase the behavior that was intended to be reduced, since people think they have "paid for it" (Steg et al., 2014). Despite the fact that this form of financial incentive does not apply to this specific study, the outcoming behavior of this incentive should be considered.

(Fehr & Falk, 2002; Gibbons & Roberts, 2012) conducted research on the impact of incentives on companies' financial discussions, at high levels. During meetings with a group of stakeholders, they discovered many elements that affected the decision-making. One of them was the application of reciprocal financial incentives. With reciprocity, parties reached a verbal agreement to produce a win-win scenario for the project or for future enterprises to convince them for a specific decision. Within this reciprocity behavior, employees tend to exhibit conduct that is advantageous for both themselves (as individuals) and the company.

Lastly, (Suprapto et al., 2016) describes two financial incentives. At first, contractual incentives, an incentive whereby different laws and/or restrictions are included in the contract between actors. And secondly; sharing financial risks. This can also be accomplished by using specific construction contract formats, or via other methods. In Finland, they have already obtained a new sustainable and innovative public procurement (Finnish Ministry of the Environment, n.d.).

SOCIAL INCENTIVES

(Fehr & Falk, 2002; Gibbons & Roberts, 2012) discovered the influence of a project manager/leader in conjunction with moral and social incentives. This project manager/leader increased the likelihood that stakeholders would agree on a specific event by fostering a culture in which he acknowledged powerful arguments and clearly addressed the negative consequences of certain actions. This incentive is both social and moral. Socially, because you want your project manager's approval, and morally, because the project's stakeholders cannot disregard negative results, which is known as self-justification. Nevertheless, the perception of social pressure is a different motivator. In collective activities, the urge to react and behave in a particular manner because everyone in your network does so. This may potentially even have detrimental effects on the individual. (Roeder, 2013; Rotemberg, 1994; Steg et al., 2018).

In addition to the project culture, organizational culture might also respond to social incentives. By establishing social value for workers who actively engage/motivate to include particular goods/services during work (Gibbons & Roberts, 2012).

This method is illustrated via the application of reputational incentives. This sort of incentives is frequently effective at encouraging individuals to make particular decisions. For instance, "employee of the month" is a public acknowledgement. While the action is supported and recognized by the organization's leadership/ top management, the perception of the employee's positive behavior will increase the likelihood that he will repeat it, and other employees will recognize the advantages of demonstrating similar conduct (Benabou & Tirole, 2003). This culture is also discernible within project teams. Peer (social) pressure, activity monitoring and discussion, and articulating group rules are acknowledged as significant influencers of behavior within a team (Gibbons & Roberts, 2012).

Rotemberg (1994) suggested that humans are initially entirely self-centered but can develop altruistic tendencies toward specific individuals. Altruism is the promotion of the welfare of others at one's own expense or risk. If different people's actions are strategic complements, he reasoned, gaining a reputation as an altruist would be advantageous because it would affect others' expectations of one's future conduct, so pushing them to behave more positively towards certain individuals in the future. Rotemberg suggested that generosity should be expected when individuals work as a team and are compensated based on their collective output. Moreover, as a group leader is responsible for defining the work pace, it is ideal for her to be selfless toward the employees, as they will be more responsive to her leadership. (Rotemberg, 1994). This strategic altruism behavior could serve as a social incentive to encourage certain project decision-making behavior.

As previously stated, Kooter et al. (2018) have identified fourteen interorganizational dynamics that must be fostered to construct circular architectures. According to (Suprapto et al., 2016) improved relational attitudes, strong collaboration quality, and a positive working connection between the client and contractor result in improved project performance. Within his research, contractual incentives to improve social relationships have been applied.

Lastly, the social warranty is an additional social incentive. According to Campbell (2006), an organization utilizes social cost pricing, also known as social warranty, if each option imposes a cost equivalent to the overall cost incurred by the rest of the group as a result of that choice. In addition to the economic risks, they also share the social risks. It is more likely that stakeholders will be risk tolerant if it is explicitly stated that everyone becomes socially responsible when they all agree on a particular occurrence. Socially speaking, no one person is to blame for the failure of certain construction strategies (e.g., circular building systems). (Campbell, 2006)

MORAL INCENTIVES

Information transmissions as incentives can be an effective means of socially influencing a stakeholder towards a particular decision. (Campbell, 2006; Dittmar, 1992) address the value of providing informational resources to stakeholders to enhance discussions throughout the decision-making process. A stakeholder's viewpoint may be directly affected by the efficient utilization of materials.

Multiple studies have shown that adhering to values that transcend an individual's immediate self-interest, such as self-transcendent, prosocial, altruistic, or bio spheric ideals, leads in environmentally conscious behavior (de Groot & Steg, 2009; Gibbons & Roberts, 2012; Rotemberg, 1994). These moral considerations should be supported to promote and generate environmentally conscious conduct.

Furthermore, it has been shown that the relation between environmental self-identity and obligation-based intrinsic motivation results in stakeholders' pro-environmental conduct. When individuals are intrinsically driven, their motivation originates from inside and they are more likely to utilize it in their everyday personal and work-related choices. (Gibbons & Roberts, 2012; van der Werff et al., 2013). It has been proven that, individuals who are intrinsically motivated achieve more environmental objectives than those who are motivated by external benefits (Frey, 1997). This individual drive is strongly associated with a sense of moral obligation. Thus, incentives have been employed to build and react on the intrinsic environmental drive in individuals, this can be achieved by increasing the interest into the topic or idea (Gibbons & Roberts, 2012; van der Werff et al., 2013).
Intrinsic motivation is described as actions that are viewed as enjoyable or challenging, and for which a person is inwardly rewarded (Oudeyer & Kaplan, 2007). However, incentives can also respond to the ethical feelings of individuals. Self-justification can be achieved by hammering on the negative consequences by a representative stakeholder (Roeder, 2013)

Conclusion and summary of the previous stated incentives
Different incentives were utilized to persuade individuals to make specific decisions and/or adjust their behavior, as seen in this chapter. An evaluation of the four categories of incentives provides a broader understanding of which incentives led to beneficial adjustments. However, not all financial incentives appear to result in a long-term shift in strategy; in fact, some may promote the behavior that was meant to be reduced because in some cases it felt that regret can be redeemed. During the empirical study, this should be investigated further. Both social and moral incentives appear to have fewer negative effects, despite being more difficult to implement and monitor.

Table 5 provides a quick summary of all previously mentioned incentives. The supplied stakeholders and targeted audience are included here. The afflicted scale level is also identified, in some cases an external (ext.) party is implicated.

Table 5: Summary of previous discussed incentives (own figure, based on previous resources)

Incentive	Short explanation	Supplied by	Scale	Targeted on	Scale
Promotion	Promotion with salary bonuses.	Project management within organization	1	Employees within organization	3
Financial penalty	Financial penalty which the organization must pay due to ignoring governmental rules.	Government, municipality	EXT.	Client, financier	1
Governmental subsides/taxes	The government provides subsides and/or taxes to give financial encouragement for specific behavior.	Government	EXT.	Client, financier	1
Compensating techniques	A measure/strategy designed to compensate for carbon dioxide released into the atmosphere because of industrial activity (e.g. carbon off-sets).	Client, financier	1	Client, financier	2
Marketing efforts	Utilizing a strategy to attract more circular activities.	Project management stakeholder/ organizations	1-2	Other organizations	1
Contractual	Different laws and/or restrictions are considered in the contract between actors.	Project management stakeholder/ organizations	1-3	Project management stakeholder/ organizations	1-3
Reciprocal	Parties reached a verbal agreement to produce a win-win scenario for the project or for future enterprises to convince them for a specific decision.	Project management stakeholder/ organizations	1-3	Project management stakeholder/ organizations	1-3
Risk-sharing	Sharing financial risks.	Client, financier	1	Project management stakeholders/ organizations	1-3
Promotion	Promotion without economic benefits.	Top-management organizations	1	Project management stakeholders	3
Social warranty	Everyone becomes socially accountable when they all agree on a certain occurrence. Socially speaking; there is no one individual to blame for the failure of some construction tactics.	Project management stakeholders	3	Project management stakeholders/ team	2-3
Social pressure	The pressure to react and behave in a certain way because everyone in your network responds in that manner.	Project management stakeholders	3	Project management stakeholders/ team	2-3
Social approval	Making choices based on the social approval of certain stakeholders.	Project management stakeholders/ team	2-3	Project management stakeholders	3
Reputational value	Social value for employees within an organization who actively engage/motivate to include goods/ services during work; public recognition as "employee of the month".	Top-management organizations	1	Project management stakeholders	3
Articulating group rules	Create group rules, so that stakeholders feel the urge to not break these.	Project manager	3	Project management team	2
Project culture monitoring and discussion	By closely monitoring actions and engaging in dialogues, people should reassess their decisions, and this gives the opportunity for other incentives.	Project manager	3	Project management stakeholders / team	2-3
Altruistic	If various persons' acts are strategic complements, then gaining a reputation as an altruist would be helpful since it would influence others' expectations of one's future conduct.	Project management stakeholders	3	Project management stakeholders	3
Self-justification	Hammering on the negative consequences so that stakeholders cannot ignore the unfavorable outcomes and act differently.	Project management stakeholders	3	Project management stakeholders	3
Self-interest	Increasing the interest in the topic or idea.	Project management stakeholders / team	2-3	Project management stakeholders	3
Self-transcendent	Let individuals entails the extension of personal boundaries by permitting people to believe in their inherent place on the planet.	Project management stakeholders	3	Project management stakeholders	3
Intrinsic motivation	Actions that are viewed as joyful or challenging, and for which a person is inwardly rewarded.	Project management stakeholders / team	2-3	Project management stakeholders	3
Informational resources	Providing stakeholders with informational resources to strengthen deliberations throughout the decision-making process.	Project management team	2	Project management stakeholders	3

Legend

- Financial incentives
- Social incentives
- Moral incentives

EXT *External (unrelated with the project)* 1 *Organizational level* 2 *Project level* 3 *Individual level*

iii. EMPIRICAL STUDY
explorative interviews results

This chapter presents a comprehensive analysis of three project cases, consisting of both a public organization and private organizations. Through semi-structured exploratory interviews involving 23 project management stakeholders, an extensive evaluation of the current situation is conducted. This assessment encompasses a detailed examination of various factors such as bottlenecks, stakeholder empowerment, influences, processes, non-circular behavior, the interorganizational dynamics and implemented incentives.

CASE STUDY SELECTION

In the empirical phase of the study, three project case studies were examined, involving one public organization and two private organizations as clients. These cases were selected based on the criterion that the design phases had already been completed. This criterion was implemented to ensure that stakeholders could communicate freely, without feeling constrained by ongoing design decisions. The stakeholders were specifically asked to analyze the decision-making process concerning the design and strategy phases. The emphasis on these early stages is due to the observation that as the project progresses from the initial phase to project completion, building opportunities, ambitions, and architecture tend to become less flexible, while the cost of making alterations increases (Winch, 2010).

In some cases, multiple stakeholders within the same organization held similar responsibilities, roles, and tasks (e.g., architect, architect-lead, architect-project managers). However, to maintain manageability in the research, a designer or an end-responsible stakeholder was selected to participate in the study.

LITERATURE REVIEW FOR RESEARCH METHODS

In this first part of the research, three cases were investigated using semi-structured interviews with an interview protocol. Within the overall strategy of the systemic design toolkit, several methodologies were utilized to evaluate the interview data and to get insight into the current stakeholder position, behavior, decision-making processes, and deciding factors for adopting (non-circular) building methods. The different methods are aligned with the purposes of each step within the systemic design toolkit. To further elucidate and discuss the figures, the case unique characteristics and determining factors will be shared. In the end, all investigations will inevitably expose the gap in the literature: the impact of incentives (what incentives are needed, who gives this, and which stakeholder should be influenced). A brief literature study is given below to offer a brief explanation and justification for the selected strategies.

Case description

Prior to analyzing the three project cases, an overview of the project management stakeholders is presented. The identification of various participants in the project management team is followed by the determination of their interrelationships. Understanding these interrelationships helps in comprehending behavioral dynamics. Moreover, this diagram illustrates the structure and boundaries of stakeholder networks, highlighting both influential and peripheral stakeholders (Reed et al., 2009).

In the literature review, a distinction is made between formal stakeholders (decision makers) and informal stakeholders (directive/ consultant functions) (Gerding et al., 2021; Roeder, 2011). This distinction is incorporated into the social network analysis. The diagram provides a broader perspective on project governance and the development, evaluation, and modification of project initiatives. The model draws on examples from Freeman (2004), P. Jones and van Ael (2022), and Schneider and Buser (2003).

Throughout the research process, a value framework was utilized to assess the characteristics of each case. This value framework, derived from the systemic design toolkit developed by Jones and van Ael (2022), outlines the objectives, characteristics, and requirements of the current cases. These details can be found in Appendix D, E, and F. It should be noted that the content of these figures primarily serves as background information for the researchers and may be reviewed for additional project and organizational insights.

Secondary stakeholder characteristics and circular interest table

Prior to conducting interviews, key stakeholders were identified. The remainder of the selection was based on the amount of interest, power, degree of impact, and job activities (a difference was established between purely controlling the building measures (e.g., safety/ vibrations) and advising on a specific aspect of the building (e.g., consultant structural engineer) (Schmeer, 2000).

To successfully apply techniques for managing stakeholders, key stakeholders must be actively involved in the project's governance and steering, while secondary stakeholders must be actively supervised throughout the process (Chinyio & Olomolaiye, 2009). The major focus of this research is on the key project stakeholders. This conclusion was based on literature, personal expertise and the advice of the project manager.

Following the initial interviews, a table is constructed that includes secondary information and characteristics of the stakeholders. In order to facilitate further analysis, it is crucial to consider the responsibilities, main activities, and interests (with a focus on circular interests) of the stakeholders (Schmeer, 2000). Research conducted by Kooter, van Uden, et al. (2021) emphasizes the importance of top-down support and circular intrinsic motivation among stakeholders in promoting the circular built environment. The table provides an indication of whether both values are present among the stakeholders.

The reason that interviewees were asked about their intrinsic motivation in the circular economy is because the literature of (Kooter, van Uden, et al., 2021) have revealed that when people are intrinsic motivated they are more encouraged to make circular professional choices. During the interviews it became evident that the interviewees all had a different interpretation of behaving circular. Within this research a distinction is made between obliged or 'standard' circular behaviors and a substantial circular behavior which may have impacted their lives. Separating carton and glass is an example of 'standard' behavior, whereas recycling and repairing old materials/ furniture/clothing are examples of circular behavior. Within this study, intrinsic (circular) motivation is defined when someone is willing to change their day life activities or behavior and be able to sacrifice something for that (Gibbons & Roberts, 2012; van der Werff et al., 2013).

Power matrix

From on this approach, a stakeholder mapping is developed using a power and interest framework. By plotting stakeholders on the power/interest matrix, project management can gain a clearer understanding of which stakeholders have the greatest influence on the project outcome and who has the highest level of interest in the project's outcome. This mapping is particularly relevant for this study in assessing the power influence within the team of designers/consultants. This method assists the researcher in determining which stakeholders should be included in the engagement study (Chinyio & Olomolaiye, 2009; Olander & Landin, 2005; Reed et al., 2009; Schmeer, 2000; Winch, 2010).

Influence map

While attempting to influence the project and company's decision-making, it is crucial to identify who was involved into the decision-making processes, during which stage and how this was done. To act strategically and alter decision-making processes (by designing incentives), it is helpful to identify present stakeholder influences and involvements. It is possible to employ influence mapping, which focuses on the roles, responsibilities, and interrelationships of stakeholders at various stages of the design process (Frooman, 1999). (Bourne & Walker, 2005) provides an example of mapping the stages and the influencers. With this methodology, influence maps are created. This tool provides a clear understanding of the decision-making processes among stakeholders, even though it has the potential to become quite complicated.

Causal loop diagram

The causal loop diagram is a typical component of systems thinking. Diagrams of causal loops are used to build logic in recognizing the many variables and reasoning that lead to a certain action. These diagrams may be used to get a thorough grasp of underlying causes and to identify causative behaviors within a system (Haraldsson, 2004). This graphic focuses on the reasoning of the specific non-circular choices, while the influence map focuses on the numerous stakeholders involved, as well as stakeholder influences and behavior among others (examples within the project). In this instance, the case being analyzed is the system. Haraldsson (2004) approach is used for constructing the causal loop diagrams.

For the evaluation of the interviews and the analysis of the outcomes, three subchapters are created: project, process, and circularity. This distinction is created on individual expertise. First, questions were asked about the project's specifications, ambitions, and stakeholder roles to gather relevant contextual information (step 1, 2 & 3). After this, more process-based questions were asked. Specifically on decision-making techniques, logic, and the requisite level of authority to lead decision-making processes (step 4 & 5). Then, the circular ambitions were addressed. To have a deeper understanding of the current situation and genuine reasons to avoid circular buildings (step 6). Checking the interorganizational checklist was the final step; this will also be included in the research methodology and findings.

CASE A DESCRIPTION

Case A project management team specification

For the first case, an evaluation was conducted on a project initiated by a public organization. A project management team consisting of twelve roles was established for this case, as outlined in Table 6. Two stakeholders were excluded from the project: the contractor and the vibrations and electromagnetic compatibility consultant. The contractor was not yet included in this project's stage. The vibrations and electromagnetic compatibility consultant's role focused solely on ensuring compliance with building-specific regulations, without providing recommendations on construction characteristics, procedures, or ambitions (Interview case A: project manager, 2023).

This construction project has completed various design phases and is currently in the process of tendering contractors. The project is a completely new initiative with specific requirements.

For the contractor tendering process, the client opted for a traditional contract with a total engineering contract (TEC), utilizing selection criteria that emphasize the provision of additional and innovative circular and sustainable building opportunities. The TEC contract aims to be more flexible and establishes a contractual relationship that encourages innovative and creative design opportunities. To achieve this objective, the TEC incorporates cooperative management techniques and incentives into its processes (McInnis, 2001).model has been applied.

Table 6: Project management stakeholders case A (own figure)

Project management stakeholders
Client - steering group
Client - project development manager
Project manager
Architect
Consultant structural engineer
Consultant installations
Consultant specific building part
Consultant sustainability
Consultant building physics
Consultant circular advisory team

Step 1 Systemic design toolkit: Framing the project case

The client organization comprises various organizational and project-level governing bodies. Initially, the real estate team of the client prepares the real estate programs, budget, and plans for the entire area, which are then discussed with the steering group. However, the steering committee has the authority to make adjustments to the budget and program plans for individual projects. Subsequently, these individual plans undergo review by the client steering group and client advisory group, consisting of managers and users. The client steering group holds ultimate responsibility for making final decisions and achieving project outcomes. However, this group does not actively participate in the project's day-to-day processes.

For the project's implementation, the development manager assumes accountability and oversees all implementation responsibilities on a project-by-project basis. The development manager collaborates with the steering group, advisory group, project manager, and other stakeholders when documentation or designs require examination and decision-making. The development manager holds the ultimate responsibility for establishing and guiding the project management team.

On the other hand, the project manager is responsible for facilitating communication between parties and supporting and managing the various designers and consultants to ensure timely delivery of their products. The project manager plays a crucial role in coordinating the project's activities and ensuring smooth collaboration among the team members. (Interview case A: Development manager, Project manager, 2023).

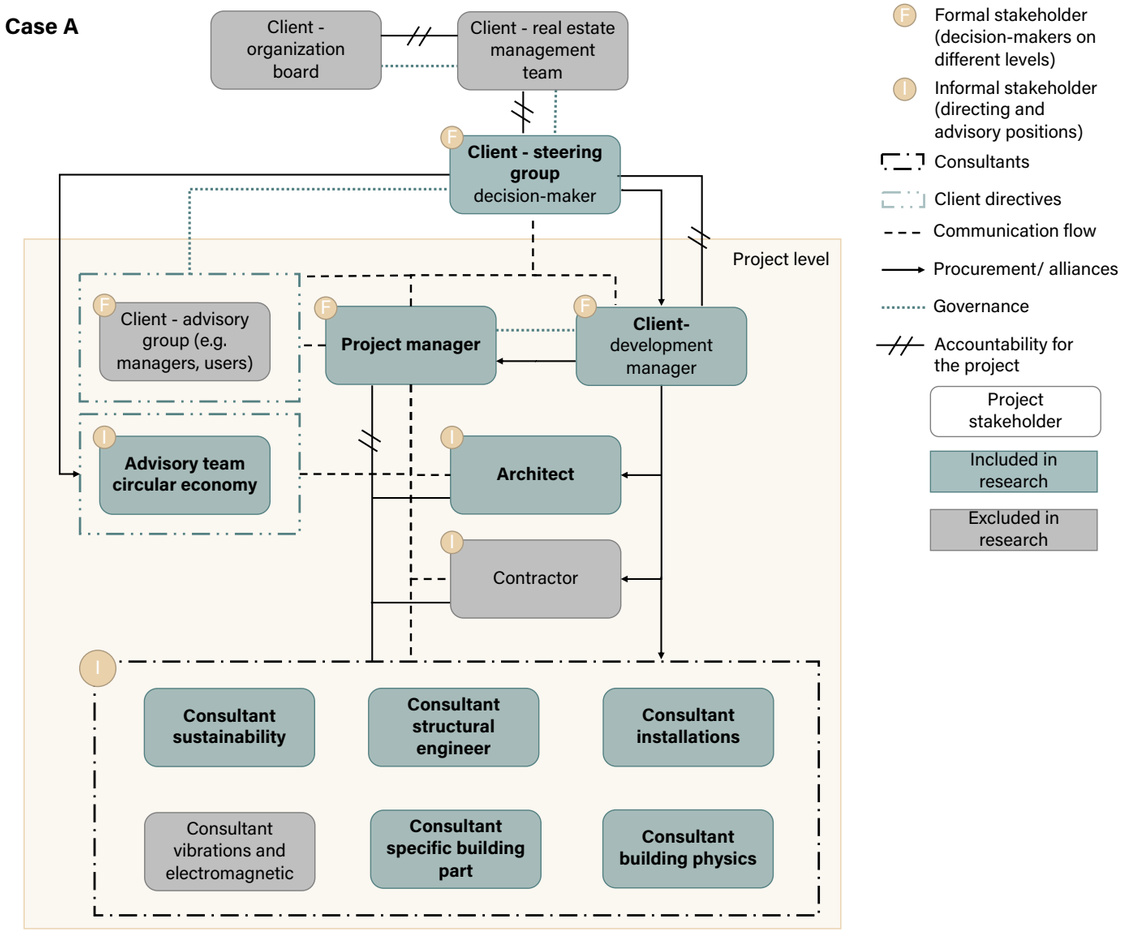


Figure 13: Social network analysis case A (Own figure, based on (Freeman, 2004; P. Jones & van Ael, 2022; Schneider & Buser, 2003)

CASE A FINDINGS

Step 1 Systemic design toolkit: Framing the project case

PROJECT I Secondary stakeholder characteristics and circular interest

To comprehend the numerous roles, responsibilities, and activities, the secondary characteristics of the stakeholders are initially analyzed. Table 7 indicates whether the stakeholders have an intrinsic motivation to participate in circular initiatives and whether their organization encourages their participation (top-down support). Both elements influence the circular decision-making.

One notable finding in this case was the significant level of top-down circular support within the organizations represented by the interviewees. These organizations have implemented various strategies to communicate the circular building goal to their employees and foster their engagement. The client has implemented a specific strategy to facilitate this motivation. These strategies will be further discussed in subsequent sections. Additionally, the project stakeholders themselves displayed a strong intrinsic motivation towards the circular environment.

Table 7: Secondary stakeholder characteristics and circular interest case A (own figure)

Job title	Project roles	Key project activites	Circular drive
Client | steering group	Governance and decision-maker organisational level	Develop organisational ambitions, create project iniatives and butgets and make final project decisions.	
Client | development manager	Governance and decision-maker project level	Launching the project, developing the program of requirements (ambitions and preconditions), ensuring the client can make a the corect decisons, and making interim design decisions.	
Project and process manager	Management, steering and advisor	Procurement of consultants, supervising design teams , chairing and managing construction meetings, quality assurance supervision and gathering information and preparing decision-making documents.	
Architect	Designer and steering	Architect project leader; combining the many objectives and disciplines into a single design while coordinating the architects in the design processes.	
Consultant building physics	Advisor, resource facilitator and reviewer	Responsible and consultant for building physics features such as thermal comfort, daylighting, and insulation. In addition, the building's fire resistance and acoustics were addressed and controlled.	
Consultant structural engineer	Designer, advisor and resource facilitator	Initially participated in the design to assist construct and advise the building's constructions. Furthermore, provide design-related guidance based on skills and expertise.	
Consultant installations	Advisor and resource facilitator	Managing design processes, establishing installation circumstances, defining installation goals, and presenting installation alternatives.	
Consultant building element	Advisor and reviewer	Consultative for certain building installations, constructions (volume and materialization), mandatory safety measures, and other building requirements.	
Consultant sustainability	Advisor and reviewer	Sustainability and BREEAM advisor. Particularly during the design process, evaluate and provide alternatives for sustainability measures. Evaluating materials' environmental impact and energy efficiency.	
Advisory team circular economy	Advisor, challenge and resource facilitator	Insist on the participation of circular building opportunities by posing challenges to project stakeholders, provide governance advice to the client, and participate actively in the development of new research.	

Step 2 Systemic design toolkit: Listening to the stakeholders

PROJECT I Project case ambitions

In the beginning of a construction project, several values and ambitions are defined. Figure 14 demonstrates that, for this client, the same top five goals are developed and evaluated for each real estate project. *''Ultimately, the primary pillar of a project will always be its functionality. If the functionality is not aligned with the users, managers and maintenance, the building is yet not circular''* [Interviewee case A: Consultant building physics, 2023].

Figure 14: Project ambitions case A (own figure)

Although the financial and planning ambitions are rigid standards and projects must adhere to particular benchmarks, there is still some room for flexibility; additional budgets are allocated for the circularity possibilities within case A. And by somewhat, it is understood that flexibility is not limitless for all pillars (Interview case A: Steering group, Development manager, Project manager, 2023) .

''Voor case A hebben we extra geld aangevraagd om een hogere mate van circulariteit toe te passen aan het overkoepelende bestuur. Dit was zelfs boven de normale duurzaamheid fondsen. Dat is gelukt, dus het kan wel, Maar het elastiek is niet oneindig.''
[Interviewee case A: Steering group, 2023]

Additionally, other objectives were developed for this project. For the architect, the building's architecture was also an essential factor; the structure needed to become a local landmark (Interview case A: Architect, 2023). The consultant building physics and installations, on the other hand, were primarily concerned with the comfort of the building. Throughout the course of the interviews, it became evident that each stakeholder has their own area of interest and interpretation of key ambitions. This plethora of scaled ambitions, characteristics, and requirements led to a conflict between these elements and their respective stakeholders. And in most of the times, the stakeholder with the highest power index won this conflict (Interview case A: Building physics, 2023).

''In het ontwikkelen van ontwerpen merk je al snel dat je spanningsvelden hebt op allerlei vlakken en ambities. Zoals budgettair heb je op gegeven moment een spanningsveld. En daarin binnen die spanningsvelden moeten eenmaal concessies worden genomen.'' [Interviewee case A: Development manager, 2023]

''Enerzijds moet je een eis functionaliteits eisen halen en anderzijds zit je met een duurzaamheidseis. Hoe weeg je dat tegen elkaar af en is het wel tegen elkaar af te wegen? Of verliest die duurzaamheidseis het eigenlijk altijd?'' [Interviewee case A: Consultant structural engineer, 2023]

''In principe kunnen heel veel dingen meer circulair, maar het kost simpel weg meer tijd, geld, inspanning, logistieke oplossingen (als opslag) en het krijg misschien niet de gewenste look and feel.'' [Interviewee case A: Consultant specific building part, 2023]

And finally, an interviewie highlighted that building circularly necessitates sacrificing other objectives in favor of circularity.

''Zodra bij heel het team duidelijk is dat de circulaire ambitie hoog staat, zal iedereen zijn verantwoordelijkheden nemen en uitstralen. Dus, de klant moet zeggen, dit is de ambitie die we gaan halen en ik ga jullie aanspreken als we deze niet halen.'' [Interviewee case A: Circular advisory team, 2023]

PROCESS | Power matrix

To gain insights into the behaviors and decision-making processes, it is helpfull to identify the stakeholders who have the greatest influence on the outcomes and those who have the highest vested interest. This analysis allows us to understand who has the most power to influence the processes (Chinyio & Olomolaiye, 2009; Olander & Landin, 2005; Reed et al., 2009; Schmeer, 2000). These insights will be valuable in designing appropriate incentives, particularly in addressing the question of "to whom?". The following analyses are conducted for case A, as depicted in Figure 15.

In the earlier phases of the project, particularly during the initiative and vision phases, the project manager holds a significant amount of power and authority (Interview case A: Development manager, 2023). This stakeholder is responsible for creating decision-making documents and providing direct guidance to the client, shaping the direction of the project. During the design phase, both the project manager and development manager are involved in making decisions at the client level. The project manager handles minor design modifications that have minor cost implications, while the development manager is responsible for larger decisions (Interview case A: Development manager, Project manager, 2023).

''Maar bij projectontwikkelaars doen wij ook al het voorwerk, dus wij doen alle afstemmingen, verzamelen informatie, geven advies en maken de besluitvormingsdocumenten die dan door de opdrachtgever bij de beslissing kan worden neergelegd om dan besluit definitief over te nemen." [Interviewee case A: Project manager]

The strategy and characteristics of the building's design are devised by the architect and consultant installations. In subsequent processes, the construction consultant was added to the core design team. Therefore, the influence index of these stakeholders is relatively high.

''Wat binnen het ontwerpteam wordt overlegd en besloten, staat vast" [Interviewee case A: Consultant sustainability, 2023]

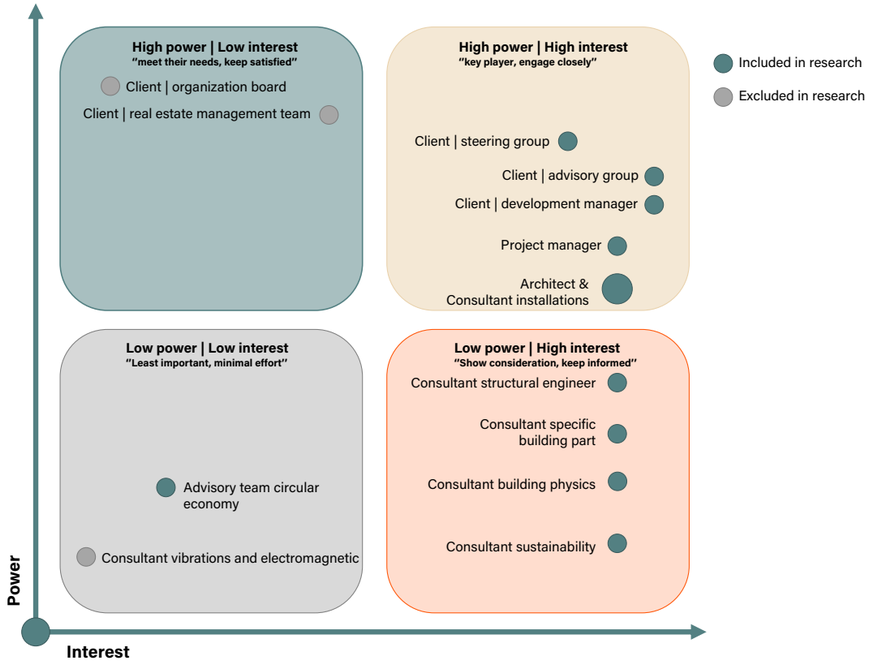


Figure 15: Power matrix case A (own figure, based on (Chinyio & Olomolaiye, 2009; Olander & Landin, 2005; Reed et al., 2009; Schmeer, 2000))

PROCESS | Influence map

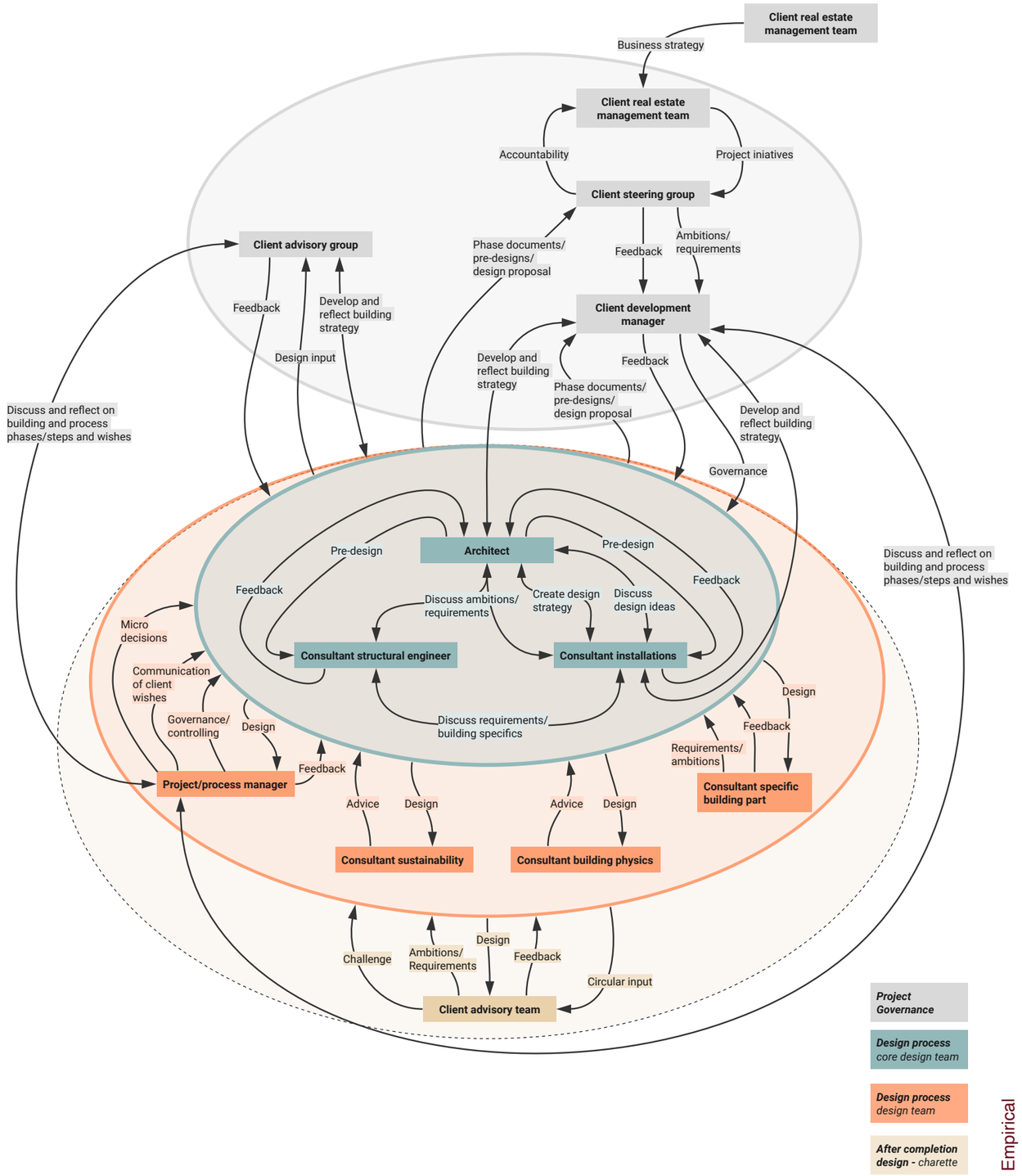


Figure 16: Influence map case A (own figure, based on (Bourne & Walker, 2005))

Findings I Case characteristics and determining factors

Each project case process has its unique attributes, stakeholders, and processes. The goal of the influence map is to identify the various decision-making processes, interrelationships, participation, and responsibilities. This pertains to the phase of strategy and design. Based on the interviews, this case is divided into distinct phases of strategy, design, and governance based on own expertise.

As previously mentioned, the design strategy is primarily developed by the architect and consultant installations, with the guidance and direction of the development manager. This reliance on these three stakeholders may have resulted in fragmented design strategies and ambitions.

The design processes are divided between the core design team (represented in blue) and the wider design and consultant team (represented in orange). In the design phases, the architect and consultant installations have exerted significant influence. However, the consultant structural engineer, although part of the team, has had less authority, as depicted in figure 15. Within the overall design team, two distinctions can be made. The project manager, consultant for the building part, and client advisory group provide design feedback that must be incorporated and implemented by the core design team. In contrast with, the sustainability and building physics consultants offer advice, and it is the responsibility of the client and core design team to consider and incorporate this advice.

In the design phases, specific ambitions were mainly driven by the core design team, with the architect playing a guiding and determining role in shaping the project's ambitions and influencing the project management stakeholders (Interview case A: Consultant sustainability, installations, specific building part, Building Physics, Project manager, Development manager, Architect, 2023). From this perspective, architects often prioritize aesthetics, comfort, and architecture (Interview case A: Development manager, Project manager, Consultant Physics, Consultant structural engineer, 2023). Consequently, in case A, the circular and sustainable goals were not adequately integrated during the design phases, but rather explored later to identify where circular and sustainable measures could be incorporated. Additionally, this decision-making process was not comprehensive (Interviews case A: Consultant building physics, Development manager, Project manager, 2023).

''Een architect heeft een grote drijfveer op het gebied van duurzaamheid en circulariteit. Zij hebben ook absoluut een sturende leidende bepalende rol. Ze hebben ook de taak voor het ontwerp coördinatie. Zij moeten zorgen dat alle disciplines op de juiste manier bij elkaar komen."
[Interviewee case A: Project manager, 2023]

''Maar dat is wel architecten eigen. Heel erg kijken naar toch soms te veel naar de vormgeving of esthetica. Dus dat we vanuit de technische disciplines dat dan toch wel. Soms moest de bijsturen en dat dat? Ja, dat ging soms wel op scherpst van de snede." [Interviewee case A: Consultant structural engineer, 2023]

''De circulaire keuzes zijn niet integraal gemaakt, architect heeft los gekeken of er op gegeven moment nog circulaire producten kunnen worden toegevoegd" [Interviewee case A: Consultant building physics, 2023]

In response to evolving government regulations, the client decided to revise the circular and sustainable goals for the building following the design competition. To pursue more ambitious circular ambitions, a circular advisory team was introduced to challenge and support the overall design team. This team plays a crucial role in translating the goals into concrete actions by providing sector-specific examples and design opportunities (Interview case A: Circular advisory team, 2023). The inclusion of this new party in the design team not only facilitates the achievement of the "new" circular goals but also raises the overall level of achievement, as all parties feel a social pressure to demonstrate their capabilities (Interview case A: Steering group, 2023).

''We zijn continu bezig om te kijken, waar kunnen we aan de kar trekken of waar kunnen we de boel stimuleren?"

''Actieve rol om de huidige uitvinden en oplossingen te onderzoeken en hierbij ook bij de aannemer te toetsen en te assisteren zodat zowel de creativiteit van de markt wordt benut, huidige partijen worden gestimuleerd en (case A) kan een actieve rol hebben in het aandragen van circulaire oplossingen"
[Interviewee case A: Circular advisor, 2023]

To ensure the preservation of various ambitions throughout the design processes, the client implemented a governance strategy. In this case, the steering group established a governance agreement that mandated the design team to provide monthly updates through phase documents. These documents serve as a means for the steering group to closely monitor the extent to which the ambitions are being upheld during the design and implementation phases. Both the steering group and the development manager hold the responsibility of reviewing these documents and providing feedback (Interview case A: Development manager, Project manager, Consultant installations, Consultant structural engineer, 2023).

''Ja ja, bij iedere fase overgang maken wij een fase document, dus even besluit document waarbij we een samenvatting geven van wat er gerealiseerd is in de afgelopen fase en daarin leg je ze ook verantwoording af op een paar belangrijke onderwerpen, waaronder duurzaamheid en circulariteit."
[Interviewee case A: Project manager, 2023]

''Maandelijkse rapportage naar de manager wat voor circulaire oplossingen geïntegreerd zijn binnen het project, gaf een sociale controle" [Interviewee Case A: Consultant installations, 2023]

Step 3 Systemic design toolkit: Framing the case

PROCESS I Causal loop diagram

This analysis aims to provide insights into the reasoning behind different project decisions and shed light on the underlying causes. Causal loop diagrams are employed to facilitate a comprehensive understanding of the dynamics and to identify influential behaviors. The results of this diagram reveal which project factors or requirements are valued as more important in comparison with the circular ambitions. Figure 17 illustrates the outcomes of the interviews.

To interpret the figure:
(+) denotes causality in the same direction.
(-) denotes causality in the opposite direction.

The letter “R” within a loop signifies reinforcement of the same behavior, while the letter “B” indicates a balancing loop that counteracts the system’s behavior, indicating opposition within the loop (Haraldsson, 2004; Roberts et al., 1997).

The blue highlighted text provides the reasoning behind the acceptance or rejection of specific circular project decisions. The orange highlighted text represents the ultimate behavior, indicating whether it aligns with circular or non-circular practices.

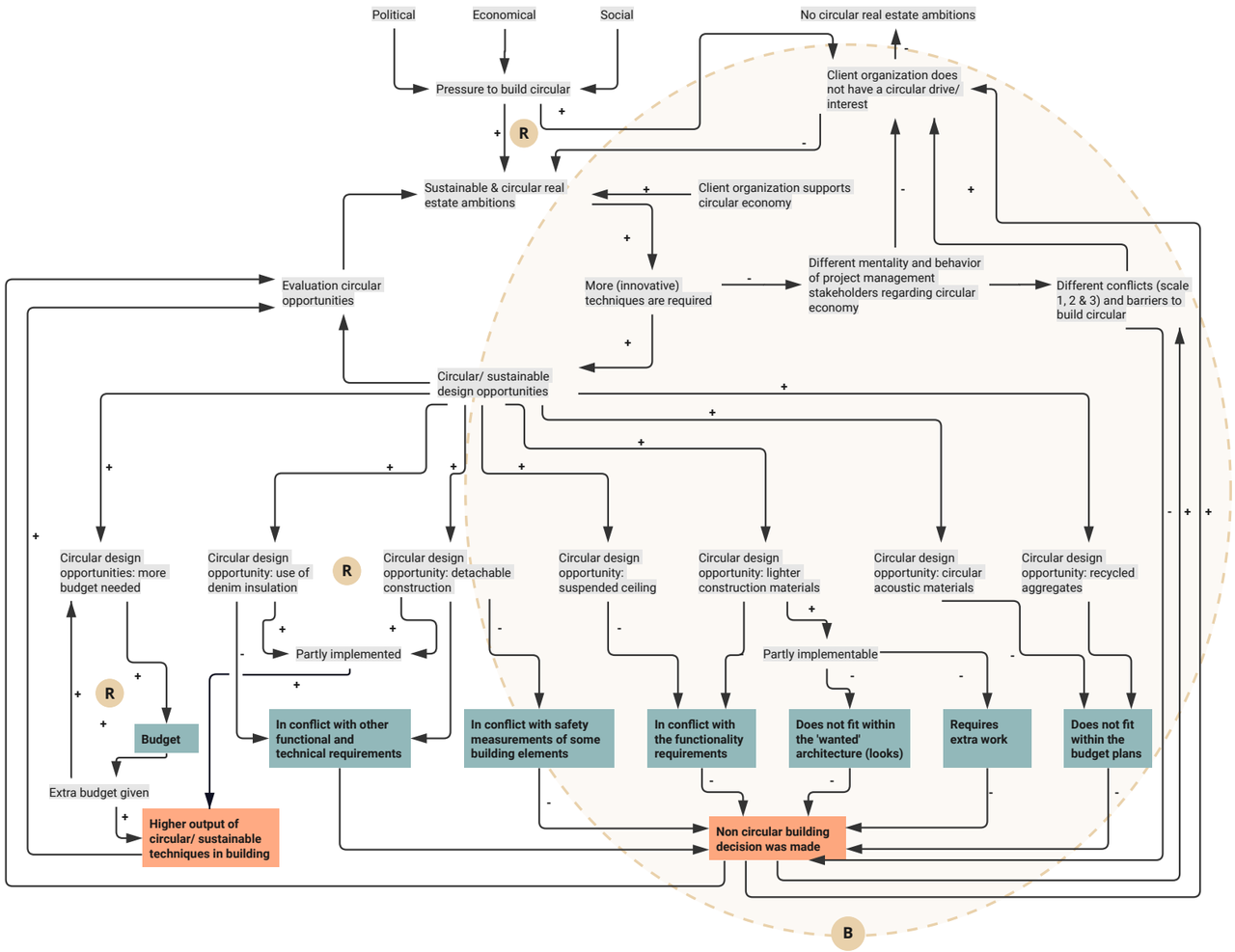


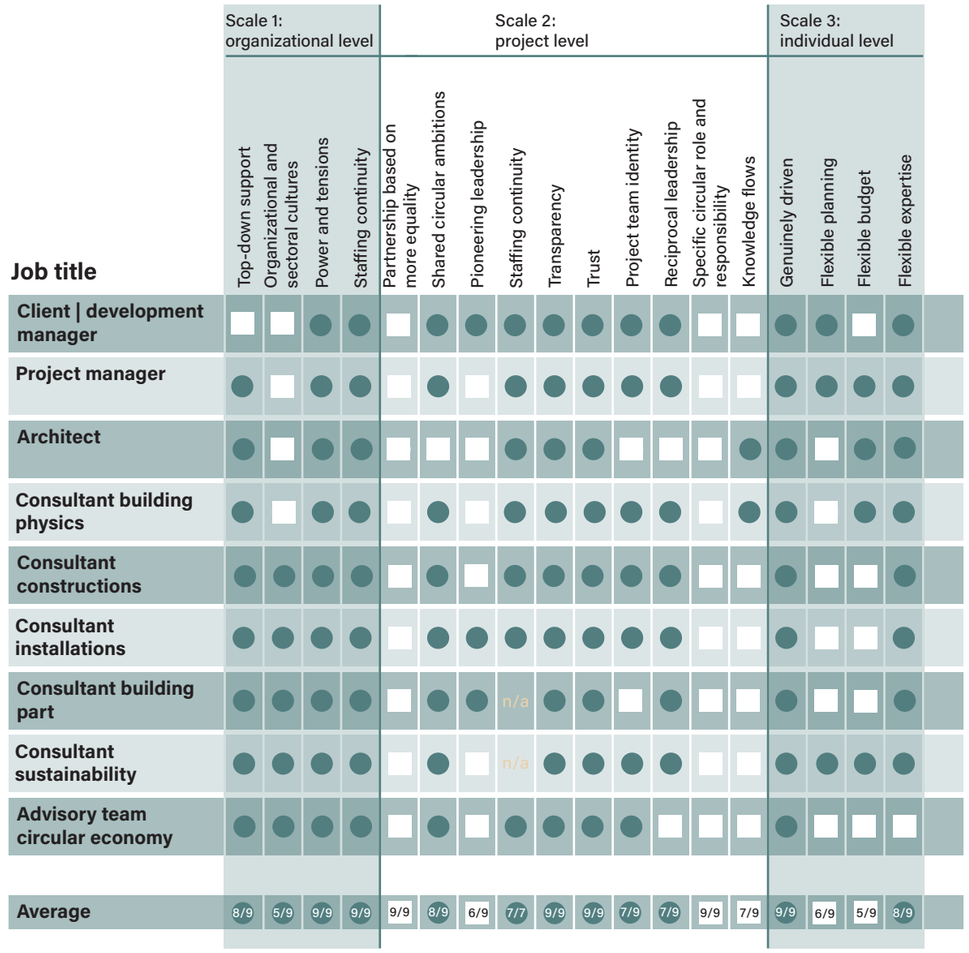
Figure 17: Causal loop diagram case A (own figure, (Haraldsson, 2004; Roberts et al., 1997))

Step 2 Systemic design toolkit: Listening to the stakeholders

PROCESS I Interorganizational dynamics

After conducting the interviews, the fourteen dynamics identified by Kooter et al. (2021) were examined. These dynamics were found to play a crucial role in fostering a circular built environment, as their presence within a project team encourages circular project decisions. The conclusions drawn from this analysis are elaborated on the following page, with the overall findings depicted in figure 18.

In figure 18, the colored circles represent the dynamics that were observed or experienced by the stakeholders. On the other hand, the white squares indicate dynamics that were not apparent during the phases.



Job title	Top-down support	Organizational and sectoral cultures	Power and tensions	Staffing continuity	Partnership based on more equality	Shared circular ambitions	Pioneering leadership	Staffing continuity	Transparency	Trust	Project team identity	Reciprocal leadership	Specific circular role and responsibility	Knowledge flows	Genuinely driven	Flexible planning	Flexible budget	Flexible expertise
	Scale 1: organizational level				Scale 2: project level										Scale 3: individual level			
Client | development manager	☐	☐	●	●	☐	●	●	●	●	●	●	●	☐	☐	●	●	☐	●
Project manager	●	☐	●	●	☐	●	☐	●	●	●	●	●	☐	☐	●	●	●	●
Architect	●	☐	●	●	☐	☐	☐	●	●	●	☐	☐	☐	●	●	☐	●	●
Consultant building physics	●	☐	●	●	☐	●	☐	●	●	●	●	●	☐	●	●	☐	●	●
Consultant constructions	●	●	●	●	☐	●	☐	●	●	●	●	●	☐	☐	●	☐	☐	●
Consultant installations	●	●	●	●	☐	●	●	●	●	●	●	●	☐	☐	●	☐	☐	●
Consultant building part	●	●	●	●	☐	●	●	n/a	●	●	☐	●	☐	☐	●	☐	☐	●
Consultant sustainability	●	●	●	●	☐	●	☐	n/a	●	●	●	●	☐	☐	●	●	●	●
Advisory team circular economy	●	●	●	●	☐	●	☐	●	●	●	●	☐	☐	☐	●	☐	☐	☐
Average	8/9	5/9	9/9	9/9	9/9	8/9	6/9	7/7	9/9	9/9	7/9	7/9	9/9	7/9	9/9	6/9	5/9	8/9

Figure 18: Interorganizational dynamics case A (own figure)

Findings I Case characteristics and determining factors

Organizational level

• Throughout the interviews, it became apparent that the development manager does not perceive top-down support for the circular economy. Yet, even though three other stakeholders stated receiving support from the top down, the company does not encourage a circular mindset/ knowledge/ expertise/ examples. (Interview case A: Client development manager, Project manager, Architect, Consultant building physics, 2023).

Project level

• Each stakeholder agreed with the high level of trust and transparency. According to the consultant for the specific building part, both the development manager and the project manager first invested heavily to create this atmosphere (Interview case A: Consultant specific building part, 2023).

• While there were common circular ambitions, no one was directly accountable for implementing the many ambitions. Every stakeholder was accountable for their own execution and interpretation of these goals (pioneering leadership)

• The only two stakeholders that highlighted the visibility of pioneering leadership said that it was the architect's responsibility. (Interview case A: Architect, Consultant specific building part, Consultant structural engineering, 2023).

• The project manager identified a bottleneck in the absence of documentation regarding circular ambitions, leading to differing interpretations and expectations among the project team. Furthermore, the circular economy advisory team noted that the project team could have incorporated additional circular construction approaches if they had benchmarked their project against similar reference projects, indicating a lack of knowledge flows. (Interview case A: Project manager, Circular advisor, 2023)

• The architect and consultant responsible for the building aspect occasionally had a vague understanding of the project team's identity. Furthermore, the client made changes to the building specifications and ambitions (project identity) during the final design phases, but these modifications were not clearly communicated. As a result, there were challenges in interpreting and implementing the changes. (Interview case A: Architect, Consultant specific building part, Consultant structural engineer, 2023).

• The inclusion of a circular advisory team in the design process was delayed until the later stages, leading to the absence of a dedicated circular role in the initial design phases.

• The perception of the client's flexibility regarding planning and budget differed among stakeholders due to their individual experiences and proposed design ideas.

GOAL I Circularity opportunities and potential incentives

During the interview the circular ambitions were discussed. In this manner, stakeholders were requested to recall on examples in which a non-circular decision was made over a circular one. And during this phase, not only is the causal loop diagram is created, but some incentives are also addressed. This chapter will provide insights of the various incentives implemented based on the initial interviews. The second interview answers, incentives, will be used to validate the literature review and to brainstorm about other creative, innovative incentives.

Organizational top-down support

In this project case, stakeholders receive significant support from their respective organizations' management for the implementation of circularity within their areas of expertise. The interviews revealed that different organizations employ distinct motivational techniques to promote circular practices.

One of the consultants stated that his organization has created commissions that partake in market research to ensure that their circular profession is up-to-date, and that they have the expertise to implement this in their working field. On a regular basis, these commissions are requested to provide advice on circular and sustainable features for various initiatives (Interview case A: Consultant specific building part, 2023).

Similarly, the consultant installations also have a similar organizational structure where employees are assigned to specific themes. These themes focus on examining building innovations, opportunities, and reference projects related to circularity and sustainability. Additionally, this company collaborates closely with various universities to gain knowledge and insights into the latest advanced circular building techniques (Interview case A: Consultant installations, 2023).

Other stakeholder organizations facilitate project oversight through specialist roles and encourage the exchange of knowledge and expertise by promoting employee exchanges (Interview case A: Steering group, Building physics, Consultant sustainability, 2023).

Ambitions

In the analysis conducted, it became evident that certain ambitions hold more prominence than others, as indicated in the causal loop diagram depicted in Figure 17. The construction consultant highlighted that circular building materials and methods often fail to meet functionality requirements and ambitions. As a proposed solution, this stakeholder suggested identifying specific functionality requirements for each building function and involving relevant consultants earlier in the process. This way, they can verify whether recycled materials also meet the vibration requirements and goals (Interview case A: Consultant structural engineer, 2023).

The installations consultant believes that different decisions can be made if stakeholders are required to provide evidence and arguments justifying their choices over other options. Additionally, holding individuals accountable for their decisions can further enhance decision-making. Furthermore, the consultant suggests marketing circularity ambitions in a different manner. Instead of presenting it to clients as "your building will be more circular," it could be positioned as "your building will be more future-proof and adaptable." Financial resources should also be considered differently, with circular building viewed as a service and materials/components amortized in financially beneficial ways. This shift in perspective can alter financial goals and encourage clients to make circular building decisions (Interview case A: Consultant installations and Circular advisor, 2023).

''Regel opnemen dat je zeg maar even bewijs moet leveren dat je dat aspect ook geaddresseerd hebt'' Beslissers moeten accountable gehouden worden voor de keuzes die ze maken, en de stakeholders moeten kunnen aantonen dat ze een goede onderbouwing hebben gegeven.''
[Interviewee Consultant installations, 2023]

''Als je het verkoopt naar de klant. Als je gebouw wordt, is toekomst gericht dat het misschien meer dat klanten eerder geneigd zijn om dat te doen, dan als je het gaat verkopen als circulariteit.''
[Interviewee Consultant installations, 2023]

''Circulair bouwen is het anders in de boeken gaan neerzetten. Dus als we lineair bouwen, hebben we een lineair gebouw dat we moeten afschrijven. Maar als we een circulair gebouw hebben, kunnen we die op een andere manier afschrijven. Onderdelen van het gebouw kunnen in een circulair verdienmodel neergezet worden, meer als een service gebruiken.''
'Producten die circulair zijn uiteindelijk beter waarde behouden. Uiteindelijk op langere termijn meer waarde opleveren dan een lineair product en die gedachte en dat die die mindset overgedragen moet worden.''
[Interviewee Circular advisor, 2023]

Finally, according to the project manager, building ambitions are frequently difficult to evaluate and, as a result, are not adequately integrated into the design process. The project manager emphasizes the importance of clearly defining ambitions with quantifiable elements to facilitate their assessment and implementation (Interview case A: Project manager, 2023).

''Hierbij zijn de circulaire ambities wel eens verwaterd omdat er geen duidelijk toetsbaar element was binnen het programma van eisen.''
[Interviewee case A: Project manager, 2023]

Design processes
According to the circular advisor, circularity is typically not incorporated into the architecture because stakeholders are unfamiliar with the urgency, information, and practical expertise. (Interview case A: Circular advisor, 2023). Another participant has discussed the positive value of information flows. The construction consultant mentioned attending various symposia and lunch lectures focused on the implementation of circular constructions, which provided valuable insights during the design phases(Interview case A: Consultant structural engineer, 2023).

''Nou, soms is dat dus informeren, het is vaak ook onbekendheid. Wat is dat dan precies? Circulaire economie. Dat is ook informeren van goh hè, waarom? Waarom moeten we dit nu doen? En waarom moet het zo snel? Waarom moeten die ambities zo hoog zijn, dus de urgentie aangeven en uiteindelijk is het toch gewoon ook praktisch maken hè? Gewoon handen en voeten geven, van hoe dan?'' [Interviewee case A: Circular advisor, 2023]

Lastly, establishing strong relationships with fabric suppliers could prove valuable during the design phase to promote the use of circular construction materials. Currently, circular products are often perceived as being significantly more expensive. However, by forming partnerships with fabric suppliers, both parties can benefit, leading to potential cost reductions and increased availability of circular materials (Interview case A: Circular Advisor, 2023).

After design completion
After the completion of the design, four strategies were employed to incorporate additional circular measurements, materials, and techniques. Initially, an external agency was tasked with evaluating the structure's circularity and proposing additional circular construction opportunities (Interview case A: Steering group, 2023). Secondly, the purpose of the charrette with the circular advisor is to challenge the various stakeholders to implement more circular measures (Interview case A: Architect, Sustainability consultant, Building physics consultant, Project manager, Development manager, 2023). Thirdly, a total engineering contract was used for contractor tendering, with contractors required to propose additional circular design opportunities, and a selection made based on these proposals (Interview case A: Development manager, 2023).

''Een nieuwe adviseur aan het team toevoegen die het project nog niet kent en daar met een frisse blik naar kijkt samen met het team. En op die manier krijg je eigenlijk altijd wel extra ideeën. Nieuwe adviseur. Die moet zich namelijk ook bewijzen.''
[Interviewee case A: Client steering group, 2023]

Critical viewpoint to BREEAM certification
Furthermore, the circular advisor highlighted that BREEAM certification often presents a distorted perception of circular behavior. Many crucial circular measures are not taken into account in the certification process or can be offset by other elements. Circular aspects should not be treated as mere credits to be obtained, but rather as fundamental circular requirements that need to be fulfilled (Interview case A: Circular advisor, 2023).

Waar breeam werkt met een puntenscore, moet er eigenlijk gewoon een basisniveau zijn aan circulaire economie. Op die manier voorkom je dat gebouwen op bepaalde vlakken absoluut niet circulair worden opgeleverd.

Op dit moment zien we een mindset als: ''We kunnen breeam ook wel halen als het niet losmaarbaar is, dus die ambitie hoeft niet meer gehaald te worden.'' Terwijl losmaakbaarheid gewoon een fundamenteel onderdeel van circulaire economie is. Tegenwoordig kan je gewoon een breeam excellent gebouw neerzetten tewijl je ontzettend veel circulaire en duurzame kansen mist.''
[Interviewee case A: Circular advisor, 2023]

Conclusion implemented incentives
During the initial interviews, specific incentives that were implemented in the decision-making processes to promote circular opportunities were discussed. Table 8 below provides a summary of these implemented incentives. In certain instances, the incentives that were implemented, as discussed in the previous findings, have also been identified in the literature review.

Table 8: The implemented incentives in case A (own figure)

Implemented incentives case A	
Charrette	Informational resources
Phase documents	Social pressure
Circular advisory team	Desire to proof
Extra budget given	Financial resources
Total engineering contract	Contractual/ desire to proof
Employees join circular commissions	Reputational value

CASE B DESCRIPTION

Case B project management team specification

In the second project case, an evaluation was conducted on a private organization with a project team consisting of fourteen different roles. However, not all individuals within the team were interviewed. Interviews were conducted with seven project stakeholders and a board member of the organization. The architectural firm hired for the project had a dual role of designing the project and providing advice on acoustics, lighting, and fit-out. Only the lead architect from the in-house architectural team was interviewed. The client had various local advisory teams, but the client location security and IT team was not included in the research as they did not offer recommendations related to construction characteristics, procedures, or ambitions (Interview case B: Project manager, 2023). Although the client sustainability facility manager and contractor were invited to participate, they did not respond to any emails or contacts.

The construction project has completed all design phases and is currently in the process of tendering contractors. The client will have full ownership of multiple floors in a newly constructed building with casco flooring. A traditional contract is being used for this project.

The client organization is already actively engaged in various sustainable and circular business processes. Unlike the other client (case C), this organization has a strong intrinsic focus on circularity and sustainability but faces budget limitations.

Table 9: Project management stakeholders case B (own figure)

Project management stakeholders
Client | Real estate director
Client | Real estate portfolio manager (specific locations)
Project manager
Cost manager
Architect
Consultant health & safety
Consultant mechanical, electric & plumbing
Consultant sustainability

In this project, the decision on whether to develop a new office, transfer an existing one, or relocate it is determined by the real estate director. Once the strategy is established, the responsible manager of the real estate portfolio takes charge of the governance, management, and accountability for the project. The client organization has separate framework partners for the architect, cost manager, and project manager, however these partners are selected through a competitive tender process.

There are variations in the relationships between the architect, client, and project manager in this particular case study. Unlike in scenario A, where the development manager remains accountable for the designs, in this project case, the architect is directly accountable to the client. The architect has internal alliances and contractual relationships with in-house architectural consultants and sustainability consultants. The project manager, on the other hand, has a governance role over the architect. The health and safety consultant is procured directly by the client based on the recommendations of the project manager. The project client manager, who is also responsible for other national/international initiatives, maintains close communication with the local organizational stakeholders. (Interview case B: Client RE portfolio manager, Project manager, Architect, 2023)

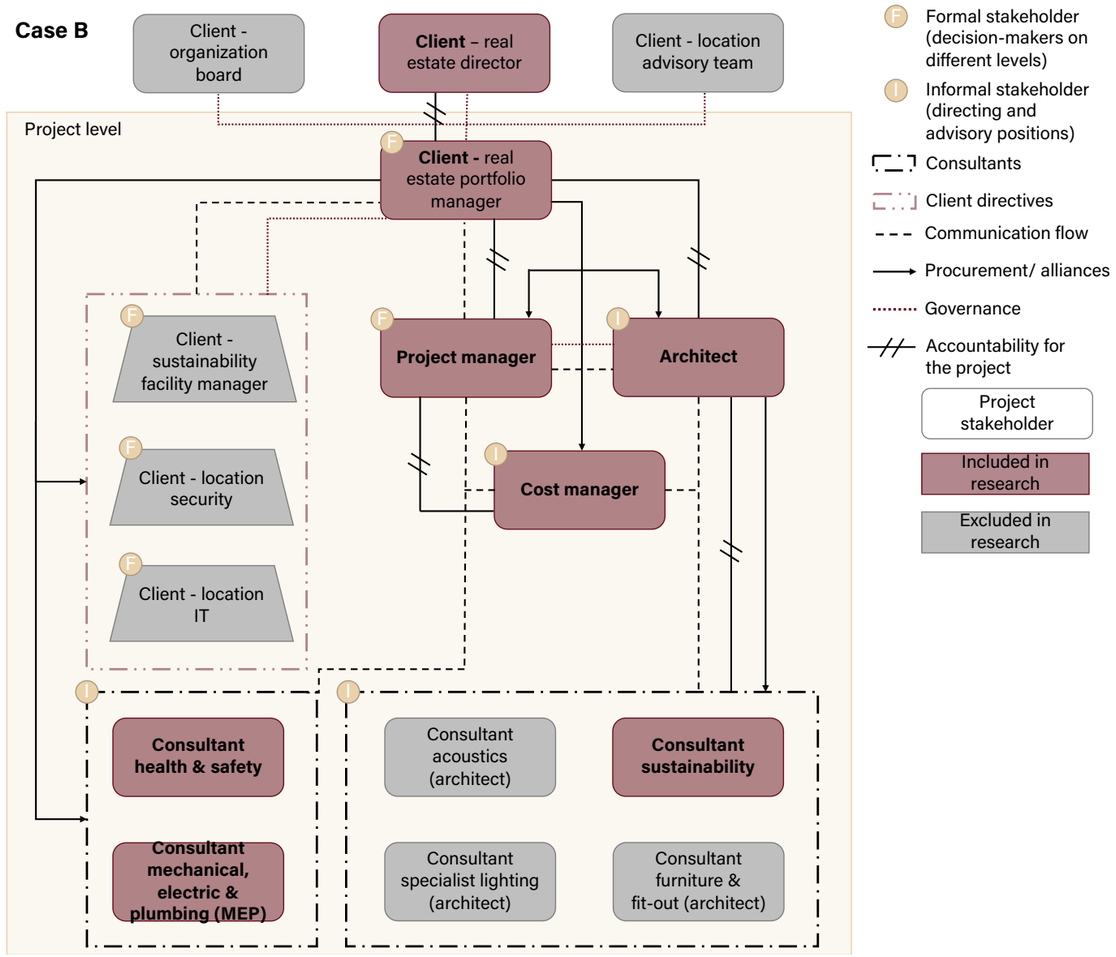


Figure 19: Social network analysis case B (Own figure, based on (Freeman, 2004; P. Jones & van Ael, 2022; Schneider & Buser, 2003)

CASE B FINDINGS

Step 1 Systemic design toolkit: Framing the project case

PROJECT I Secondary stakeholder characteristics and circular interest

To comprehend the numerous roles, responsibilities, and activities, the secondary characteristics of the stakeholders are initially analyzed. Table 10 indicates whether the stakeholders have an intrinsic motivation to participate in circular initiatives and whether their organization encourages their participation (top-down support). Both elements influence the circular decision-making.

Half of the team involved in this project case demonstrates an intrinsic motivation towards circularity. Furthermore, both the sustainability consultant and the lead architect, who are employed by the same organization, receive top-down support from their organization in terms of sustainability and circularity. They leverage their in-house expertise in these areas to secure project tenders and differentiate their architectural work from competitors. For them, circular behavior serves as a marketing strategy. (Interview case B: Architect, Sustainability consultant, 2023).

Moreover, the client in this case actively engages in various circular and sustainable practices. This strategic approach extends beyond their real estate projects and encompasses global operational processes. Examples include initiatives such as reprocessing and converting printed files into toilet paper, opting for train travel instead of flying for business trips, and utilizing recycled kitchen materials, among others. (Interview case B: RE portfolio manager, 2023).

Table 10: Secondary stakeholder characteristics and circular interest case B (own figure)

Job title	Project roles	Key project activites	Circular drive
Client | head of real estate facilities	Decision-maker organisational level, top- management	Being responsible for all the real estate properties (asset - portfolio) worldwide, taking high-end real estate decisions. Additionally, writing the sustainability and compliance strategy for the business.	
Client | real estate portfolio manager	Governance and decision-maker project level	Responsible for the international real estate portfolio, assisting in the search for new locations, managing the process, protecting business objectives, and making project location decisions.	
Project manager	Management, steering and advisor	Supervising design teams, chairing and managing construction meetings, quality assurance supervision and gathering information and preparing decision-making documents.	
Cost manager	Steering, reviewer and advisor	Manage the costs payments from concept design to the final design, this by giving monthly reports to the client.	
Architect (lead)	Designer and steering	To oversee the design team, allign the wishes, preferences and ambitions of the design team and client and bring this all together into one design.	
Consultant health & safety	Advisor and reviewer	Offer safety and health guidance (safety routes, application of materials, user aspects). During construction, overseeing the contractors' adherence to safety protocols.	
Consultant MEP	Advisor and reviewer	Provide advice on installation opportunities (electricity, mechanical and plumbing). Furthermore, provide insight into energy use and reduction recommendations.	
Consultant sustainability	Advisor, reviewer and steering	Create a sustainability strategy for the project, do various carbon calculations, determine which certifications are required (client wishes), and examine user health and well-being.	

Step 2 Systemic design toolkit: Listening to the stakeholders

PROJECT I Project case ambitions

In the beginning of a construction project, several ambitions are defined. Figure 20 demonstrates the top five ambitions for this specific project case. Within this project the main ambition was clear, *''So again the budget, it's always the Trump card''* [Interview case B: Client RE portfolio manager, 2023]. The company operates within a fixed budget for the project, allowing little to no room for additional costs related to circular and sustainable objective (Interview case B: Client RE portfolio manager, Project manager, Cost manager, Architect, 2023).

Due to this constrained budgetary flexibility, the organization carefully considers various sustainable and circular goals only if there is a direct benefit to the organization. And this benefit is not always financial; it can also be marketing related. This explicitly characterizes their attitude to various decisions (Interview case B: Client RE portfolio manager, 2023).

''What would the cost be and what would the benefit be as well? Because we, also look at whether there's a business benefit.''
[Interviewee case B: Client RE portfolio manager, 2023]

''A lot of clients want stories on these things that yeah, I understand the goal and everything, but a lot of the circular economy is that's being done isn't really for that. It's for this their own benefits or they want if they could get no benefit out of it they would not do it basically.''
[Interviewee case B: Cost manager, 2023]

The architecture of the building, along with its comfort, aesthetics, experience, and atmosphere, emerged as one of the top priorities in this project. Throughout the case study, numerous deliberations took place, but architectural ambitions consistently held sway over specific project decisions, regardless of their cost or sustainability/circularity implications. Examples include choices related to furniture, materials, equipment, and layout. To illustrate, a quote highlighting the rejection of a circular project initiative is provided below (Interview case B: Client RE portfolio manager, Project manager, Cost manager, Architect, Consultant sustainability, 2023).

''Yes, it's a really lovely story. So, the guy that runs it, he collects all the plastic from the canals in Amsterdam and Rotterdam and then he grinds it all up and then mixes it in with a rubber-based resin and then it's a poured floor and it's we love that as a story. But in the end, we didn't go with that because the client felt that it didn't look; it didn't align with the look of their look and feel of what they wanted to achieve in the space.'' [Interviewee case B: Architect, 2023]

Figure 20: Project ambitions case B (own figure)

On the third position, the planning was placed. The planning for this project was characterized by rigidity, leaving little room for flexibility (Interview case B: Project manager, MEP consultant, 2023). As a result of these schedule constraints, a standardized procedure was implemented for the mechanical, electrical, and plumbing components (Interview case B: MEP consultant, 2023). The functionality of the building was ranked fourth in terms of importance. Finally, the sustainable and circular ambitions were given priority, although the organization was unwilling to compromise on other ambitions (Interview case B: Client RE portfolio manager, 2023).

''There are some battles that just aren't worth fighting and obviously if it's scientifically, if it's about performance of the building, the different sustainable measures, the look and feel will eventually be outweighed.'' [Interviewee case B: Architect, 2023]

PROCESS I Power matrix

To gain insights into the behaviors and decision-making processes, it is helpfull to identify the stakeholders who have the greatest influence on the outcomes and those who have the highest vested interest. This analysis allows us to understand who has the most power to influence the processes (Chinyio & Olomolaiye, 2009; Olander & Landin, 2005; Reed et al., 2009; Schmeer, 2000). These insights will be valuable in designing appropriate incentives, particularly in addressing the question of "to whom?". The following analyses are conducted for case A, as depicted in Figure 21.

Given that the client has framework agreements with the architect, cost manager, and project manager, these individuals have relatively higher authority (Interview case B: Project manager, 2023). The client directly procures the services of the architect, who then procures the various consultants, this reflects their amount of power in this project, shown in figure 21.

However, both the project manager and the architect hold same positions of power. While the architect makes final decisions regarding the design creation, the project manager represents the client and has the authority to make decisions related to the process and certain architectural aspects (such as the use of materials and walls) (Interview Case B: Client RE portfolio manager, Project manager, Architect, 2023)..

''I think it's striking the balance. But I suppose in terms of the authority, yes, it probably would circle back to us to make those final decisions and weigh up the information and make the best recommendation.''

[Interviewee case B: Architect, 2023]

The cost manager holds a specific authority in regulating the cost goals of the design team for the project. Within this scope of responsibility, the cost manager has the authority to reject or modify design opportunities as needed (Interview case B: Cost manager, 2023). The various consultants are then positioned within the matrix structure accordingly.

''We have quite authority as a CM as in budget wise. So program wise I have zero power because it's more responsibility cost wise. I do so that means I can query architects and designers on what are the experience flying? Why are they specifying it? And sometimes this means saying no to architects"

[Interviewee case B: Cost manager, 2023]

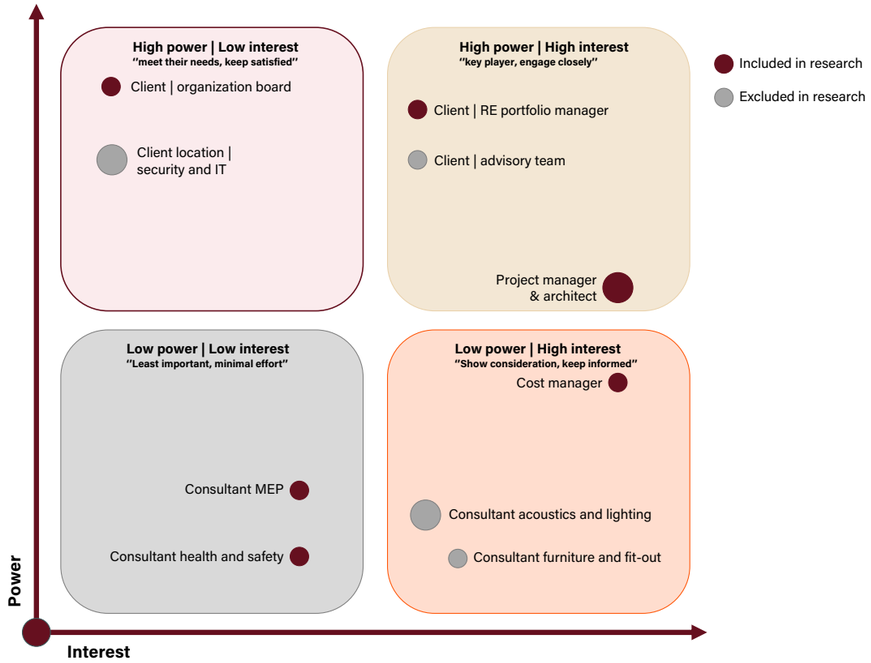


Figure 21: Power matrix case B (own figure, based on (Chinyio & Olomolaiye, 2009; Olander & Landin, 2005; Reed et al., 2009; Schmeer, 2000))

PROCESS I Influence map

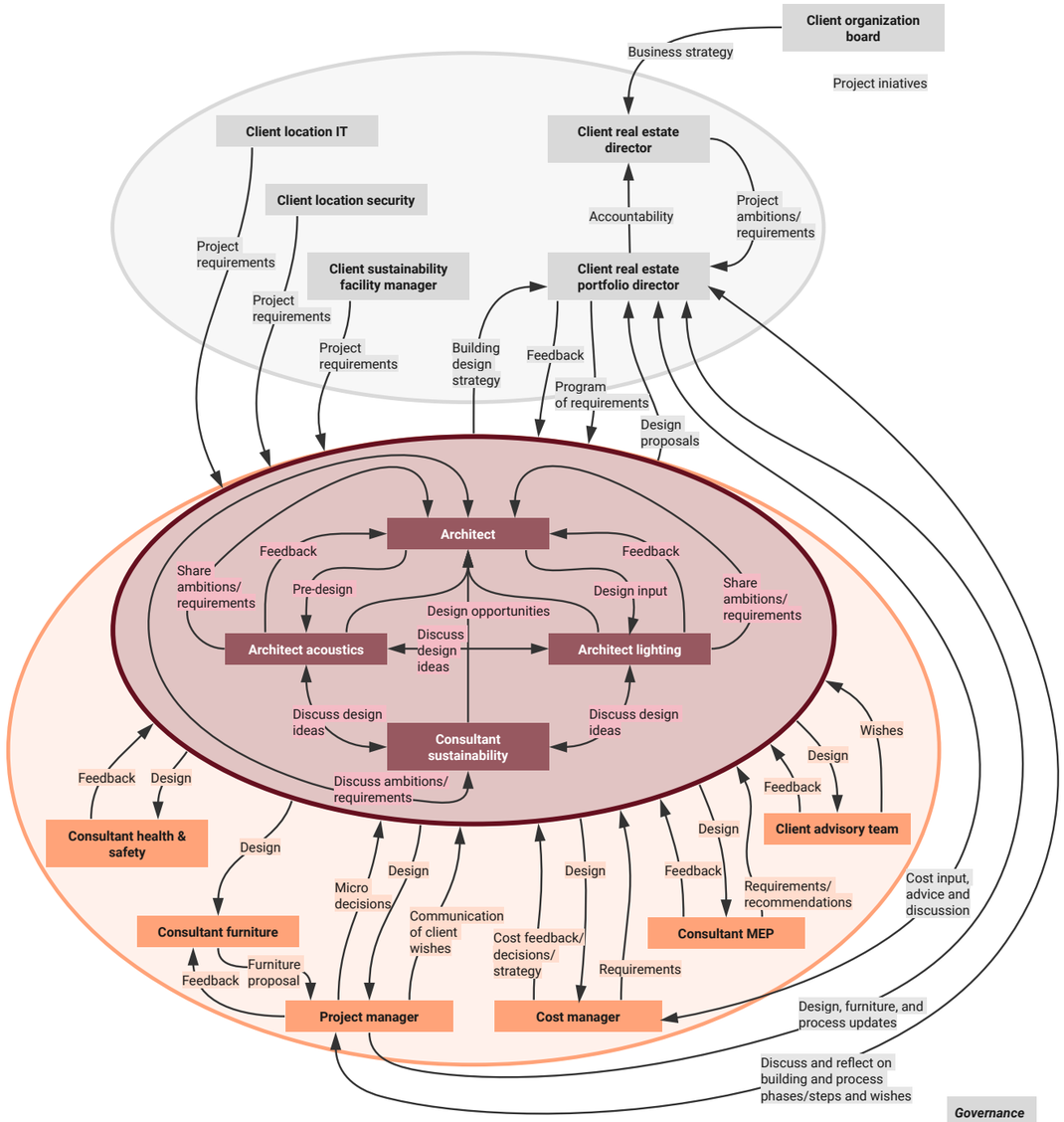


Figure 22: Influence map case B (own figure, based on (Bourne & Walker, 2005))

Findings I Case characteristics and determining factors

Each project case process has its unique attributes, stakeholders, and processes. The goal of the influence map is to identify the various decision-making processes, interrelationships, participation, and responsibilities. This pertains to the phase of strategy and design. Based on the interviews, this case is divided into distinct phases of strategy, design, and governance based on own expertise.

The client in this project relied more significantly on the expertise of the design team, particularly the in-house architectural team, compared to other cases. As a result, both the design and strategy plans were developed and discussed within the in-house architectural team. The consultant sustainability played an active role within the core design team. The active role of this internal party circular expertise has led to an increase in circular design opportunities (Interview case B: Architect, Consultant sustainability, Client real estate portfolio manager, 2023).

Within the total design team, the consultants, such as the Health & Safety and MEP consultants, had a shared consulting function where they were responsible for evaluating the designs based on various requirements and providing advice to the architectural team. The architect is then responsible for assessing these recommendations (Interview case B: Safety consultant, 2023). Furthermore, the furniture consultant develops various furniture options, which are initially discussed with the project manager. The project manager then after own evaluation, communicates the outcomes to the client's portfolio manager (Interview case B: Client real estate portfolio manager, 2023).

''Getting sustainability ambitions into all of our projects and trying to educate the internally teams to to do more, but also to help educate our clients and help them to understand the importance''
''Have a great control when sustainability team is inhouse''
[Interviewee case B: Consultant sustainability, 2023]

The design processes in this project are divided between the core design team and the entire design and consultant team. Unlike the other case study, the consultants in the total design team (represented in orange) primarily have advisory roles, including the consultant furniture, MEP and health & safety. The consultant health & safety is tasked with ensuring that the current design complies with national requirements, and based on their assessment, they provide advice and develop plans accordingly (Interview case B: Consultant health & safety, 2023). Similarly, the consultant furniture explores different furniture options, which are first discussed with the project manager, who then relays the outcomes to the client portfolio manager. Thirdly, the MEP consultant fulfills their responsibility by providing the core design team with a comprehensive report containing recommendations (Interview case B: MEP Consultant, 2023).

The cost and project manager possess the ability to make design and process decisions, although these decisions are considered micro-level since they do not significantly impact the overall process and design outcomes, such as material selection (Interview case B: Cost and Project manager, 2023).

PROCESS I Causal loop diagram

This analysis aims to provide insights into the reasoning behind different project decisions and shed light on the underlying causes. Causal loop diagrams are employed to facilitate a comprehensive understanding of the dynamics and to identify influential behaviors. The results of this diagram reveal which project factors or requirements are valued as more important in comparison with the circular ambitions. Figure 23 illustrates the outcomes of the interviews.

To interpret the figure:
(+) denotes causality in the same direction.
(-) denotes causality in the opposite direction.

The letter "R" within a loop signifies reinforcement of the same behavior, while the letter "B" indicates a balancing loop that counteracts the system's behavior, indicating opposition within the loop (Haraldsson, 2004; Roberts et al., 1997).

The blue highlighted text provides the reasoning behind the acceptance or rejection of specific circular project decisions. The orange highlighted text represents the ultimate behavior, indicating whether it aligns with circular or non-circular practices.

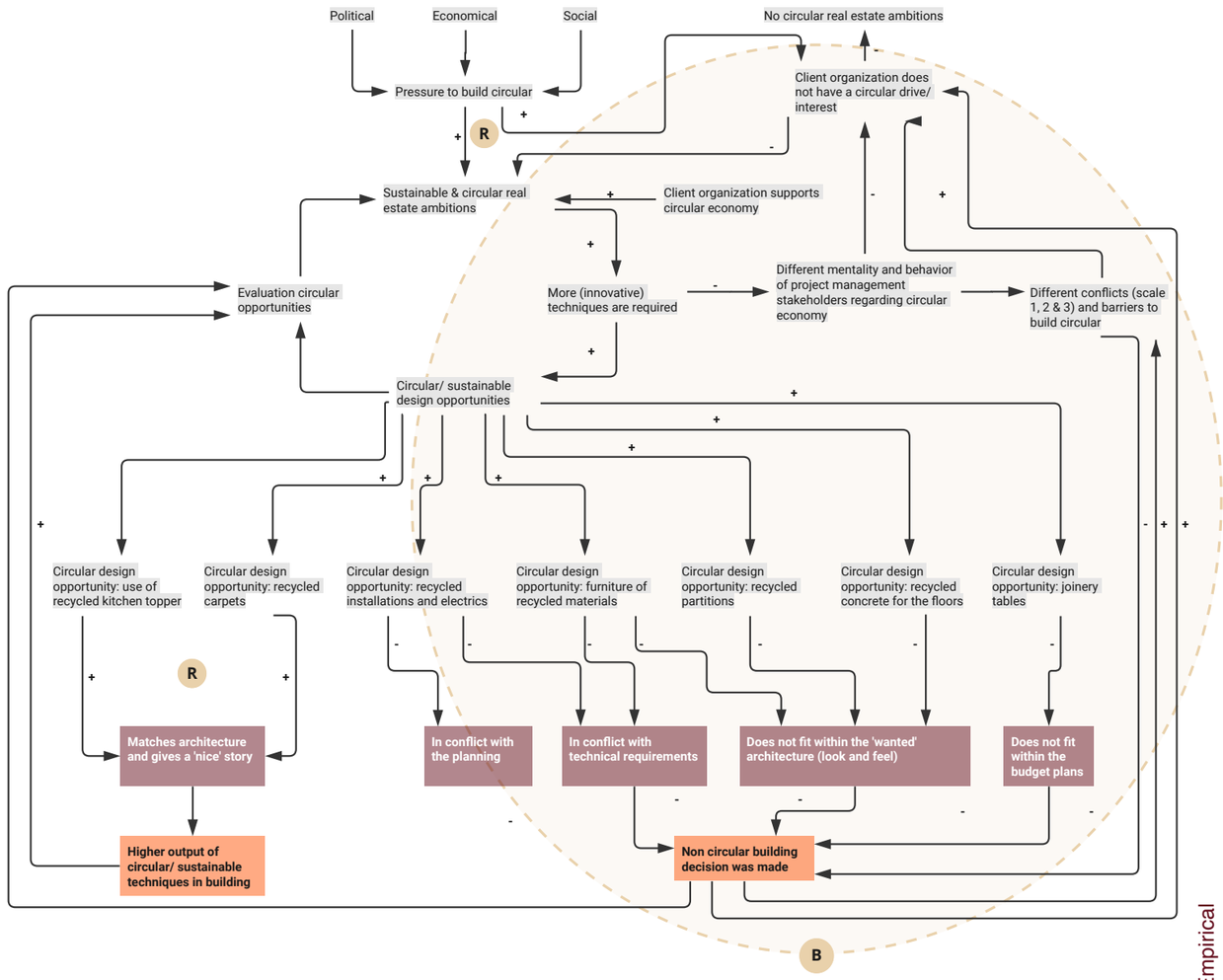


Figure 23: Causal loop diagram case B (own figure, (Haraldsson, 2004; Roberts et al., 1997))

PROCESS I Interorganizational dynamics

After conducting the interviews, the fourteen dynamics identified by Kooter et al. (2021) were examined. These dynamics were found to play a crucial role in fostering a circular built environment, as their presence within a project team encourages circular project decisions. The conclusions drawn from this analysis are elaborated on the following page, with the overall findings depicted in figure 24.

In figure 24, the colored circles represent the dynamics that were observed or experienced by the stakeholders. On the other hand, the white squares indicate dynamics that were not apparent during the phases.

Please note that the health & safety consultant had limited involvement with the team, which resulted in their inability to provide answers to the interorganizational checklist questions. As a result, their responses remained marked as n/a (not applicable).

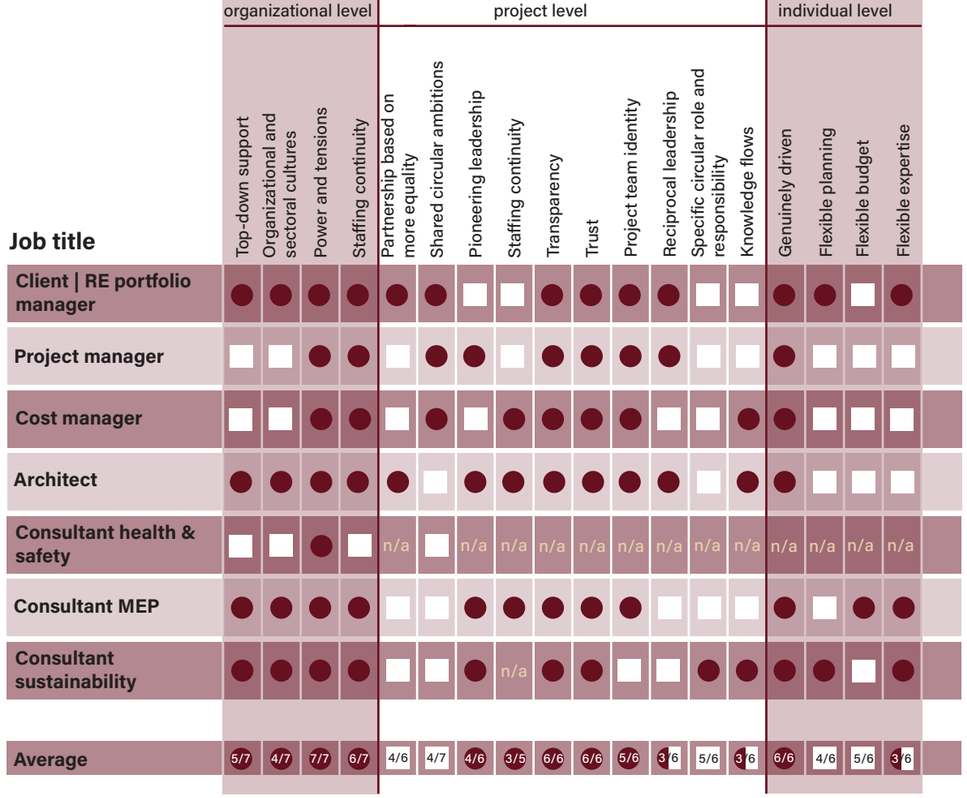


Figure 24: Interorganizational dynamics case B (own figure)

Findings I Case characteristics and determining factors

Organizational level

• Within the project management team, three stakeholders expressed a lack of top-down support for the implementation of circular building methods and techniques. Moreover, the organizational culture within their respective company does not foster a circular culture (Interview case B: Project manager, Cost manager, Consultant health & safety, 2023). During the interviews, it became evident that the limited knowledge and understanding of circular principles, both in terms of cost and architecture, contributed to the adoption of non-circular decisions. These factors, along with the reasons outlined in Figure 23, influenced the implementation of non-circular choices (Interview case B: Cost manager, 2023).

Project level

• A high level of trust and transparency was established within the project team, facilitated by their prior collaboration and familiarity as framework partners. This had two key outcomes: firstly, the stakeholders possessed a solid understanding of the client's desires and constraints, and secondly, the client fostered an open and relaxed environment from the project's inception (Interview Case B: Client RE portfolio manager, Project manager, Architect, 2023). However, this dynamic also resulted in a lack of reciprocal review among stakeholders, as they did not feel compelled to directly evaluate each other's work (Interview case B: Cost manager, 2023).

• Regarding the project's flexibility, the client indicated limited budgetary flexibility (Interview case B: Client RE portfolio manager). Furthermore, opinions varied on the adaptability of practical expertise. While the client expressed openness to new innovations, certain goals such as the fit-out and appearance of the building were deemed unalterable (Interview case B: Project manager, Cost manager, Architect, Sustainability Consultant, 2023).

GOAL I Circularity opportunities and potential incentives

During the interview the circular ambitions were discussed. In this manner, stakeholders were requested to recall on examples in which a non-circular decision was made over a circular one. And during this phase, not only is the causal loop diagram is created, but some incentives are also addressed. This chapter will provide insights of the various incentives implemented based on the initial interviews. The second interview answers, incentives, will be used to validate the literature review and to brainstorm about other creative, innovative incentives.

Organizational top-down support

The project and cost managers in this case study were identified as lacking both top-down support and circular expertise and knowledge. Figures 21 and 22, which illustrate the power-matrix and influence map, demonstrate their close interaction and influence over the client, both in terms of communication and their ability to steer decision-making. Having project and cost managers who can effectively educate the client about various circular aspects and cost variables could serve as an incentive to socially guide the client toward making more circular decisions (Interview case B: Consultant sustainability, Project manager, Cost manager, 2023).

''De klant wil meer circulaire en duurzame innovaties, en ik denk wel dat de kennis mist. Eigenlijk hebben we als project managers niet voldoende kennis om daar die klant goed voor te informeren."
[Interviewee case B: Project manager, 2023]

''It would be easier to advise a client on these methods, if you don't know how much it costs then you have an issue. So it would be helpful, for instance, if the company had a rate library stating costs for different items and also having basically information on what is it zero carbon, and what is the manufacture? Is it locally sourced? It is information like that this that is the biggest drive."
[Interviewee case B: Cost manager, 2023]

Furthermore, the client's business operations exemplify a strong commitment to circularity and sustainability. They employ various employee engagement strategies to foster participation and enthusiasm for circular and sustainable practices. One notable practice is the active recycling of everyday operational materials in a circular manner. For instance, the company recycles printed documents into toilet tissue as part of their long-term business strategy. This approach not only contributes to their circular goals but also promotes employee awareness and cultivates a more circular culture within the organization (Interview case B: Client RE director, 2023).

In addition to the indirect incentives, the client implements a range of strategies to actively engage employees in sustainability efforts. These include the establishment of environmental ambassadors' organizations, the formation of climate change champions teams, and the implementation of a pawprint foot app challenge.

The environmental ambassadors consist of a global in-house team responsible for researching sustainable objectives and facilitating their implementation across the organization. On the other hand, the climate change champions are local employee teams that investigate new sustainable and circular innovations, identify opportunities for local teams, and share this knowledge to inspire others. Although these champions do not receive direct financial incentives, their participation in multiple projects often leads to increased salaries, as the company's remuneration is based on project fees.

Lastly, the client organized an international employee challenge called the pawprint foot challenge. Through an app, employees can track their carbon footprint, and they are assigned to international teams to compete against one another. The winners of the challenge are rewarded with sustainable prizes and global recognition as "top sustainable employees." These initiatives aim to challenge, inspire, raise awareness, and motivate employees towards sustainable practices.

By implementing these strategies, the client encourages active employee participation, fosters awareness, and instills motivation in their workforce (Interview case B: Client RE director, Client RE portfolio manager, 2023).

''So people become more mindful and more competitive within themselves of ohh wow, but that seems done really well. We need to do something."
[Interviewee case B: Client RE director, 2023]

Apart from the client, the architectural firm also embraces circular organizational strategies. They employ a sustainability expert who provides advice on sustainable and circular practices to clients. This stakeholder conducts extensive research to stay up-to-date with contemporary innovations and knowledge in the field. The findings are then shared with colleagues through webinars and an organizational portal, fostering awareness and commitment within the firm.

Moreover, the architectural firm has established a partnership with a university to collaborate on providing architects with clear guidance on implementing construction strategies aligned with circular principles. This collaboration also enables the firm to stay informed about the latest innovations in the field of sustainability. By actively engaging in these initiatives, the architectural firm demonstrates its dedication to promoting and implementing sustainable and circular practices (Interview case B: Consultant sustainability, 2023).

Ambitions

In this project, the budget and architecture were given high priority. Various circular opportunities were considered during the design process, but they were mostly rejected based on these two key factors. The interviews with different project stakeholders revealed that clients are primarily interested in circular opportunities that are visually impactful and have a compelling narrative. However, even these "cool" product stories rarely outweigh the cost considerations. (Interview case B: Architect, Project Manager, Cost Manager, 2023)

''A lot of clients want stories on these things that yeah, I understand the goal and everything, but a lot of the circular economy is that's being done isn't really for that. It's for this their own benefits or they want a cool story to tell with the products, or they would not do it basically."
[Interviewee case B: Cost manager, 2023]

''Deel van onze takenpakket ligt ook om te pushen, maar wij kunnen natuurlijk niet in de portemonnee van de klant kijken."
[Interviewee case B: Project manager, 2023]

''I think if I'm 100% honest, circularity and sustainability can sometimes be a marketing thing for a company. A telling a really good story. I think there's a mixture of that. Being able to say and promote that you're doing it as much. ''They tend to not buy or apply the circular stuff if they can't show it to the world, they want to advertise."[Interviewee case B: Architect, 2023]

A current challenge in the project is the limited availability of time and information. The MEP consultant had to implement a standard procedure for the assignment due to time constraints, which prevented further exploration of the potential of circular materials. Given more time, additional investigation could have been conducted (Interview Case B: MEP Consultant, 2023).

Furthermore, the cost manager has highlighted that gathering diverse circular information is a costly endeavor. Due to the lack of cost information within the company and the client's strict project timeline, this stakeholder sees no immediate opportunity to incorporate circularity into the projects (Interview case B: Cost Manager, 2023).

''The biggest issue is time; it sometimes takes four weeks to find out the specific costs for circular objects. And we do not have that time. That you have to call around and find out and just getting pricing from suppliers is already quite a nightmare sometimes."
[Interviewee case B: Cost manager, 2023]

Finally, during the interview with the architect, it was noted that clients often lack a sense of commitment towards circular products due to their limited understanding of the product's appearance and the underlying story. The architect highlighted the need for additional explanation for certain circular products to bridge this knowledge gap (Interview case B: Architect, 2023).

''I think the more you educate clients on like you know for example had they come on that factory tour to the good flooring company and really learn about how it's made and where it comes from. I think that that makes you know individuals really want to make the eco conscious decision based on you know doing the right thing. I think the more the more information you can give clients the more they will realize like the true meaning of what."
[Interviewee case B: Architect, 2023]

Conclusion implemented incentives
During the initial interviews, specific incentives that were implemented in the decision-making processes to promote circular opportunities were discussed. Table 11 below provides a summary of these implemented incentives. In certain instances, the incentives that were implemented, as discussed in the previous findings, have also been identified in the literature review.

Table 11: The implemented incentives in case B (own figure)

Implemented incentives case B	
Organizational kudos (client)	Social recognition
Inhouse circular advisor team	Marketing advantage
Circular products with cool story	Marketing trick
Partnership with universities	Informational resources

CASE C DESCRIPTION

Case C project management team specification

In the third project case, an evaluation was conducted on a private organization. The project team consisted of fourteen different roles. Out of these fourteen roles, five members of the team were actively involved in the research, as outlined in Table 12. Certain stakeholders who did not participate in the key decision-making processes of the design team were excluded from the research, but were still requested to provide feedback on selected design decisions or minor architectural technical aspects (such as the consultant AV, security, IT, and carbon calculator) (Interview case C: project manager, 2023).

Other stakeholders, such as the contractor and the programme manager, did not respond to the invitation and were consequently not included in the research

The client in this project owns multiple buildings that contribute to the overall real estate plans. The project team was responsible for the construction of specific buildings and floors. Some floors had already completed the design and construction phases, while others were yet to commence. The client retains ownership of all structures. Traditional contracts were implemented for all construction processes.

In comparison with cient B, this client is already engaged in some sustainable and circular organizational business processes, although not nearly as much as the other client (Interview case B: RE portfolio manager, case C: RE portfolio manager, 2023). The client in case C is primarily driven by market demands and regulations related to circularity, while the client in case B voluntarily embraces these principles without external pressure. This difference in motivations may influence their perspectives and actions when it comes to circular decision-making. Additionally, unlike client B, the business in case C has a budget that is considered "unlimited."

Table 12: Project management stakeholders case C (own figure)

Project management stakeholders
Client | Real estate portfolio manager (specific locations)
Project manager
Cost manager
Architect
Consultant sustainability

In this organization, the responsibility for determining the location and timelines of new real estate initiatives lies with the client's business opportunity manager. However, unlike project case B, the overall accountability for real estate assets and project management rests with the client's real estate portfolio manager, who has national jurisdiction. Similar to Case B, this organization operates using framework partnerships. However, unlike Case B, these framework collaborators may have been included in the pool of partners without recent reassessment and reevaluation of their expertise, knowledge, and ambitions. Furthermore, they are not competitively selected for each project. All stakeholders depicted in Figure 28 are part of these framework partnerships. Hereby, the project manager and the architect are givin more direct accountability to specific project and process factors. The architect is responsible for design decisions, while the project manager primarily handles process decisions and micro design decisions, such as partitions and walls (Interview case C: Client RE portfolio manager, Project manager, Architect, 2023).

''Het is slechts door een hoepeltje springen aan het begin. Even bewijzen van, 'wij kunnen het', maar daarna is alle uitdaging verdwenen''
[Interviewee case C: Project manager, 2023]

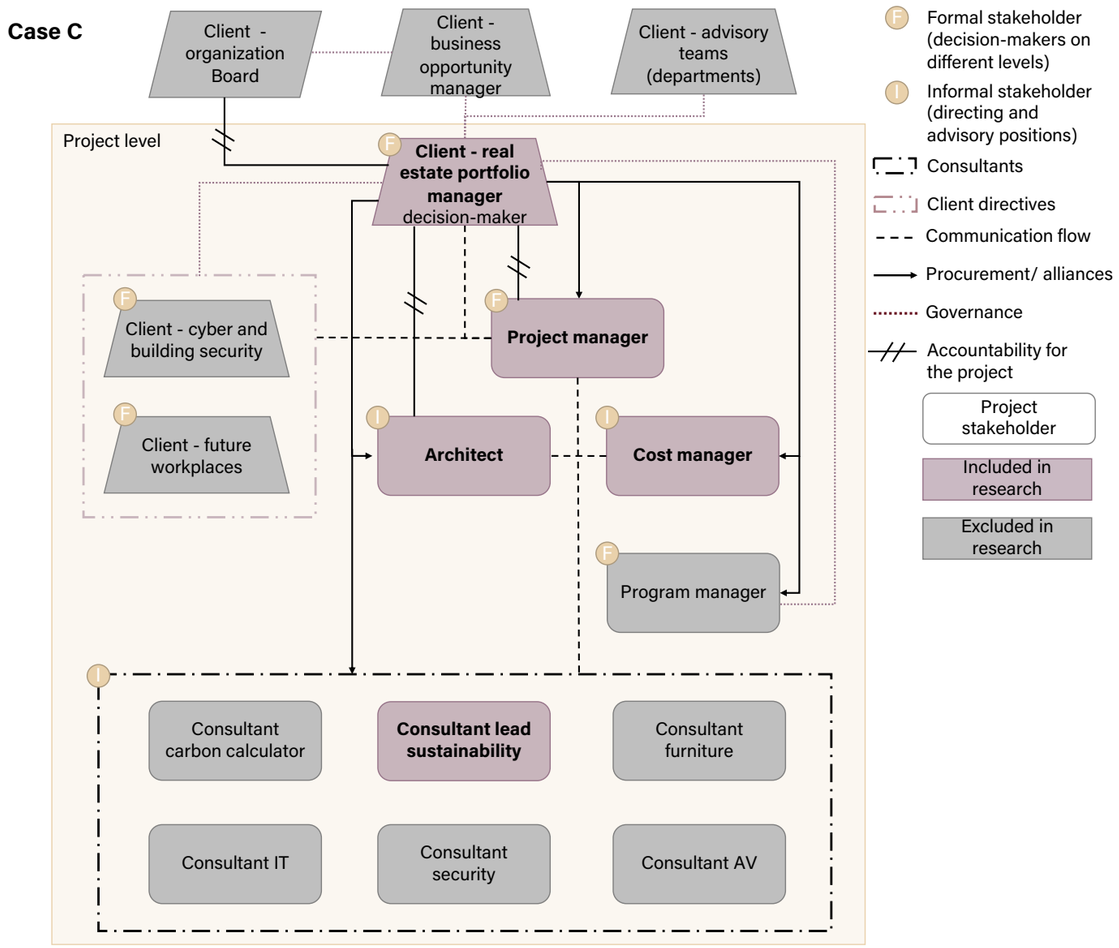


Figure 25: Social network analysis case C (Own figure, based on (Freeman, 2004; P. Jones & van Ael, 2022; Schneider & Buser, 2003)

CASE C FINDINGS

PROJECT I Secondary stakeholder characteristics and circular interest

To comprehend the numerous roles, responsibilities, and activities, the secondary characteristics of the stakeholders are initially analyzed. Table 13 indicates whether the stakeholders have an intrinsic motivation to participate in circular initiatives and whether their organization encourages their participation (top-down support). Both elements influence the circular decision-making.

Two stakeholders among those interviewed exhibited an intrinsic motivation towards the circular economy. The project manager's interest in embracing circular practices was ignited during a previous role when the need arose to become proficient in BREEAM. This experience brought about a shift in the project manager's mindset and perspective regarding the circular economy. However, the current organization does not foster a culture that prioritizes circularity, and there was no support provided for the revalidation of the project manager's expert certificate, which is necessary to maintain official expert status. Despite no longer holding the official BREEAM expert title, the project manager continues to apply the acquired knowledge in their role, enabling them to critically evaluate architectural choices, such as material usage (Interview case C: Project manager, 2023). (Interview case C: Project manager, 2023).

The project and cost manager, being part of the same organization, both lack top-down support.
The sustainability consultant at first become circular in her personal life and since the intrinsic motivation for the circular growed, this party integrated this circular commitment into the profesionnal career.(Interview case C: Project manager, Cost manager, Consultant sustainability, 2023).

Table 13: Secondary stakeholder characteristics and circular interest case C (own figure)

Job title	Project roles	Key project activites	Circular drive
Client | RE portfolio manager	Governance and decision-maker project level	Responsible for a part of the real estate portfolio, assisting in the search for new locations, managing the process, protecting business objectives, and making project location decisions.	
Project manager	Management, steering and advisor	Supervising design teams, chairing and managing construction meetings, quality assurance supervision and gathering information and preparing decision-making documents, and take micro-decisions.	
Cost manager	Steering, reviewer and advisor	Manage the costs payments from concept design to the final design, this by giving monthly reports to the client.	
Architect	Designer and steering	Deliver designs, manage the design team, ensuring that the wishes, preferences, and ambitions of the design team and client are aligned, and monitoring the deliverables and quality of what is given.	
Sustainability consultant	Advisor, reviewer and steering	Assist the team in sustainable and circular opportunites within the final design, organizes sustainable workshop, creates an assurance report, and supervises and directs the contractor with waste plans.	

Findings I Project case ambitions

Table 27 illustrates the top five objectives for the specific project case. The client prioritized the quality, comfort, and architecture (look and feel) of the building. Creating a sense of novelty and providing a visually appealing environment for the employees were of utmost importance to the client. Through visits to other circular buildings, the client noticed that certain circular building decisions had a negative impact on the user experience. From the client's perspective, circular products appeared less desirable, and as a result, the architectural experience of the building had little circular elements (Interview case C: Client RE portfolio manager, 2023).

To foster circular building opportunities, the client should place even greater emphasis on this objective, and designers should also exhibit this behavior. It is crucial for the client to translate their objectives into practice. However, the lack of a circular mindset, as well as a scarcity of circular strategies and methods, result in limited integration of circular approaches (Dokter et al., 2021). This hypothesis has been confirmed for this case study. During the interviews, it became evident that the architect lacked a circular and sustainable mindset.

Figure 26: Project ambitions case C (own figure)

''Ik ben laatst bij een pand geweest waarbij ze veel materialen circulair hebben gebruikt. Maar ik vind het er een beetje shabby uit zien. Weet je denkt van ja, Ik kan wel zien dat dat hergebruikt is. Dus ik wil er graag aan toevoegen van ja absoluut duurzaamheid nastreven, maar het moet wel nieuw voelen of goed voelen.''
[Interviewee case C: Client RE portfolio manager, 2023]

''De belangrijkste drijfveer is eigenlijk voor de mensen die er gaan werken en hun ervaring.''
[Interviewee case C: Project manager, 2023]

The ambition for the project's planning ranked third in priority. While there was some flexibility in the project's schedule, there was a specific deadline for the completion of the building. The client placed a higher emphasis on circularity and sustainability rather than cost objectives. The client is guided and encouraged to prioritize circular building techniques, and in the company's overall business strategy developed by its shareholders, this objective has recently been elevated above cost considerations (Interview case C: Client RE portfolio manager, 2023).

However, the project manager, having expertise in BREEAM, was able to challenge the architect and promote sustainable and circular design opportunities, leading to greater involvement in circular projects (Interview case C: Project manager, Cost manager, 2023)

''Voor de architect zijn er toch altijd weer andere belangen die denken vaak Alleen maar in mooi, niet in duurzaamheid. Dat heb ik ook echt gemerkt. Over het algemeen mistte de duurzame gedachte daar wel.''
[Interviewee case C: Project manager, 2023]

PROCESS I Power matrix

To gain insights into the behaviors and decision-making processes, it is helpfull to identify the stakeholders who have the greatest influence on the outcomes and those who have the highest vested interest. This analysis allows us to understand who has the most power to influence the processes (Chinyio & Olomolaiye, 2009; Olander & Landin, 2005; Reed et al., 2009; Schmeer, 2000). These insights will be valuable in designing appropriate incentives, particularly in addressing the question of "to whom?". The following analyses are conducted for case A, as depicted in Figure 27.

Given that the project manager was recruited through framework partnerships and has recently been involved in another real estate project in the Netherlands, which was completed within the designated timeframe, budget, and in accordance with all client requirements, this stakeholder has been granted greater authority. The portfolio manager has delegated to the project manager the decision-making power in both design and process aspects (Interview case C: Client RE portfolio manager, Project manager, 2023). Furthermore, the project manager serves as the interface between the client and the various consultants involved in the project.

''Wij zijn eigenlijk het oliemannetje tussen al die verschillende adviseurs. En nemen zo af en toe ook wel besluiten, maar we zijn vooral, de glue tussen alle verschillende, dus tussen de opdrachtgever en alle verschillende consultants.''
[Interviewee case C: Project manager, 2023]

Given that the client prioritizes the sustainable and circular objectives of the project, the consultant sustainability holds greater influence compared to the cost manager. Additionally, a carbon calculator was employed to calculate the carbon offsets for the project and to raise awareness among the project management stakeholders about reducing carbon emissions. However, during the design process, the carbon calculator only fulfilled its role of calculating carbon offsets and did not actively challenge other stakeholders. This has negatively influenced the carbon calculator position in Figure 27 (Interview case C: Client RE portfolio manager, Project manager, Cost manager, Architect, 2023).

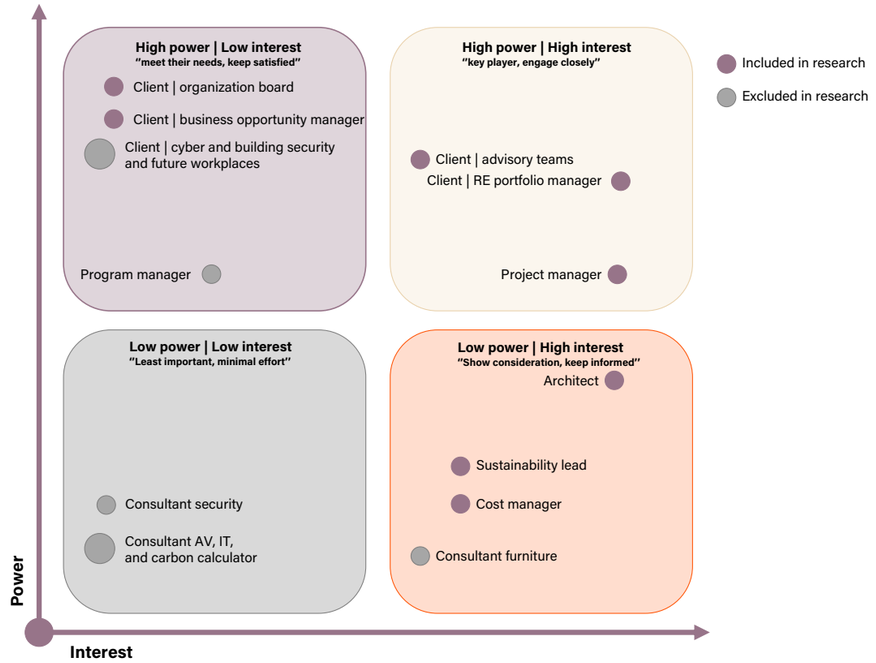


Figure 27: Power matrix case C (own figure, based on (Chinyio & Olomolaiye, 2009; Olander & Landin, 2005; Reed et al., 2009; Schmeer, 2000))

PROCESS I Influence map

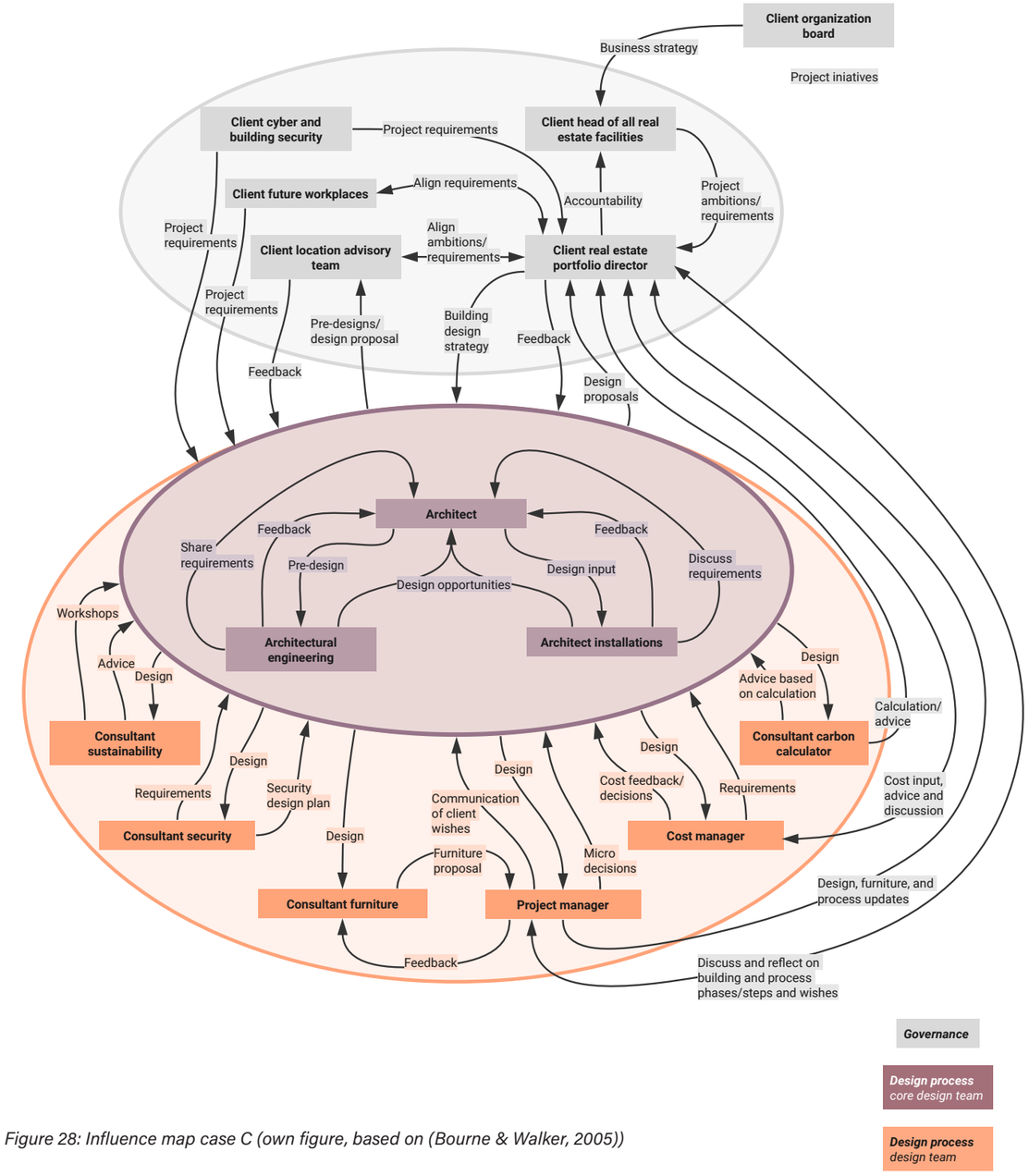


Figure 28: Influence map case C (own figure, based on (Bourne & Walker, 2005))

Findings I Case characteristics and determining factors

Each project case process has its unique attributes, stakeholders, and processes. The goal of the influence map is to identify the various decision-making processes, interrelationships, participation, and responsibilities. This pertains to the phase of strategy and design. Based on the interviews, this case is divided into distinct phases of strategy, design, and governance based on own expertise.

The real estate portfolio manager of the client took charge of developing the real estate strategy for the building, unlike in cases A and B where the architect and a team of consultants handled this responsibility. The decision for this arrangement was driven by the need to meet various business requirements set by the cyber and building security divisions, as well as future workplace considerations. Additionally, the real estate portfolio manager maintained close relationships with local advisory teams to ensure alignment (Interview case C: Client RE portfolio manager, 2023).

Furthermore, a distinction was made between the core design team and the complete design team in this project. Similar to case B, the architect had an in-house architectural staff comprising the core design team, which was responsible for all design-related tasks. The sustainability consultant and carbon calculator had a more passive advisory role within the overall design team. The consultant carbon calculator calculated the project's CO_2 emissions and shared the findings with both the client and the primary design team. However, the client assumed the responsibility of directing and managing the primary design team if the emissions figures fell short. Nonetheless, limited action was taken based on the calculation results primarily due to the challenges associated with accurately determining all the relevant data and the client's lack of commitment to reducing CO_2 emissions (Interview case C: Client RE portfolio manager, 2023).

Furthermore, the sustainability consultant played a passive role during the design phase and only became involved toward the end of that phase. Their primary responsibility lay in influencing the contractor to adopt measures for material reprocessing and waste reduction (Interview case C: Consultant sustainability, 2023).

''The workshop about how to implement best practise for sustainability for sites both in for design standards and going forward and this huge documents gonna be away to really help each site know how to drive circularity." [Interviewee case C: Consultant sustainability, 2023]

Furthermore, unlike in case A, no specific governance strategy was implemented in addition to regular meetings with the project management team (Interview case C: Client RE portfolio manager, 2023).

Step 3 Systemic design toolkit: Framing the case

PROCESS | Causal loop diagram

This analysis aims to provide insights into the reasoning behind different project decisions and shed light on the underlying causes. Causal loop diagrams are employed to facilitate a comprehensive understanding of the dynamics and to identify influential behaviors. The results of this diagram reveal which project factors or requirements are valued as more important in comparison with the circular ambitions. Figure 29 illustrates the outcomes of the interviews.

To interpret the figure:
(+) denotes causality in the same direction.
(-) denotes causality in the opposite direction.

The letter “R” within a loop signifies reinforcement of the same behavior, while the letter “B” indicates a balancing loop that counteracts the system’s behavior, indicating opposition within the loop (Haraldsson, 2004; Roberts et al., 1997).

The blue highlighted text provides the reasoning behind the acceptance or rejection of specific circular project decisions. The orange highlighted text represents the ultimate behavior, indicating whether it aligns with circular or non-circular practices.

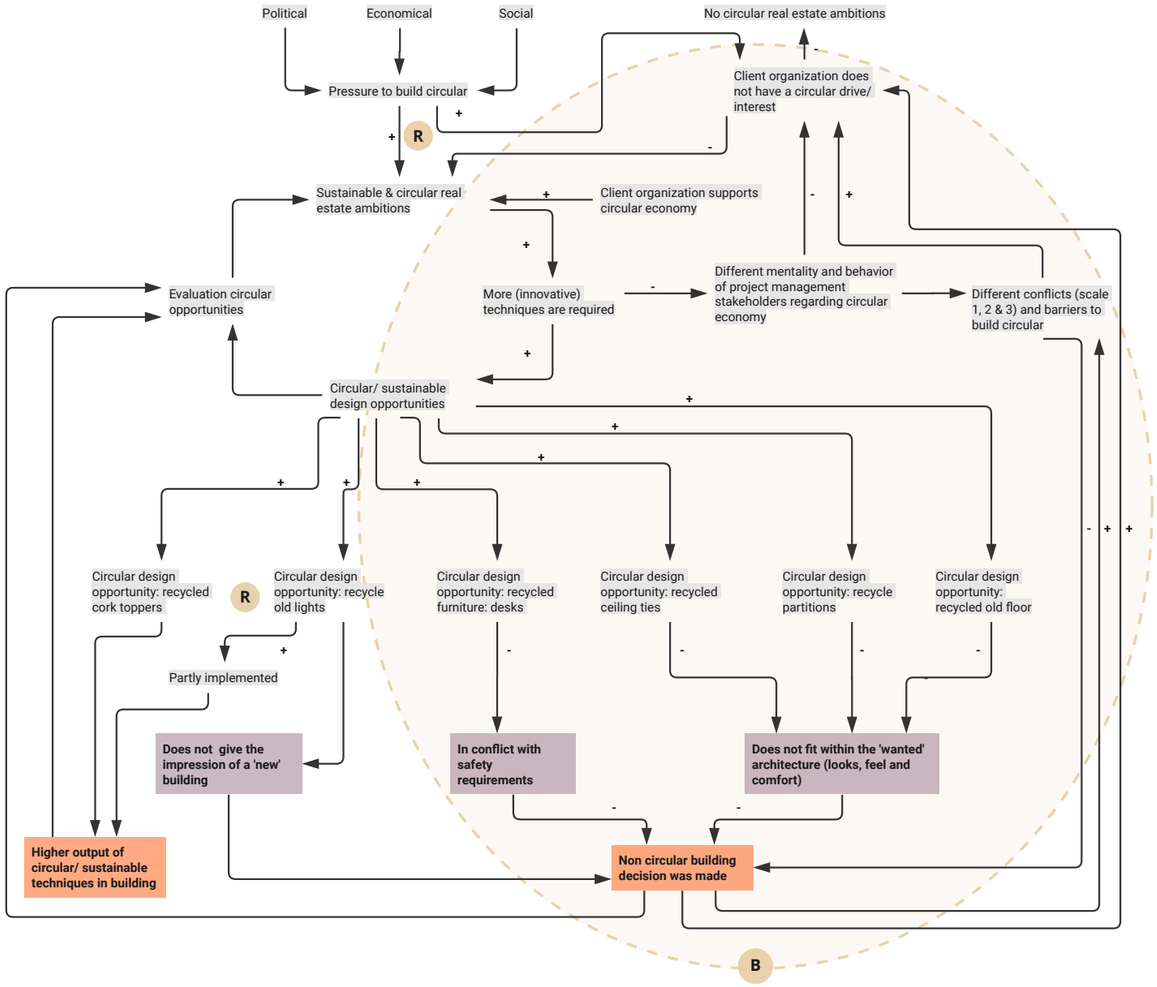


Figure 29: Causal loop diagram case C (own figure, (Haraldsson, 2004; Roberts et al., 1997))

Step 2 Systemic design toolkit: Listening to the stakeholders

PROCESS | Interorganizational dynamics

After conducting the interviews, the fourteen dynamics identified by Kooter et al. (2021) were examined. These dynamics were found to play a crucial role in fostering a circular built environment, as their presence within a project team encourages circular project decisions. The conclusions drawn from this analysis are elaborated on the following page, with the overall findings depicted in figure 30.

In figure 30, the colored circles represent the dynamics that were observed or experienced by the stakeholders. On the other hand, the white squares indicate dynamics that were not apparent during the phases.

	Scale 1: organizational level				Scale 2: project level									Scale 3: individual level			
Job title	Top-down support	Organizational and sectoral cultures	Power and tensions	Staffing continuity	Partnership based on more equality	Shared circular ambitions	Pioneering leadership	Staffing continuity	Transparency	Trust	Project team identity	Reciprocal leadership	Specific circular role and responsibility	Knowledge flows	Genuinely driven	Flexible planning	Flexible budget	Flexible expertise
Client | RE portfolio manager	●	●	●	●	□	□	□	●	□	●	●	□	□	●	●	●	●	●
Project manager	□	□	□	●	□	●	●	□	●	□	●	□	●	●	●	●	●	●
Cost manager	□	□	□	●	n/a	□	□	●	●	●	□	□	●	□	●	□	●	□
Architect	●	●	●	●	n/a	●	□	●	□	□	□	□	□	□	□	●	●	□
Consultant sustainability	□	□	●	●	□	□	□	●	●	●	●	●	□	●	●	n/a	n/a	n/a
Average	3/5	3/5	3/5	5/5	3/3	3/5	4/5	4/5	3/5	3/5	3/5	4/5	3/5	3/5	4/5	3/4	3/4	2/4

Figure 30: Interorganizational dynamics case C (own figure)

Findings I Case characteristics and determining factors

Organizational level

• The cost manager, project manager, and consultant sustainability within their organization lack support and circular organizational and sectoral culture to develop and integrate circular practices into their professional activities. This lack of support has had an impact on the overall implementation of circular design opportunities. The interview with the sustainability consultant revealed that the organization does not prioritize the circular and sustainable building environment as its core business. The consultant sustainability role was established as an additional service to project management within the same organization. Consequently, this stakeholder independently gathers all the necessary information. Moreover, the consultant sustainability faces challenges in influencing and guiding stakeholders towards adopting more circular approaches (Interview case C: Sustainability Consultant, 2023).

Project level

• In comparison to other case studies, the project management team in this particular case scored lower and exhibited more divergent opinions regarding project dynamics. Reasons for this is because, the stakeholders held varying perspectives on leadership, project identity, trust, and transparency. The presence of occasional mistrust and lack of transparency, especially concerning research on circular and sustainable design opportunities, had a negative impact on the design opportunities and decision-making processes. Secondly, the design team for this project was located abroad, necessitating a combination of online and on-site meetings. This geographical barrier created challenges in communication and limited the team's on-site experiences. (Interview case C: Client RE portfolio manager, Project manager, Architect, 2023).

GOAL I Circularity opportunities and potential incentives

During the interview the circular ambitions were discussed. In this manner, stakeholders were requested to recall on examples in which a non-circular decision was made over a circular one. And during this phase, not only is the causal loop diagram is created, but some incentives are also addressed. This chapter will provide insights of the various incentives implemented based on the initial interviews. The second interview answers, incentives, will be used to validate the literature review and to brainstorm about other creative, innovative incentives.

Organizational top-down support

According to both the project manager and the cost manager, they expressed the need for increased access to circular expertise and knowledge to effectively guide clients and influence them towards more circular practices. They believe that obtaining educational information on circular concepts would be an effective strategy to enhance their ability to make a positive impact on clients (Interview case C: Project manager, Cost manager, 2023)

"En, Ik denk dat het heel belangrijk is om je projectmanagers dus een iets van een duurzaamheidstest/ cursus te geven of een BREEAM/lead expert etc. Juist vanuit een adviserende rol kan dit veel impact hebben. Het helpt je wel om duurzaam te denken. En als je die met die gedachte, nou ja, met die handtas met spullen en gereedschappen naar de klant gaat van oké, dit zijn de gereedschappen die we allemaal kunnen gebruiken om duurzamer te worden op allerlei verschillende onderdelen. Dan kan dat zeker veel impact maken" [Interviewee case C: Project manager, 2023]

''Zodra ik meer expertise in duurzaamheid en circulariteit zou hebben, zou ik de klant zeker beter kunnen adviseren in mogelijke duurzame en circulaire mogelijkheden" [Interviewee case C: Cost manager, 2023]

The design team organization employs several motivators to encourage architects to adopt sustainable and circular design practices. Internally, managers consistently review and evaluate the integration of sustainable and circular design outcomes, engaging in discussions to justify their decisions. Furthermore, the organization provides internal sustainable and circular services, such as in-house experts and circular sessions, as well as an online portal offering knowledge resources, trainings, and reference projects. However, for this specific assignment, the provision of in-house experts as an additional service was not included, as the client did not pay an additional fee. Which is in conflict with the 'unlimited' budget for the project and, the ambitions ranking list since circularity was valued as more important than costs (2023, Interview Case C: Architect).

Design processes

During the design processes, the sustainability consultant observes that the current project management stakeholders may occasionally perceive the circular goals as overwhelming. Given the numerous requirements, goals, project factors, interorganizational targets, market pressures, and stakeholder ambitions already in play, the circular economy may sometimes appear as an additional aspect rather than a core requirement. To prevent stakeholders from feeling overwhelmed in this environment, the consultant employs strategies to engage and inspire them. These strategies include showcasing potential positive outcomes, initiating positive communication by highlighting circular design opportunities, facilitating extensive brainstorming sessions with stakeholders, and organizing circular workshops. The consultant maintains a positive attitude throughout, aiming to make the exploration of circular opportunities as enjoyable and engaging as possible and hereby this party tries to keep the morale high (Interview case C: Sustainability consultant, 2023).

"And I will try to make sustainability as fun as it possibly can be without making it obligated. Like I'm really trying. I think a big part of my role is to keep the morale high with it. I want it to be a way that we're exploring and unlocking rather than tracking and penalising so much and questioning. Because they have enough on their plate as it is."[Interviewee case C: Consultant sustainability, 2023]

After design comletion

During the interviews, the project manager put forth the hypothesis that project management stakeholders often possess limited knowledge and expertise regarding the latest advancements in circular innovations. To enhance the integration of higher levels of circularity, it is suggested that (local and external) business cases be incorporated into the design phases. This approach enables (local) market participants to provide input and potentially generate new concepts in response (Case C: Interview, Project Manager, 2023).

"Dus je wil eigenlijk iets lokaals zie je hebben, dus eigenlijk wil je dat degene die het die je maakt dat die met de oplossing komt. Jongens, wij willen de meest duurzame vorm hebben van zo'n soort vloer en het moet ongeveer deze look and feel hebben. Komen jullie maar met een voorstel, want de markt heeft namelijk de meeste kennis."
[Interviewee case C: Project manager, 2023]

Conclusion implemented incentives

During the initial interviews, specific incentives that were implemented in the decision-making processes to promote circular opportunities were discussed. Table 14 below provides a summary of these implemented incentives. In certain instances, the incentives that were implemented, as discussed in the previous findings, have also been identified in the literature review.

Table 14: The implemented incentives in case C (own figure)

Implemented incentives case C	
Rehearse by manager	Social pressure
Circular workshops	Self-interest

iv. EMPIRICAL STUDY validation and brainstorm interviews results and, incentives scheme

This chapter presents the findings of the final brainstorming and evaluation interviews, focusing on the examination and discussion of various incentives. An overview of the incentives is provided, along with a clear depiction of the supplying stakeholders and the targeted audience. Lastly, participants shared additional advices during the interviews, these have been put into a table.

VALIDATION AND BRAINSTORM INTERVIEWS

Step 5 Systemic design toolkit: Exploring effective transformation solutions

The initial interview aimed to comprehensively understand the project's context and situation by examining various aspects such as roles, responsibilities, tasks, levels of authority, design processes, and stakeholder influences. Additionally, it sought to uncover the underlying reasons behind noncircular decision-making. Besides this, the findings indicate that certain stakeholders and organizations have already implemented incentive strategies to encourage the adoption of circular practices among their team members or employees. However, there is still potential for further improvement in the invovlement and effectiveness of pro-circular incentive strategies.

The empirical studies have produced several notable conclusions. Firstly, it was found that certain informal stakeholders exert a significant influence on project outcomes. Secondly, private organizations predominantly prioritize profit and architectural considerations. Thirdly, a prevailing lack of circular culture was observed within most organizations. Lastly, circular ambitions often face rejection due to competing project ambitions. More conclusions are given in the discussion and conclusion chapter.

During the second validation and brainstorm interviews, participants were asked to identify the incentives required to foster greater circular commitment at both individual and project team levels, as well as to cultivate a circular organizational culture and prioritize circular ambitions. The main objectives of these interviews were to allow participants to brainstorm their own incentive ideas based on a critical review of existing processes and to evaluate the incentives gathered from the literature.

Given the substantial volume of findings, the detailed results have been placed in appendix G. However, some commonly shared arguments, strategies, roles, and responsibilities are summarized and shared.

FINDINGS

Step 5 Systemic design toolkit: Exploring effective transformation solutions

Number (#) of stakeholders supporting ... *on a specific contextual factor, incentive and/or argument*

#21 stakeholders concluded that the lack of information, expertise, and knowledge contributes to the current non circular behavior. They recommended that all stakeholders receive additional circular information through trainings, seminars, and brainstorming sessions.

#18 stakeholders made the conclusion that all project management stakeholders (design team) should adhere to an competetive tendering process with stringent circular credit requirements. Whereas participants should be evaluated based on their genuine interest in the circular economy.

#14 stakeholders suggested that circular goals and objectives should become more concrete and quantifiable.

#12 stakeholders concluded that currently project management stakeholders have limited circular expertise and that there is currently no time to stay up to date with circular market innovations and opportunities. By developing business cases during the design phases market parties can react to new market innovations. This allows to integrate the high circular building techniques into practices.

#12 stakeholders concluded that socially-awareness and accountability for design decisions must be increased for stakeholders. Consequently, argumentation and design opportunity analyses must be provided to the other stakeholders.

#12 stakeholders recommended including circular objectives and building methods and processes in the contractual agreements.

#9 stakeholders recommended integrating all project management stakeholders earlier in the process (already in the strategy and initial conceptual design phases).

#9 stakeholders advised that the circular economy should be marketed in a distinct manner. For example, organizations were provided with varied marketing opportunities to attract new business clients and some stated that marketing strategies are needed to persuade real estate project clients to employ circular techniques.

#8 stakeholders recommended adding a circular expert to the project management teams to inspire, enthuse, challenge, and help the other stakeholders.

#8 stakeholders have concluded that they are prepared to exert additional effort in exchange for a financial rewards if a greater percentage of circular criteria are met.

#6 stakeholders concluded that additional budget and time are required to achieve circular goals.

#6 stakeholders opined that public recognition of their circular accomplishments will result in a greater commitment to and adoption of circular practices.

#5 stakeholders proposed that an additional function as a material scout would be beneficial to indicate which constructions will be dismantled (timeline) and which materials can be reused in the projects.

Both private organizations stated that the most effective way to stimulate the circular economy is by '**forcing**' this industry by government via subsidies, tax rebates, and legislation to adopt circular building techniques.

TOTAL INCENTIVE SCHEME

Step 5 Systemic design toolkit: Exploring effective transformation solutions

In the final phase of the empirical studies, the incentives identified and discussed during the first and second interviews with the project management stakeholders have been compiled and organized into a table. This table serves as a comprehensive overview of the various incentives proposed, suggested and some implemented by the participants.

The table is organized to be read from left to right, beginning on the left page. It presents the incentives along with a short explanation of each. An icon is used to indicate whether the incentive is of a financial, social, or moral nature. The table then includes a discussion of the intended audience, including suppliers and targeted stakeholders. Each incentive is provided by a specific party and aims to target a specific audience. The different scale levels introduced in the introduction are incorporated as well. Furthermore, the table provides information on which stakeholders have discussed each incentive during the interviews. Abbreviations are used to represent the stakeholders created on the researchers expertise, and translations for the abbreviations are provided below each table.

On the right page, a circle should indicate whether the incentive origiates from the literature or from participants during the interview. Thereafter, a brief discussion is included, highlighting the opportunities, positive effects, potential risks, and negative effects associated with each incentive. This discussion may draw upon literature from the literature review (indicated in purple text) or newly investigated literature related to the incentive strategy. While the discussion provides a brief enumeration of arguments, it is important to note that there may be additional considerations to be taken into account (for further research).

Abbreviations stakeholders;
DM *(Development Manager),* ***PM*** *(Project Manager),* ***Arch*** *(Architect),* ***CPH*** *(Consultant building PHysics),* ***CI*** *(Consultant Installations),* ***CSE*** *(Consultant Structural Engineer),* ***CBP*** *(Consultant specefic Building Part),* ***CS*** *(Consultant Sustainability),* ***CA*** *(Circular Advisor),* ***RED*** *(Real Estate Director),* ***REM*** *(Real Estate portfolio Manager),* ***CM*** *(Cost Manager),* ***CHS*** *(Consultant Health & Safety), and* ***CMEP*** *(Consultant Mechanical, Electric and Pumbling)*

Table 15: Incentive scheme based on empirical studies (own figure)

Incentive	Cluster	Short explanation	Audience including scale levels	Discussed by ... (during interview) and quantity	Originates from: Literature	Originates from: Interviews	Supported by literature/interviews: opportunities and positive effect	Supported by literature/interviews: potential risks and negative effect
Financial bonus	€	**Reward project management stakeholders with a financial bonus if a specified percentage of higher circular ambitions (both project as process values) are met.**	*Supplied by:* 2 Client *Targeted on:* 3 Project management stakeholder	*Case A:* CPH, CI *Case B:* PM, Arch *Case C:* REM, CS #6		●	*The use of financial incentives makes individuals feel more competent and independent, which in turn promotes greater autonomous motivation and reduced controlled motivation, as well as improved work performance (Landry et al., 2017).* *These incentives is already utilized within health care systems (surgeons who become specialists in particular surgical procedures receive economic advantages) (Roland & Dudley, 2015).*	*Since stakeholders are short-term financially stimulated, financial incentives may not result in long-term behavioral changes (Bolderdijk et al., 2011; Steg et al., 2014; Zeiske et al., 2021).* *Setting financial incentives to motivate stakeholders can create a competitive and less desirable work environment (Yousaf et al., 2014).*
	€	**Encourage employees to become an in-house circular expert by sharing the financial promotion and income increase of increased project participation via this opportunity.**	*Supplied by:* 1 Organization *Targeted on:* 3 Employees within organization	*Case B:* PM, Arch, CS *Case C:*REM, CS #5	●			
Financial penalty	€	**Enforce the development of circular construction projects by compelling organizations and stakeholders to comply with national circular building regulations and laws through the imposition of financial penalties.**	*Supplied by:* EXT Government *Targeted on:* 1 Client	*Case A:* DM *Case B:* RED, REM, PM, CS, CMEP *Case C:* REM, PM #8	●		*This incentive forces different the society towards a wide transition towards the implementation of circular building practices (Lu et al., 2021).*	*Using penalties as incentive can lead to a demotivation, a negative work culture and decline in circular commitment. Additionally, penalties may result into the risk adverse behaviors (Mortimer et al., 2021).* *Organizations try to find other offsetting strategies to avoid the financial penalties (Cheng et al., 2023).*
	€	**Compel project management stakeholders to meet circular building targets by implementing a financial penalty for non-compliance.**	*Supplied by:* 2 Client *Targeted on:* 1 Stakeholders' organizations	*Case A:* CPH *Case C:* REM #2		●		
Financial governmental help	€	**Promote the development of circular buildings by offering governmental or EU subsidies.**	*Supplied by:* EXT Government/EU Union *Targeted on:* 1 Client	*Case A:* Arch *Case B:* RED, REM, Arch *Case C:* REM, PM #6	●		*Sweden and South Africa are currently implementing this strategy (governmental help), as tax benefits have been proved to be an effective strategy for accelerating the transition to CE (Guceri, 2018; Hartley et al., 2020).* *It will result in a broad transition to circular building practices (Lu et al., 2021).*	*To take advantage of the tax benefits, some businesses may falsely assert that they are implementing circular practices. This can undermine the effectiveness of the tax breaks and reduce the incentive for other businesses to actually adopt sustainable practices (Guceri, 2018).*
	€	**Stimulate organizations to integrate circular building techniques by offering tax breaks.**	*Supplied by:* EXT Government/EU Union *Targeted on:* 1 Client	*Case B:* RED, REM, Arch *Case C:* REM, PM #5	●			
Marketing strategy	€	**Emphasize the financial advantage gained through increased project participation when stakeholders possess more circular experiences compared to competitors.**	*Supplied by:* 3 Project management stakeholder(s) *Targeted on:* 3 Project management stakeholders	*Case A:* CPB, CI #2	●		*(Jakobsson et al., 2002; Laffont & Martimort, 2001; Steg et al., 2018) have proven that marketing efforts to the ease of program participation is an effective strategy to incentivize stakeholders. Especially since these parties are interested in a competitive advantage.* *Also, when design decisions are proposed with additional advantageous attributes, clients are more likely to select this option (Hart et al., 2019).*	*To increase one's commitment to the CE. Other strategic planning, cost management, quality management, process management, service management, and research and development should be incorporated into the transition. This transition requires budget, time, adaptability, willingness, and expertise (Barros et al., 2021).*
Reciprocal	€	**Forge a mutually beneficial agreement with project management stakeholders' organizations that states when circular targets are met, stakeholders have the opportunity to become framework partners.**	*Supplied by:* 3 Client *Targeted on:* 1 Project management organizations	*Case B:* RED *Case C:* REM, CS #3	●		*(Fehr & Falk, 2002; Gibbons & Roberts, 2012) conducted research on the effect of incentives on economic discussions at the highest levels of corporations. The implementation of reciprocal economic incentives was one of them, they identified the positive outcomes with the use of this technique.* *Design projects tend to be short-term endeavors, which hinders designers' engagement with the lifecycles of designed artifacts and the possibility of attaining circularity in the long run. With the involvement of this incentive, a long-term circular mindset may be created (Dokter et al., 2021).*	*When collaborating with standard framework partners, partners lack the motivation to proof, resulting in a dearth of innovative and creative solutions (Interview 1: case B: Client head of all RE facilities, Client RE portfolio manager, case C: Project manager, Cost manager, 2023; Interview 2: case B: Project manager, case C: Consultant sustainability, Project manager, Client RE portfolio manager, 2023).* *(Fehr & Falk, 2002; Gibbons & Roberts, 2012) Within this reciprocity behavior, employees tend to exhibit conduct that is advantageous for both themselves (as individuals) and the company.* *Additionally, there is yet little research and experience in the use of material donor projects.*
	€	**Develop a mutually beneficial agreement for long-term engagement with architects by granting them access to other real estate projects to serve as material donors for future enterprises.**	*Supplied by:* 3 Client *Targeted on:* 1 Architectural firm	*Case A:* Arch, CA #2		●		

EXT *External (unrelated with the project)* 1 *Organizational level* 2 *Project level* 3 *Individual level*

Abbreviations stakeholders;
DM *(Development Manager),* ***PM*** *(Project Manager),* ***Arch*** *(Architect),* ***CPH*** *(Consultant building PHysics),* ***CI*** *(Consultant Installations),* ***CSE*** *(Consultant Structural Engineer),* ***CBP*** *(Consultant specefic Building Part),* ***CS*** *(Consultant Sustainability),* ***CA*** *(Circular Advisor),* ***RED*** *(Real Estate Director),* ***REM*** *(Real Estate portfolio Manager),* ***CM*** *(Cost Manager),* ***CHS*** *(Consultant Health & Safety), and* ***CMEP*** *(Consultant Mechanical, Electric and Pumbling)*

Note: Purple text exemplifies the content in the literature review

Table 15: Incentive scheme based on empirical studies (own figure)

Incentive	Cluster	Short explanation	Audience including scale levels	Discussed by ... (during interview) and quantity	Originates from: Literature	Originates from: Interviews	Supported by literature: opportunities and positive effect	Supported by literature and interviews: potential risks and negative effect
Contractual		**Enforce project management stakeholders through a circular contractual agreement, which may incorporate circular targets, ambitions, benchmarks, and process factors.**	*Supplied by:* 3 Client *Targeted on:* 2, 3 Project management stakeholder(s)/ team	*Case A:* DM, PM, Arch, CPH, CS, CBP *Case B:* Arch, CM, CHS, CS *Case C:* Arch #11	●		*(Suprapto et al., 2016) outlines the impact of contractual incentives, an incentive in which various laws and/or restrictions are incorporated into the contract between actors. This improves project performance by fostering improved working relationships, relational attitudes, and collaboration quality among project stakeholders.*	*Various legal uncertainties may arise when leasing materials and products, such as the retention of ownership, financial value, depreciation, collateral risk, questionable credibility, ownership of long-term assets, property law, etc. In addition, this form of contract has limited application at present, and much remains unknown (Ploeger et al., 2019).*
Promotion		**Motivate employees by offering additional functions or promotions that provide social recognition, increased expertise, but yet without financial rewards.**	*Supplied by:* 1 Organization *Targeted on:* 3 Employees within organizations	*Case B:* PM, Arch *Case C:* PM, CS #4	●		*In addition to the expanded knowledge a stakeholder has gained by becoming an expert, it also gives them a greater sense of authority and autonomy (M. M. Cheng & Coyte, 2014). Stakeholders are more willing to share knowledge and have a higher committed value to their field of expertise.*	*Stakeholders are required to surrender project-specific information that has been accumulated and developed over time, whereas engaging in general extra-role behaviors, is timeconsuming process. Wherefore, employees may feel dissatisfied and disrespected over time due to their additional responsibilities (M. M. Cheng & Coyte, 2014).*
Social warranty		**Establish collective social responsibility for circular risks by emphasizing that everyone bears socially accountability for design choices in order to avoid attributing blame to individuals in case of circular construction failures.**	*Supplied by:* 3 Client/ project manager *Targeted on:* 2 Project management team	*Case A:* Arch, CSE, CS, CBP *Case B:* PM *Case C:* Arch #6	●		*It is more likely that stakeholders will be risk tolerant if it is stated explicitly that everyone becomes socially responsible. In addition, stakeholders are granted greater control over all project decisions, and a more collaborative work environment is fostered (Campbell, 2006).*	*When everyone is accountable, no one is truly accountable, and no one is willing to express decisive opinions (Interview 1 Case A: Circular advisor, 2023). The concept of accountability is already profoundly ingrained in our daily professional lives, making it difficult to alter. Also, politically speaking, it is difficult to hold inexperienced individuals accountable for decisions in such complex initiatives (Esmark, 2007).*
Social pressure		**Drive and exert pressure on project management stakeholders by consistently and actively articulating who supports each project decision and the underlying reasons behind it.**	*Supplied by:* 3 Project manager *Targeted on:* 2 Project management team	*Case A:* PM *Case C:* CM #2	●		*In collective activities, the urge to react and behave in a particular manner because everyone in your network does so. This may potentially even have detrimental effects on the individual (Roeder, 2013; Rotemberg, 1994; Steg et al., 2018).*	*When stakeholders feel pressured, it can have a negative effect on their future performance, they can become uncomfortable, and with a few power relations, this can be misinterpreted (Heinle et al., 2012).*
Desire to proof		**Stimulate project stakeholders to generate comprehensive circular building opportunities through a competitive tendering process with circular criteria. Stakeholders have a desire to validate design ideas for circularity in order to win.**	*Supplied by:* 3 Client *Targeted on:* 2, 3 Project management stakeholder(s)/ team	*Case A:* DM, PM, Arch, CPH, CBP, CI *Case B:* RED, PM, Arch, CHS *Case C:* REM, PM, Arch #13	●		*The participation of project management stakeholders in a rigorous bidding process - a competitive environment - stimulates innovation, creativity, and quality assurance (Winch, 2010).*	*While there is a focus on a particular behavior, the inverse may also occur: stakeholders may become passive because they believe this is the responsibility of the CE expert (Interview 2 case B: Cost manager, 2023).*
		Stimulate project stakeholders to create additional circular building opportunities by incorporating a circular expert/ team during the design processes. This will ignite stakeholders' motivation to demonstrate their proficiency in circular knowledge.	*Supplied by:* 3 Client *Targeted on:* 2, 3 Project management stakeholder(s)/ team	*Case A:* DM, PM, Arch, CA, CS *Case C:* Arch, CS, CM #8	●		*With the addition of an new role (specialist), stakeholders perceive a desire to proof, this has been demonstrate as an effectively strategy (Interview 1 case A: Steering group, 2023).*	
		Foster employee approval by top management through catch-up meetings or rehearsals focused on the integrated circular building aspects.	*Supplied by:* 1 Organizations *Targeted on:* 3 Employees within organization	*Case A:* CI *Case C:* CM #2	●		*The architect of case C (Interview case 1 case C: Architect, 2023) has also successfully experiences with getting rehearsed by a top-management stakeholder. Since a leader is responsible for determining the work, it is ideal for her to be altruistic towards the employees, as they will be more receptive to her leadership (Rotemberg, 1994). When the employee work is closely monitored, there are more social strategic decision-making considerations and a more productive environment (Holmstrom, 1982).*	
Reputational value (social recognition)		**Encourage employees in the adoption of circular practices by providing public organizational recognition through accolades such as "Employee of the Month," attention, and merit awards in organizational newsletters or updates.**	*Supplied by:* 1 Organizations *Targeted on:* 3 Organizational employees	*Case B:* RED, PM, CHS *Case C:* PM, Arch #5	●		*"Employee of the month" capitalises to the feeling of employees who are seeking for approval and recognition from the organization's leadership / top management. The perception of the employee's positive behavior will increase the likelihood that he will repeat it, and other employees will recognize the advantages of demonstrating similar conduct (Benabou & Tirole, 2003). In the medical sector these forms of incentive are commonly used (Roland & Dudley, 2015).*	*This incentive can distract employees from their 'real' job, effectiveness may be unclear for the employees, has the potential to widen disparities, and is difficult to measure (Roland & Dudley, 2015).*
		Motivate other project management stakeholders by publicly acknowledging the implementation of circular practices during stakeholder meetings.	*Supplied by:* 2 Client/ project manager *Targeted on:* 3 Project management stakeholders	*Case A:* DM *Case B:* CHS *Case C:* Arch, CA #4	●		*When social recognition is giving within group projects, individuals feel better and more motivated to put more efforts in a given event (Rode et al., 2015).*	

Note: Purple text exemplifies the content in the literature review

EXT *External (unrelated with the project)* 1 *Organizational level* 2 *Project level* 3 *Individual level*

Abbreviations stakeholders;
DM *(Development Manager),* ***PM*** *(Project Manager),* ***Arch*** *(Architect),* ***CPH*** *(Consultant building PHysics),* ***CI*** *(Consultant Installations),* ***CSE*** *(Consultant Structural Engineer),* ***CBP*** *(Consultant specefic Building Part),* ***CS*** *(Consultant Sustainability),* ***CA*** *(Circular Advisor),* ***RED*** *(Real Estate Director),* ***REM*** *(Real Estate portfolio Manager),* ***CM*** *(Cost Manager),* ***CHS*** *(Consultant Health & Safety), and* ***CMEP*** *(Consultant Mechanical, Electric and Pumbling)*

Table 15: Incentive scheme based on empirical studies (own figure)

Incentive	Cluster	Short explanation	Audience including scale levels	Discussed by ... (during interview) and quantity	Originates from: Literature	Originates from: Interviews	Supported by literature: opportunities and positive effect	Supported by literature and interviews: potential risks and negative effect
Lacking behind		Promote employees' knowledge in the circular economy by organizing circular seminars, trainings, lectures, etc., fostering a sense among employees that they strive to keep pace with their coworkers and not fall behind.	*Supplied by:* 1 Organization; *Targeted on:* 3 Employees within organization	*Case A:* PM; *Case B:* PM, CM, Arch, CS; *Case C:* PM, Arch — #7		●	*Employees encourage one another to participate in particular work because they do not want to feel behind (Gibbons & Roberts, 2012).*	*Employees may feel discriminated against (when they have no personal interest in the topic), they may react based on extrinsic motivation, which has less impact, there may be no clear business orientation, and it may be challenging to translate all the information into practical practices (Chang & Lee, 2007).*
Actively monitoring, involvement and discussions		Exercise control over the design team by issuing phase-specific documents (quarterly reports) that explicitly state the design decisions. This enables the client to oversee the project decisions effectively.	*Supplied by:* 2 Client; *Targeted on:* 3 Project management stakeholders	*Case A:* DM, PM, Arch, CSE, CS, CI, CPH — #7		●	*The findings of the research of (Dokter et al., 2021) highlight the need for extensive collaboration with stakeholders and experts throughout all phases of the design process. Although collaboration is an essential element of any design process, the cases presented illustrate the role designers can play in facilitating connections and collaborative spaces between the actors, which may play a crucial role in devising solutions in support of a circular economy.*	*It can be complicated for the stakeholder(s) to be tasked with creating phase documents or to assume additional responsibilities as a project manager. They already have a substantial amount of responsibilities and duties. When more is expected of stakeholders, they may lose interest in their work (own experience) (Interview 1 Case C: Consultant sustainability, 2023).* *When a design strategy is created collectively, the duration will be prolonged, it will be more challenging to integrate all data, and it will be unclear who is accountable and responsible (Smith & Tardif, 2009).*
		Drive project management stakeholders to adopt circular practices by actively monitoring project decisions through the project manager and initiating discussions regarding specific choices.	*Supplied by:* 3 Client; *Targeted on:* 3 Project manager	*Case A:* DM; *Case B:* Arch, CS; *Case C:* Arch — #4	●			
Self-justification sense of urgency		Create awareness and a sense of urgency among project management stakeholders by conducting workshops that highlight the negative consequences of linear construction methods and consistently emphasize the environmental impacts.	*Supplied by:* 3 Circular expert; *Targeted on:* 2-3 Project management stakeholders/ team	*Case A:* Arch, CA; *Case B:* CS — #3		●	*(Fehr & Falk, 2002; Gibbons & Roberts, 2012) discovered the influence of self-justification whereas people react on moral decisions since stakeholders cannot disregard the negative consequences.*	*Recalling on the negative consequences of specific actions may result into a negative working environment; more competing and blaming environment. And possibly, participants may be less satisfied with the end result (Gould, 1993).*
		Create awareness and a sense of urgency among project management stakeholders by making stakeholders responsible for calculating the carbon offsets of each project decision.	*Supplied by:* 3 Client / project manager; *Targeted on:* 2-3 Project management stakeholders/ team	*Case A:* PM, Arch, CA; *Case B:* Arch, CS — #5		●		
Self-interest		Elevate self-interest in the circular economy among the project management team by organizing charrette, innovation, or brainstorming days.	*Supplied by:* 3 Client; *Targeted on:* 2 Project management team	*Case A:* DM, PM, Arch, CS, CSE, CI; *Case B:* CM — #7		●	*It is crucial to raise awareness and provide design practitioners and students with the appropriate training and strategies to facilitate effective and long-lasting collaborations throughout the entire design process and lifecycle of designed artifacts. This will increase commitment and engagement (CE) with particular topics (Dokter et al., 2021).*	*With charrettes and creative sessions, stakeholders may neglect to incorporate circular goals into the'regular' design processes (Interview 1 case A: Consultant building physics, 2023).*
Self-transcendent		Change stakeholders mentality by instilling the belief among project management stakeholders that the circular built environment is the new norm, establishing an environment where linear building methods are regarded as the "wrong" choice.	*Supplied by:* 3 Project management stakeholder(s); *Targeted on:* 2 Project management team	*Case A:* CA — #1		●	*The circular advisory organization has increasingly employed this strategy in initiatives. They have discovered that in certain instances, this strategy can result in the belief that circular economy is the new norm (Interview 1 case A: Circular advisor, 2023).*	*It is difficult to predict who is sensible for this strategy, and this organization learned that it is not always considered a successful strategy (Interview 1 case A: Circular advisor, 2023).*
Intrinsic motivation		Deepen personal and stakeholder affinity with the circular economy by emphasizing the positive global impact of making circular decisions.	*Supplied by:* 3 Project management stakeholder(s); *Targeted on:* 3 Project management stakeholder(s)	*Case A:* CPH; Case C: Arch — #2		●	*With positive feedback, stakeholders will demonstrate positive and contented behavior. They maintain a positive attitude and affection toward particular objectives and recognize the added value of previously unseen opportunities. The purpose of these positive internal reactions is to increase intrinsic motivation (Carver, 2003).*	*An individual's intrinsic motivation is unique, and it may not be an effective strategy to stimulate it. By continually recalling the positive outcomes of a particular behavior, the level of urgency may diminish (Carver, 2003).*
Informational resources		Enhance stakeholders' knowledge in the circular economy by assigning an individual with the responsibility of conducting research into new circular innovations.	*Supplied by:* 3 Client; *Targeted on:* 2 Project management stakeholder(s)	*Case A:* REM, Arch; *Case B:* Arch; *Case C:* CM — #4		●	*(Campbell, 2006; Dittmar, 1992) discuss the importance of providing stakeholders with informational resources. The efficient utilization of materials may have a direct impact on a stakeholder's perspective.* *This incentive has been demonstrated to be an effective method for enhancing employee performance, employee engagement, and employee commitment (Heslina & Syahruni, 2021).*	*Not all presented information can be characterized as successful or vital. Employees continue to prioritize the various informational resources; however, when leadership is not actively promoting the use of informational resources, employees tend to do nothing with the information provided, and employees can become overwhelmed with all information (Heslina & Syahruni, 2021).*

Note: Purple text exemplifies the content in the literature review

EXT *External (unrelated with the project)* 1 *Organizational level* 2 *Project level* 3 *Individual level*

Abbreviations stakeholders;
DM *(Development Manager),* ***PM*** *(Project Manager),* ***Arch*** *(Architect),* ***CPH*** *(Consultant building PHysics),* ***CI*** *(Consultant Installations),* ***CSE*** *(Consultant Structural Engineer),* ***CBP*** *(Consultant specefic Building Part),* ***CS*** *(Consultant Sustainability),* ***CA*** *(Circular Advisor),* ***RED*** *(Real Estate Director),* ***REM*** *(Real Estate portfolio Manager),* ***CM*** *(Cost Manager),* ***CHS*** *(Consultant Health & Safety), and* ***CMEP*** *(Consultant Mechanical, Electric and Pumbling)*

STAKEHOLDERS / AUDIENCE / USERS

Step 6 Systemic design toolkit: Theory of systems change

Incentives can play a role in motivating stakeholders to embrace sustainable construction practices and drive the transition towards a circular economy. The incentive scheme provides a comprehensive overview of empirically proven incentives that have been identified as strategies for encouragement. The scheme includes concise explanations of each incentive, along with information regarding the various suppliers involved and the targeted stakeholders they aim to influence.

For incentives to effectively serve as an encouragement strategy, identicating the stakeholders, users and affected audience becomes essential. To provide a comprehensive overview of the incentive landscape, a sankey diagram has been created, representing twenty-seven distinct incentives, each associated with a unique supplier and specific targeted stakeholders. By mapping out the relationships between suppliers and their targeted stakeholders, the diagram provides a holistic perspective on how incentives flow and which stakeholders are influenced by them.

This visualization not only highlights the diverse range of available incentives but also demonstrates the intricate connections between suppliers and their target audience. The sankey daigram, figure x, serves as a valuable resource for researchers, practitioners, and policymakers seeking to deepen their understanding of the incentives that drive the adoption of circular practices in the construction industry. Armed with this knowledge, stakeholders can effectively design and implement incentive strategies that foster the construction of more circular buildings, thereby promoting sustainability in the built environment.

This study demonstrates a broad applicability that encompasses a diverse array of users. Initially, these users include suppliers, however, the target groups themselves may also adopt the incentive strategy indirectly. While the target groups may not directly implement the incentive, they can actively engage in discussions with the relevant suppliers to encourage its adoption. Ultimately, all stakeholders depicted in the Sankey diagram have the potential to become users or by advocating this strategy, or by actively promoting its implementation to the correct suppliers.

Note: The term “project management team” specifically refers to the cohesive group as a whole, which receives the incentives. In contrast, the term “project management stakeholders” pertains to the individual members within the team both the formal (decision-makers; client, project manager etc.) and informal stakeholders (consultants, designers etc.).

i. ii. iii. **iv.** brainstorm & validation interviews v.
The Circular Influencer

Step 6 Systemic design toolkit: Theory of systems change

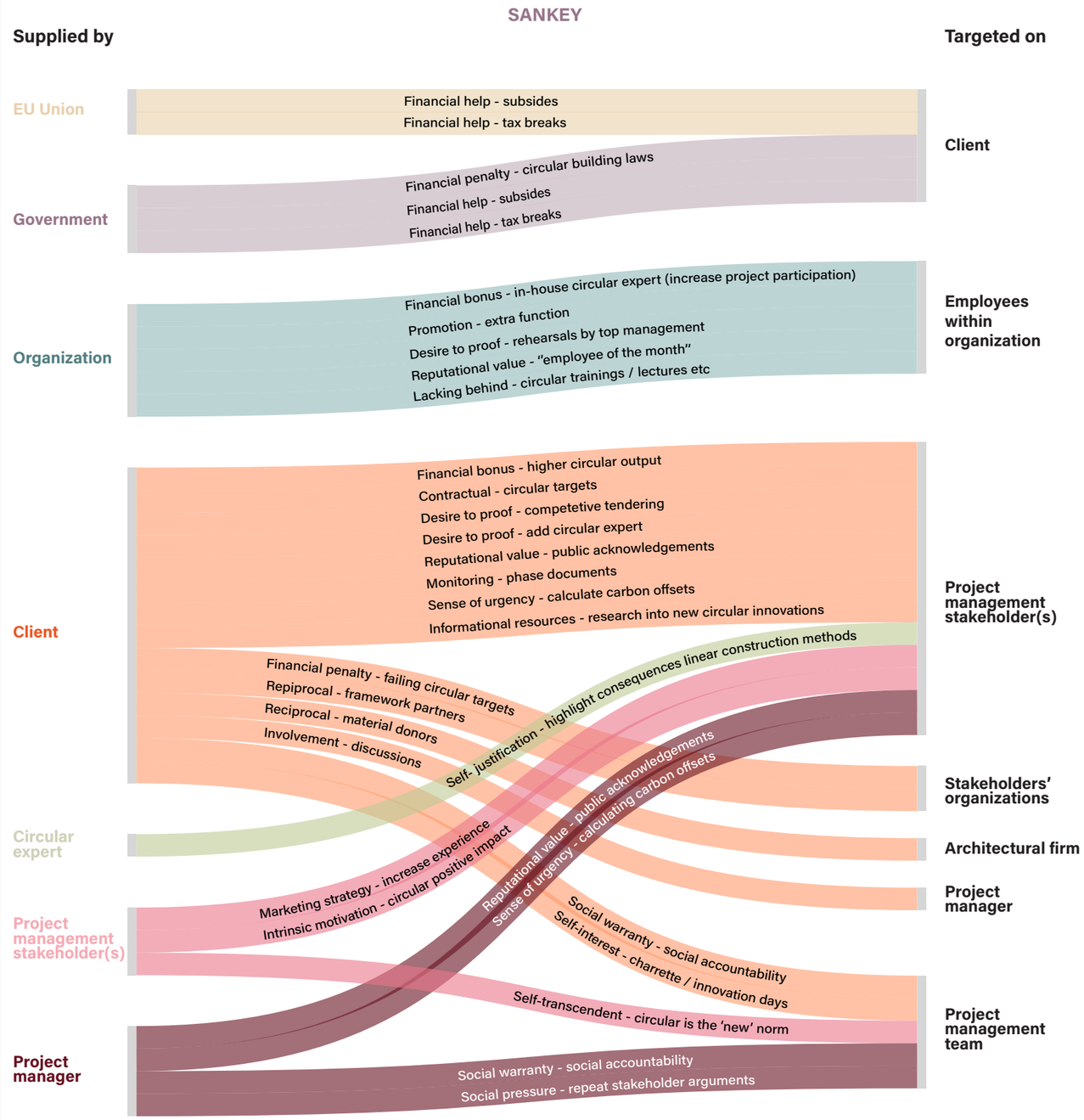


Figure 31: Sankey diagram with the suppliers and targeted audience (own figure)

ADVICES

Step 6 Systemic design toolkit: Theory of systems change

During the second interview, it was observed that in certain instances, stakeholders not only discussed incentives but also provided advices in encouraging project management stakeholders to stimulate the circular built environment. Within these advices, various other encouragement strategies were mentioned. The primary distinction is that incentives are designed to stimulate and reinforce desired behaviors through the provision of rewards, benefits, recognition, or penalties. Conversely, the advices shared encompassed encouragement strategies facilitated via a supportive tool (contracts, rules, process steps, strategies, knowledge sharing etc.), with no explicit focus on the positive or negative consequences for stakeholders. Nevertheless, some advices may have a positive or beneficial outcome on stakeholders. An overview of all the advices may be reviewed in table 16.

The causal loop diagrams (figure 17, 23 and 29) reveal instances where circular decision-making was rejected. Certain rejections can be resolved by incorporating the suggested advice. For example, conflicts between safety and functionality measurements led to noncircular decisions in some cases. The interviews further highlighted that involving stakeholders earlier in the process, specifically during the strategy phase, would have enabled them to reassess, reevaluate, and adapt certain requirements.

Table 16: Advices discussed during validation and brainstorm interview (own figure)

	Advice	Discussed by ... (during interview) and quantity	Given to
CONTRACTUAL AGREEMENTS	During the tendering process, incorporate a Total Engineering Contract (TEC) for the contractor. Specify criteria that require the contractor to propose additional circular building techniques and opportunities (risk sharing).	*Case A:* REM, PM **#2**	Client
	Implement a Bouwteam contract, which involves engaging all project management stakeholders during the initial design phases, including the strategy phase and conceptual/pre-design stages.	*Case A:* Arch, CPH *Case C:* REM, Arch **#4**	Client
	Establish a contractual arrangement with manufacturers to initiate the rental of construction materials and components.	*Case A:* PM, Arch, CA *Case C:* PM **#4**	Client
PROCESS	Incorporate all project management stakeholders throughout the development of the design strategy.	*Case A:* DM, CPB, CSE *Case B:* PM **#4**	Client and project manager
	Introduce an additional phase after the conceptual design called "Opportunity Framing," which involves a dedicated day for all stakeholders to explore potential circular opportunities.	*Case C:* REM **#1**	Client and project manager
	Establish a group rule mandating that every stakeholder must provide justification and conduct trade-off analyses for each project decision.	*Case A:* DM, PM, Arch, CA, CI *Case B:* CM *Case C:* Arch, CM **#8**	Client and project manager
	Visit reference projects and circular product manufacturers.	*Case A:* DM, CI, CSE, CA *Case B:* RED, PM **#6**	Project management stakeholders
	Upon the completion of the design phase, develop an external business case that invites external parties such as start-ups or universities to contribute additional circular opportunities	*Case A:* DM, PM, Arch, CBP, CPH *Case B:* CS *Case C:* REM, CM **#8**	Client
MARKET STRATEGY	Use a comprehensive circular economy business strategy to attract new business partners/customers and to employ new employees (for argumentation top-management).	*Case A:* CI, CA *Case B:* RED, REM *Case C:* REM **#5**	Organizations
	Promote the circular targets differently to the client through a distinct marketing approach, highlighting other advantageous characteristics such as adaptability, long-term investment benefits, higher residual value, future-proofing, unique selling point, among other compelling features.	*Case A:* CS, CPH, CBP, CI *Case B:* Arch, CS *Case C:* REM, CM, Arch **#9**	Project management stakeholders
KNOWLEDGE	Create a concise overview of the circular targets to the project management stakeholders, offering relevant circular information and knowledge, along with potential applications within the circular economy.	*Case A: DM, Arch, PM, CPH, CA, CPE, CI, CSE, CS* *Case B: Pm, Arch, CM, CS, CHS, CMEP* *Case C: REM, PM, CM, Arch, CS* **#21**	Project management stakeholders
	Offer clients comprehensive information that illuminates the vast array of opportunities within the circular economy. Simultaneously, emphasize the detrimental consequences associated with traditional linear building methods	*Case A: PM, CA* *Case B: Arch, CM, CS* *Case C: Arch, CS* **#7**	Project manager

Abbreviations stakeholders;
DM *(Development Manager),* ***PM*** *(Project Manager),* ***Arch*** *(Architect),* ***CPH*** *(Consultant building PHysics),* ***CI*** *(Consultant Installations),* ***CSE*** *(Consultant Structural Engineer),* ***CBP*** *(Consultant specefic Building Part),* ***CS*** *(Consultant Sustainability),* ***CA*** *(Circular Advisor),* ***RED*** *(Real Estate Director),* ***REM*** *(Real Estate portfolio Manager),* ***CM*** *(Cost Manager),* ***CHS*** *(Consultant Health & Safety), and* ***CMEP*** *(Consultant Mechanical, Electric and Pumbling)*

CONCLUSION

Step 6 Systemic design toolkit: Theory of systems change

Two main factors should be closely considered when implementing incentives. Firstly, based on the findings from the cases, noncircular decisions were made for various reasons. In order for incentives to be effective, they should be designed to specifically address and alter the behavior and perspective underlying the noncircular decision. The incentive should act as a countermeasure to the noncircular reasoning. While examples of such incentives are provided, it is important to note that there may be additional suitable options for incentive strategies.

Various circular project decisions are presently rejected on the premise of:

COST

Financial incentives can play a significant role in enabling projects and organizations to pursue circular design opportunities by providing them with the necessary financial resources. These incentives can make the implementation of circular practices financially viable and facilitate the adoption of sustainable and circular solutions..

AESTHETIC ARCHITECTURAL DESIGNS

The implementation of a comprehensive set of incentives, comprising financial, social, and moral aspects, can effectively facilitate the promotion of the circular economy. To encourage circular architectural designs, a social promotion strategy can be adopted, highlighting the benefits and value of circular project decisions as part of a broader marketing approach. By appealing to self-interest and fostering active involvement in the circular economy, individuals can be motivated to actively engage and commit to circular practices.

EXTRA TIME AND EFFORS REQUIRED

Through the provision of social or financial compensation to stakeholders, their motivation and commitment to conduct in-depth research on circular practices can be enhanced. By acknowledging and rewarding their efforts, stakeholders are incentivized to allocate more time and resources towards exploring and implementing circular solutions. This compensation serves as a tangible recognition of their contribution and reinforces their dedication to advancing circularity in their work, both on project as organizational level.

Secondly, when implementing incentives, it is essential to carefully consider the stakeholders, users, and audiences involved for an incentive to function as encouragement strategy for a specific behavior. This is because the stakeholders providing (suppliers) the incentives have a particular objective in mind, such as promoting more circular project decisions, and therefore aim to elicit a targeted response from the intended audience (targeted stakeholders). For instance, when the government endeavors to promote the adoption of electric cars, it is crucial to direct the incentives towards individuals possessing driver's licenses, and not to a targeting audience without driver's licenses. This would make the incentive ineffective.

v. DISCUSSION & CONCLUSION

This chapter presents a comprehensive analysis of the research findings, comparing and contrasting them with the literature review. It includes an examination of the research findings, limitations of the study, limitations of the systemic design toolkit, and provides recommendations for future research

This research further supports the notion that incentives can positively influence the decision-making processes of project management stakeholders in the real estate sector.

DISCUSSION

The forthcoming section will conduct an evaluation of the research findings in light of the extant literature, incorporating the insights elucidated in the preceding chapters. This examination will be followed by a thorough discussion on the limitations intrinsic to both this research and the employed systemic design toolkit. In the subsequent subsection, recommendations for future research will be provided.

Analysis research findings comparison with literature

PROJECT - AMBITIONS

The study by Corvellec et al. (2020) established that circular ambitions are not prioritized in projects and that non-built circular characteristics do not significantly influence project success or the evaluation process by project management stakeholders. This hypothesis has been validated across all three project cases, resulting in the circular objective being ranked fourth or fifth in terms of relevance.

Furthermore, the introduction also indicated that private organizations tend to exhibit self-interested pro-pareto-optimal behavior, seeking economic advantages for themselves (Boyne, 2002; Gibbons & Roberts, 2012). This hypothesis was confirmed during the empirical study. In the analysis of case B, a private organization, the primary objective of the real estate project was to adhere to the predetermined budget. Circular alternatives that involved higher costs were rejected based on this financial consideration.

In contrast, case C demonstrated a distinct intrinsic motivation towards the circular economy. The company's shareholders closely monitor the organization's circular economy business and strategy responses, making it intolerable to reject circular decisions solely on the basis of cost. However, a dichotomy arises as circular real estate decisions are not implemented if the organization does not foresee long-term financial benefits. Consequently, in this case, cost objectives may hold a fifth or last position in the project's priorities. Nevertheless, if the overall business strategy fails to establish pro-pareto optimal behavior over the long term, the circular decision remains off the table.

We might conclude that case B did not involve short-term financial adjustments, whereas in case C, such adjustments were made, but only if they resulted in long-term financial benefits. This suggests that short-term financial ratios played a decisive role in case B, while long-term financial ratios were considered more important in case C.

Hence, the aforementioned hypothesis by Boyne (2002) and Gibbons & Roberts (2012) is confirmed. Nevertheless, it is important to differentiate between short-term financial project decisions and long-term financial decisions, as they hold distinct importance and implications within the framework of circular project objectives

CIRCULAR COMMITMENT

The literature review highlights potential differences in the level of commitment to the circular economy between public and private organizations. It is suggested that public organizations may exhibit a stronger dedication to circular practices, influenced by factors such as funding, mission and goals, resource allocation, long-term perspectives, and the regulatory environment (Klein et al., 2020; Levering & Vos, 2019; Owojori & Okoro, 2022).

By comparing the characteristics of Case A with Cases B and C, disparities in mission and goals, long-term perspectives, and the regulatory environment become evident. Case A, being a public organization, demonstrated an overall real estate business strategy that placed greater emphasis on social and environmental objectives. The organization's top management implemented various strategies to enhance environmental impact, including the involvement of a circular advisory team and the strict adherence to phase documents for control purposes. Furthermore, the organization's extensive asset portfolio necessitated a heightened focus on long-

term value creation encompassing social, architectural, flexible, modular, and circular aspects. Additionally, the close affiliation with government entities compelled the organization's board of directors to establish ambitious environmental goals.

PROCESS - STAKEHOLDER INFLUENCES

In the literature review, a distinction is made between formal and informal stakeholders. Formal stakeholders are characterized as participants involved in the project's decision-making processes, such as clients, who hold the final decision-making authority regarding the project's direction (Roeder, 2011; Aminoff et al., 2016). In contrast, informal stakeholders occupy a less formal position of authority, impact, and influence, providing information and resources to enhance the decision-making processes of other members (Gerding et al., 2021). Based on this understanding of formal and informal stakeholders, project management stakeholders are classified as formal stakeholders, including clients and project- and cost managers, while other consultants are considered as informal stakeholders. And hereby, the project manager, in particular, assumes the role of bridging the client's aspirations and the acquisition of necessary resources (Winch, 2010).

However, the findings of this study reveal that informal stakeholders possess a relatively high level of impact, influence, and authority. Notably, the roles and influence of the project manager, architect, and certain consultants are often underestimated. For example, in case A, the installation consultant and structural engineer, and in case B, the sustainability consultant, played crucial roles. In some instances, the responsibilities of consultants and architects extended beyond resource management to encompass overall design strategy, making critical project decisions during the design process (such as material selection, design flexibility, and building shape). In both case A and B, the architect assumed full responsibility and accountability for design decisions, acting as a decision-maker during the design phases.

Secondly, it became evident that the project manager has a decisive role in project steering and oversight responsibilities, and that they are even able to make micro design decisions such as decisions in partitions, walls, and materials.

Furthermore, the project manager was found to play a decisive role in project steering and oversight, even being involved in micro design decisions such as partitions, walls, and materials. Additionally, through interviews, it became evident that in two of the three project cases, the project manager held significant steering influence over the client's pro-circular decision-making processes. Consequently, the project manager not only served as an intermediary between the client and the project management team but also influenced the client's behavior.

The existing literature, as supported by studies conducted by Eberhardt et al. (2019) and Kooter, van Uden, et al. (2021), suggests that clients tend to modify their objectives during circular projects, resulting in a decrease in circular ambitions due to their significant influence in the decision-making process. The findings of this study confirm this analysis across all three project cases. Furthermore, the examination of client behavior revealed not only the extent of their power but also their inclination to alter their approach towards circular ambitions. Based on these findings, it is advisable to prioritize efforts towards encouraging clients to make more pro-circular decisions.

To promote the circular economy in initiatives, it is necessary to consider the impact, authority, and influence of these specific stakeholders. It may be more effective to encourage and stimulate project stakeholders with significant influence within the team and the client's organization.

PROCESS - NON CIRCULAR DECISION

In all the project cases examined, it can be concluded that architectural objectives, including functionality, quality, and aesthetics,

held a prominent position as project ambitions. Consequently, several circular design opportunities were rejected based on these aspirations and targets, as depicted by causal loop diagrams. Often, there was a discrepancy between the desired architectural design and the available circular opportunities. In the cases of B and C, the organizations expressed a desire for circular architectural designs with a compelling marketing narrative. They were willing to modify their architectural vision if it offered them a marketing advantage, such as attracting new customers or providing a unique selling proposition within the building.

Furthermore, certain circular design opportunities were disregarded due to conflicts with technical, functional, and safety requirements. During the interviews, three potential solutions were discussed. First, incorporating consultants earlier in the real estate organization's process would enable them to conduct more in-depth research on circular opportunities. Second, innovative market participants should intensify their efforts to develop new circular products. Lastly, government-mandated requirements, such as the bouwbesluit (building regulations), should be adjusted to align with circular products.

In addition to design and project-specific modifications, various process-related factors that hinder the implementation of circular building practices were identified. These barriers were discussed in the introduction, highlighting the industry's lack of understanding, awareness, and urgency regarding the circular environment, as noted by Adams et al. (2017). Clients, designers, and consultants in the supply chain face limitations in terms of information and innovative solutions for incorporating circular measures. The hypothesis regarding the lack of circular project integration due to a lack of awareness, urgency, and information in the circular economy was confirmed by twenty-two out of twenty-three interview participants. The results section presented different incentive strategies to promote the circular economy.

Moreover, Kooter et al. (2021) identified fourteen interorganizational dynamics that play a crucial role in fostering circular project outcomes. This study validates the importance of these dynamics in facilitating circular involvement within a project team. For example, the limited flexibility in planning, budget, and adjusting professional and practical expertise was identified as necessary for making circular design decisions. Another example is the higher degree of circular involvement observed in case A, which was attributed to high levels of trust and transparency. Conversely, in case C, the lack of these aspects resulted in fewer circular design decisions. The involvement of top-down circular support within organizations, the composition of a circular project team, pioneering leadership, and the shared circular ambitions of motivated individuals were also discussed as highly influential factors.

GOAL - INCENTIVES

During both the first and second interviews, various incentives within the moral, social, and financial clusters were discussed. It became evident that some stakeholders have successfully implemented incentives to encourage project members, or employees, to make more circular decisions. These incentives include organizational recognition (kudos), the presence of circular experts, partnerships, and evaluation documents, among others. From this and many other examples provided in the findings, it can be concluded that incentives can serve as an effective strategy to encourage stakeholders in making specific decisions. However, for incentives to be effective, two elements should be carefully considered.

Firstly, since circular design opportunities are denied for various reasons, such as depicted in causal loop diagrams, the nature and objective of the incentive, as well as the target audience, should be carefully selected and implemented. For example, if a client rejects circular decisions due to financial constraints, a financial incentive should be implemented. Similarly, if a client hesitates to make a circular project decision due to aesthetic concerns, creating a sense of urgency and affection for circular

products by allowing them to experience the products and visit manufacturers or reference projects to learn about the positive impact and circular stories can be an effective approach (using social and moral incentives).

Another scenario observed during the empirical study was when the client held pro-circular visions, but the project management team lacked a circular perspective. In such cases, incentives should be directed towards the project management stakeholders. These stakeholders may sometimes feel that their extra time and efforts are not sufficiently appreciated. By providing social or economic compensation, they can be encouraged to devote more time and effort to exploring circular design opportunities.

Secondly, when implementing incentives, it is crucial to carefully consider the stakeholders, users, and audiences involved. Incentives should be designed as an encouragement strategy for specific behaviors, and the stakeholders providing the incentives (suppliers) have specific objectives in mind, such as promoting more circular project decisions. Therefore, the incentives aim to elicit a targeted response from the intended audience (targeted stakeholders). Careful consideration of these factors ensures that the incentives align with the desired behaviors and effectively motivate the stakeholders involved.

CONTRACT MODEL

The literature review provides a brief description and comparison of traditional and integrated contract models. During the interviews, participants highlighted the early involvement of project management stakeholders as a viable strategy for integrating more circular building practices. Based on the findings of this research, it can be concluded that employing an integrated contract model can be a more effective approach for encouraging project management stakeholders and realizing greater opportunities for circular building practices.

CRITICAL VIEWPOINT BREEAM

During the interviews, clients frequently valued themselves with a high level of circular commitment given the significance of the BREEAM ambitions. However, the circular advisor provided clarification that the current BREEAM certifications can be obtained without incorporating essential circularity elements, such as detachability. This stakeholder concluded that the existing BREEAM certifications do not necessarily reflect genuine client commitment and engagement to circular principles. Instead, they are perceived as a credit puzzle, wherein a certification can be obtained with minimal effort, even if important circular and sustainable building opportunities are missed.

ADVICES

During the interviews with the project management stakeholders not only incentives were discussed as well some advices were mentioned. One observation was that clients may perceive circular ambitions and plans negatively. However, by marketing circular building opportunities differently, such as emphasizing the adaptability of the building, clients are more inclined to choose circular decisions. Another identified bottleneck is the lack of clear and comprehensive information on circular building opportunities, information, and applications. Stakeholders believe that providing enhanced clarity in information provision increases the likelihood of making circular design decisions.

Limitations research

Based on the established selection criteria, three project cases were chosen for this research study. However, it should be noted that the available case options were limited, and the selection was made in collaboration with the internship organization. The small sample size and focus on specific participants, projects, and organizations raise questions about the generalizability and applicability of the findings to a larger population or different contexts.

Furthermore, the internship organization's involvement in initiatives with framework partners could have influenced the study results, particularly in terms of the participants' perception of their ability to express themselves freely. Additionally, cases B and C involve private international organizations, which may have different business perspectives, strategies, management practices, and governance compared to Dutch entities. Cultural differences could have also influenced the results. Moreover, some project management stakeholders are located in other EU nations, introducing potential cultural conflicts and biases. Each nation has its own circular and environmental goals, which may have influenced the research outcomes if stakeholders were based in countries with varying levels of circularity focus and research.

The research primarily focuses on behavior, perceptions, engagement, self-interest, and intrinsic motivation in the circular economy. These aspects rely on the subjective opinions and factors provided by the participants. Individual perspectives, preconceived notions, and inherent biases can influence the interpretation and analysis of the results. The researcher may also be susceptible to being influenced by the participants' expectations and subjective opinions that lack grounding. Different researchers may interpret the data differently during analysis. Additionally, respondents may be inclined to provide socially desirable responses, presenting themselves in a positive manner or conforming to societal norms. This bias can affect the accuracy and validity of the collected data.

Limitations systemic design toolkit

It is important to acknowledge that the systemic design toolkit used in this study has its limitations. The design principles it offers serve as guidelines rather than conclusive methods. Consequently, the researcher's reliance on this specific toolkit may have limited exploration of alternative research strategies and methodologie

Firstly, not all steps of the toolkit were fully comprehended in terms of their relevance, leading to some steps being considered unnecessary or relegated to the appendix (D, E and F). A more effective approach might involve selectively choosing the essential steps while deeming others as less crucial.

Secondly, the process of creating graphs and figures using the toolkit proved to be more time-consuming than writing conclusions. This time-intensive nature of toolkit implementation could have been allocated differently, such as engaging in a critical analysis of the incentive scheme through an expert panel.

Thirdly, certain steps within the toolkit were found to overlap, such as the simultaneous occurrence of step 3 (understanding the system) and step 4 (envisioning desired futures). These overlapping steps should be addressed and potentially integrated more effectively. Currently, the distinct purposes of these steps may be misunderstood, leading to a misalignment of methodologies and research, particularly evident in the lack of a detailed visual framework for step 4.

Additionally, not all provided figures effectively communicate the aim and results, and some visualizations or text may provide clearer explanations. For example, Figure 3, the rich context discussed in the introduction, does not clearly convey its goal. Similarly, the causal loop diagrams contain redundant information already discussed, potentially overwhelming the reader. An alternative method could ensure that the final message of each figure is conveyed more strongly, reducing information overload. Furthermore, the excessive use of figures and tables throughout the report may also be overwhelming

Moreover, the researcher implementing the systemic design toolkit may have limited knowledge of multidisciplinary and collaborative techniques, which could impact the proper execution of the various phases. Furthermore, discrepancies were observed between the steps of system thinking and design thinking within the toolkit. A researcher well-versed in the nuances of the toolkit might

have recognized that certain stages do not align perfectly with the documented framework. During the initial stages of applying the design toolkit, analyzing participants' responses and behaviors posed a challenge. Grasping the complexity and intricacy of networks, interconnected challenges, relationships, behavior, and intentions is demanding. Misunderstanding or misinterpreting these components may have led to erroneous conclusions (Battistoni et al., 2019; Vandenbroeck, 2016).

It is important to note that the systemic design toolkit primarily focuses on individual cases or "systems," which influenced the conclusions drawn in this study. However, since this research emphasizes the relational and behavioral aspects of stakeholders, there is limited evidence to suggest that these incentives will significantly impact the broader building environment. A more strategic approach with reduced emphasis on individual cases could have yielded more generalizable conclusions.

Societal impact

This research study focuses on promoting circular project decisions among stakeholders in project management, thereby directly advancing the circular economy. Circular building practices play a crucial role in conserving resources, reducing waste, and promoting material reuse and recycling. By incentivizing stakeholders to embrace circular principles in real estate initiatives, research can contribute to mitigating the environmental impact of the construction industry. In addition to the environmental benefits, the circular building economy also offers economic opportunities and advantages. By encouraging the recycling, reuse, and refurbishment of building materials, circular practices stimulate the emergence of new business models and markets. This, in turn, leads to job creation, economic growth, and innovation within the construction industry

Recommendations future research

The subsequent recommendations are made for future research:

i. The contractor's participation in these empirical investigations was either absent or declined for this research study. Nevertheless, the interviews and responses have highlighted the significant role of the contractor in various building opportunities within the circular building environment. Therefore, it is recommended to conduct an analysis of the contractor's function, impact, and potential incentives to gain a comprehensive understanding of their involvement in promoting circular practices.

ii. Based on the findings, stakeholders recommended considering the use of a bouwteam contractual model to enhance the integration of circular objectives. However, further research is warranted to examine the specific impact of this contract model as well as other contractual models (such as DBFMO, Design & Build, etc.). It is important to explore potential conflicts between the incentive of early stakeholder involvement and certain contractual procurement models.

iii. The possibility of exploring new contractual relationships with manufacturers, where materials and construction components are "rented" instead of purchased, was discussed during the interviews. Further research is warranted to examine the potential of this concept in depth.

iv. Given the identification of government-provided incentives in this study, it is recommended that further research be conducted to explore the potential for changes in the role, resources, and characteristics of the government in promoting circular practices.

v. Conducting a comprehensive case study analysis on a larger scale would enable further exploration of additional incentives and yield more extensive insights into their effectiveness. Moreover, research efforts could delve into the effects, potential risks, and outcomes associated with these incentives. Such endeavors would enhance our understanding and allow for a multifaceted

examination of the various perspectives surrounding potential incentives

vi. The overarching objective is to foster a pervasive adoption of circularity in the decision-making processes of real estate initiatives in the long term. While implementing incentives serves as a short-term strategy to incentivize stakeholders, it is advisable to further investigate strategies aimed at inducing lasting changes in stakeholders' circular behavior over the long term.

vii. During the interviews, the limitations stemming from the role of a BREEAM expert were acknowledged. However, to gain a comprehensive understanding of the impact of this certification on the aspirations of circular projects, further research is needed. This research should delve deeper into the specific influences, implications, and potential constraints imposed by the BREEAM certification in the context of circular project objectives.

CONCLUSION

The changing environmental, social, political, and economic factors have heightened the significance of the circular economy in the real estate construction industry. While there is a growing push for a national transition towards a circular building economy, numerous challenges, risks, and barriers persist. Extensive research has been conducted on barriers, challenges, long-term trends, opportunities, and stakeholder perspectives, but there has been a relative lack of studies exploring the fundamental reconsideration of the roles, responsibilities and other encouragement strategies. Therefore, the aim of this study was how incentives can be succesfully used to encourage project management stakeholders in making pro-circular decisions. Leading to the following research question:

How can incentives be an effective method for the pro-circular strategic decision-making processes of project management stakeholders?

By conducting semi-structured interviews with a total of 23 project management stakeholders representing public and private organizations involved in three distinct project cases, an extensive assessment of the current situation was examined. This assessment encompassed a thorough analysis of various aspects, including bottlenecks, stakeholder empowerment, influences, processes, and non circular behavior. Subsequently, the same group of participants engaged in a unstructured brainstorming and validation interview. The overarching objective of these interviews was to delve into stakeholder-specific needs, preferences, and requirements relevant to the circular decision-making transition process, while also examining the incentives identified in the literature review. The outcome of this research is a comprehensive scheme of a diverse range of incentives that can be effectively employed during the initiation and design phases of real estate development projects.

Literature substantiates the widespread adoption of incentives as a method to encourage individuals to make specific decisions and engage in desired behaviors across various domains. This research further supports the notion that incentives can positively influence the decision-making processes of project management stakeholders in the real estate sector. Hereby, several participants have already successfully implemented a range of incentives, yielding desired outcomes, while other potentially effective incentives have been identified. Consequently, it may be concluded that incentives represent an effective strategy for fostering pro-circular strategic decision-making among project management stakeholders.

Nonetheless, the selection and implementation of appropriate incentives depends on a variety of contextual factors related to the project and its stakeholders, such as organizational and individual positions, responsibilities, contextual factors, influence ability, and ambitions. Firstly, proper supplying and targeting of incentives towards specific stakeholder audiences is essential for achieving desired effects. Secondly, as certain circular decisions may encounter resistance or rejection due to various reasons, aligning incentives with the underlying factors contributing to such behavior is imperative. Additionally, power dynamics among the project management stakeholders should be taken into account, consequently in the end decision-makers should be influenced.

To conclude, incentives can serve as an effective approach to promote pro-circular decision-making among project management stakeholders if they are appropriately targeted, aligned with the underlying reasons for resistance or rejection of circular decisions, and the power dynamics of project management stakeholders are considered. This research contributes valuable insights into the implementation of incentives within the real estate industry and underscores their potential to drive the transition towards a circular building economy.

vi. REFLECTION

This chapter encompasses the researchers' reflection on several aspects, including the connection with the master track, ethical considerations, relevance of the research, research methodology and strategy, as well as personal reflections on both the product and the process.

REFLECTION

This research concludes with a reflection on the relationship with the master's program, ethical considerations, relevance, and methodology. And lastly, a personal reflection on the process and product is provided.

Relationship between the thesis and the master's program (MBE)

In response to the urgent need to address climate change, depletion of natural resources, and other sustainability challenges, the built environment industry must progressively adopt circular construction practices. Currently, there is a lack of circular behavior and commitment to a circular built environment; therefore, research into incentives for project management stakeholders is essential for encouraging these behaviors. By identifying the primary incentives that motivate stakeholders, you will be able to develop effective strategies for promoting the adoption of circular building principles in future projects. In the long run, the circular built environment influences society and the environment as a whole. Therefore, this research is pertinent to the master's degree as well as the larger environment and society.

Ethical factors

Due to the sociological nature of the research, I was required to conduct interviews with diverse project stakeholders with differing professional and personal viewpoints. Some stakeholders were extremely critical of the various processes, the process's disadvantages, and occasionally other stakeholders. As a researcher, you must conduct all subsequent interviews without any preconceived notions. You must also approach interviews objectively and not pre-fill answers for particular stakeholders. I attempted to be as objective as feasible during interviews as a researcher.

Additionally, some stakeholders have expounded negatively on other stakeholders and occasionally provided ethically sensitive responses (towards the client, for example). In order to protect these parties, sensitive comments were not distributed.

Due to the large number of participants and the investigation of three project cases involving one public and two private organizations, a comparatively extensive research scope has been completed. Consequently, societal value will increase as more circular building initiatives are created.

Relevance

Assessing the value of my project's transferability was a crucial aspect of my research journey. I approached this by contemplating the practical relevance and applicability of the findings beyond the scope of my study. I assessed how the findings and recommendations from my research could be adapted and implemented in a variety of real estate projects, taking into account various stakeholders and project management scenarios (also by conducting three case studies with distinct project variations as client variations). By doing so, I intended to determine the extent to which project results could be transmitted and utilized in a variety of contexts to influence circular decision-making. Due to the character of certain beneficial incentives, they may be implemented directly by a variety of project management stakeholders. Additionally, some are already in use. Nevertheless, certain social and moral incentives may have a negative impact on a stakeholder. Before directly transferring these incentives, additional research into their effects is required.

There was a reciprocal relationship between my findings and the design/recommendations that arose throughout my research. The research influenced my design and recommendations by providing a comprehensive comprehension of the efficacy of incentives in promoting circular decisions (during both exploratory and validation interviews). I was able to identify the most effective incentive strategies and their prospective benefits by performing a thorough analysis and synthesis of the literature, empirical data, and case studies. This comprehension influenced the design of effective and individualized incentive mechanisms that project management

stakeholders could implement.

In addition, the design/recommendations guided the focus and trajectory of my investigation (the newly identified incentives in addition to those identified in the literature review). The design/recommendations served as a framework for evaluating the efficacy of incentives in real-world contexts, and the research sought to validate incentives from the literature and refine and add more incentives based on empirical evidence and stakeholder feedback. My research findings further informed and refined the design/recommendations, thereby creating a continuous feedback cycle between the research process and the design outcomes.

This reciprocal relationship between research and design/recommendations enabled iterative enhancements and ensured the practical applicability of my research findings. The research findings influenced the design of effective incentive strategies, while the design/recommendations influenced the process and focus of the research.

Research method and strategy reflection

Within the research strategy, the systemic design toolkit has been implemented. Although this was a helpful guide for analyzing project cases, it was sometimes difficult to select the appropriate approach within the various phases due to the book's inclusion of multiple methodologies. Due to my lack of familiarity with many of the methodologies, researching and learning the research strategy and various methodologies was a time-consuming process. In addition, the methodologies presented in the book aligned with my research objectives for the initial stages of my first exploratory interviews. Consequently, research progresses quite 'smoothly'. Nevertheless, during the second phase of my empirical study, the development of the incentive scheme, the methodologies in the book did not align with my research goal. Due to the meticulous planning, no incentive table techniques have been implemented. This may have been a lost opportunity.

In addition, the various stages (one through seven) detailed in the book can and frequently must be modified to obtain 'correct' research results. I was initially unfamiliar with this matter. Consequently, this may have limited the purview of my investigation. Later in my research, I was inspired to reconfigure the systemic design toolkit's stages while organizing and constructing the various research frameworks. And to be less constrained and dependent on a single research strategy (based on the feedback of my mentors), I ultimately chose three methodologies not supported by the book. This has broadened my research horizons.
However, to end with a positive note, due to my lack of experience in behavioral research, the book's systemic design toolkit structure has guided me throughout the entire thesis process.

Personal reflection I Process

My research topic is a subject that piques my personal interest; developing an innovative solution after observing the behavior of stakeholders and working towards a circular life (project management). Throughout my various extracurricular consulting practices, I have discovered that actively contributing to the design of a creative solution to a challenging problem provides me with a great deal of energy. In addition, I find excitement in working with and around individuals. Consequently, throughout my investigation I have encountered high levels of motivation and contentment.

During the initial phase (P1 to P2) of my literature review, I began quickly. It was a prolonged period characterized by extensive reading. And even though reading is not my preferred pastime, I made it to the end of the sentence without a single complaint. Due to the paucity of literature on incentives within the circular built environment, it was sometimes difficult to locate relevant sources. Nevertheless, the fact that I could incorporate the literature review into my current side job was a tremendous help. Consequently, I combined an activity that provided me with less energy with one that provided me with more energy (incentive ;)).

This study examined the individual perspectives and behaviors of project management stakeholders. I conducted twenty-three interviews for the first empirical studies (P3). All interviewees were authentically passionate and invested in my topic, so the interviews were insightful, intriguing, and pleasurable. Even the chief executive director of a company requested an interview with me because he/she believed that my research added great value to place a greater emphasis on the circular building environment. And the compliments from the interviewees served as an excellent incentive ;) for me. After the interviews I was fully energetic to start analyzing the data.

I must admit, however, that I underestimated the time necessary to contact individuals, have introductory conversations to determine if the case is appropriate, schedule appointments, and send consistent reminders. In addition to the time, I invested during the interviews. In the end, I scheduled all the interviews within a two-week span (due to the strict thesis planning), which necessitated conducting six or seven interviews per day on occasion. Even though I enjoy conducting interviews, the sixth interview of the day is not particularly enjoyable.
During this phase of my research, I experienced elevated levels of tension since I was also required to analyze the interviews, add some literature, create figures and schemes, etc. When I was exposed to higher levels of tension, I experienced increased emotional difficulty (as well as due some personal circumstances).

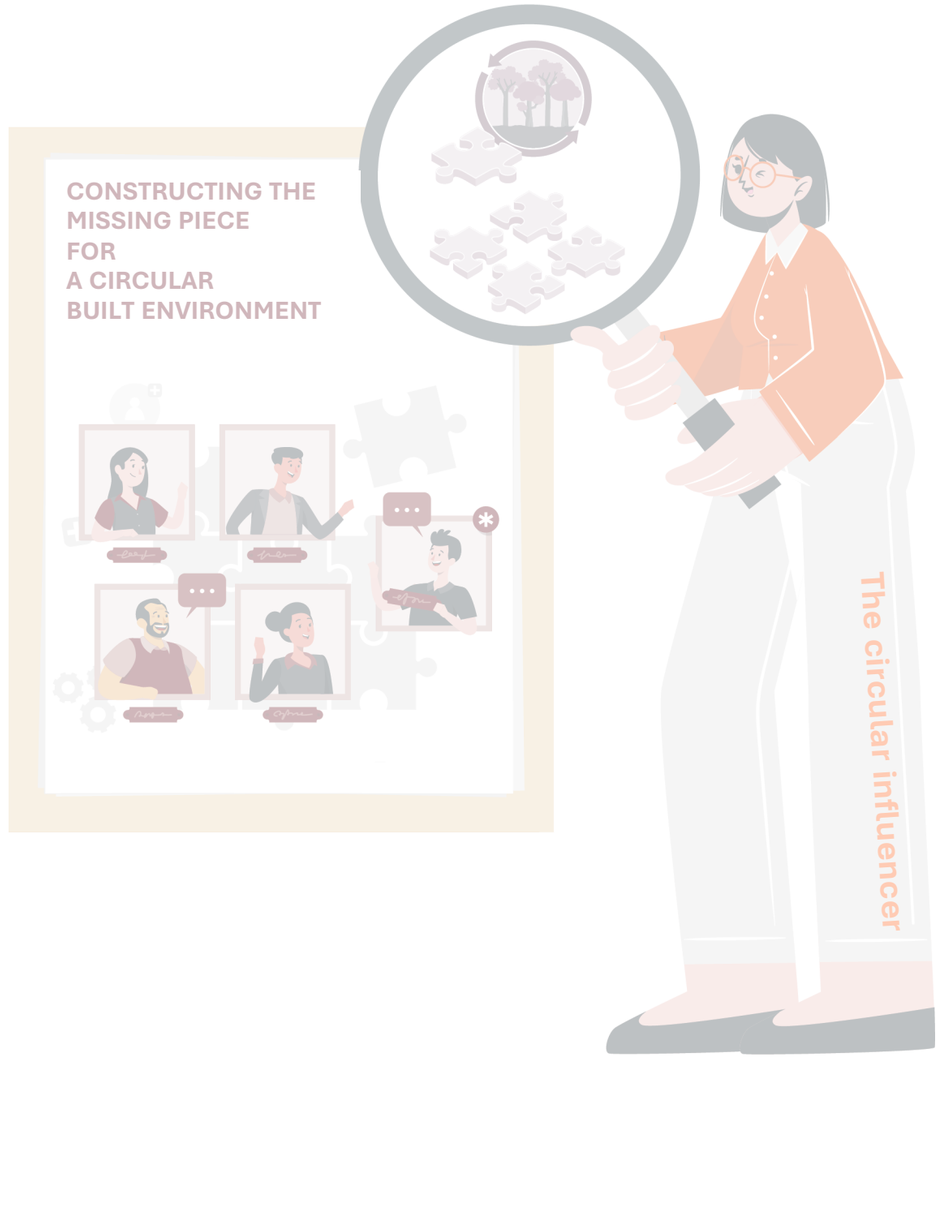
After the P3, the objective was straightforward: execute the final validation and brainstorming interviews and then work towards my primary goal, which was to demonstrate whether incentives are an effective method for encouraging stakeholders. This portion of the investigation was the most enjoyable because the large puzzle was coming together. The fact that the various participants were enthusiastic about my research topic, and they even discussed potential incentives with their colleagues was also helpful. After the interviews, I decided to just go with the 'flow' and learn by doing. This mindset (incentive ;)) provided me with sufficient balance of peace and delegation, which resulted in a greater motivation to complete my thesis.

Personal reflection I Product

As a person, I enjoy setting ambitious and challenging goals in order to maintain my interest and continue to challenge myself. In my dissertation research, I was challenged by both the systemic design methodology and the quantity of interviews (N=45). Some friends who graduated last year advised me to do less, despite the fact that I was advised to do less. A large number of interviews has resulted in a broad, in-depth analysis with multiple stakeholder perspectives. Consequently, this has resulted in an extensive incentive scheme on which I am proud of.

THE CIRCULAR INFLUENCER

A research into the impact of incentives in the circular strategic decision-making processes within project management stakeholders



BIBLIOGRAPHY

Adams, K. T., Osmani, M., Thorpe, T., & Thornback, J. (2017). Circular economy in construction: Current awareness, challenges and enablers. Proceedings of the Institution of Civil Engineers - Waste and Resource Management, 170(1), 15–24. https://doi.org/10.1680/jwarm.16.00011

Aminoff, A., Valkokari, K., & Kettunen, O. (2016). Mapping Multidimensional Value(s) for Co-creation Net works in a Circular Economy. In H. Afsarmanesh, L. M. Camarinha-Matos, & A. Lucas Soares (Eds.), Collaboration in a Hyperconnected World (pp. 629–638). Springer International Publishing. https://doi.org/10.1007/978-3-319-45390-3_54

Anthony Onwuegbuzie, Wendy B Dickinson, Leech, N., & Zoran, A. (2009). A Qualitative Framework for Collecting and Analyzing Data in Focus Group Research. 1–21. https://doi.org/10.1177/160940690900800301

Barbaro, S., Napoli, G., & Trovato, M. R. (2022). Circular Economy and Social Circularity. Diffuse Social Housing and Adaptive Reuse of Real Estate in Internal Areas. In F. Abastante, M. Bottero, C. D'Alpaos, L. Ingaramo, A. Oppio, P. Rosato, & F. Salvo (Eds.), Urban Regeneration Through Valuation Systems for Innovation (pp. 229–244). Springer International Publishing. https://doi.org/10.1007/978-3-031-12814-1_14

Barros, M. V., Salvador, R., do Prado, G. F., de Francisco, A. C., & Piekarski, C. M. (2021). Circular economy as a driver to sustainable businesses. Cleaner Environmental Systems, 2, 100006. https://doi.org/10.1016/j.cesys.2020.100006

Battistoni, C., Giraldo Nohra, C., & Barbero, S. (2019). A Systemic Design Method to Approach Future Complex Scenarios and Research Towards Sustainability: A Holistic Diagnosis Tool. Sustainability, 11(16), Article 16. https://doi.org/10.3390/su11164458

Beach, L. R. (1993). Broadening the Definition of Decision Making: The Role of Prechoice Screening of Options. Psychological Science, 4(4), 215–220. https://doi.org/10.1111/j.1467-9280.1993.tb00264.x

Benabou, R., & Tirole, J. (2003). Intrinsic and Extrinsic Motivation. Review of Economic Studies, 70, 489–520. https://doi.org/10.1111/1467-937X.00253

Blaikie, N., & Priest, J. (2019). Designing Social Research: The Logic of Anticipation. John Wiley & Sons.

Bolderdijk, J. W., Knockaert, J., Steg, E. M., & Verhoef, E. T. (2011). Effects of Pay-As-You-Drive vehicle insurance on young drivers' speed choice: Results of a Dutch field experiment. Accident Analysis & Prevention, 43(3), 1181–1186. https://doi.org/10.1016/j.aap.2010.12.032

Bolzan de Rezende, L., Denicol, J., Blackwell, P., & Kimura, H. (2022). The main project complexity factors and their interdependencies in defence projects. Project Leadership and Society, 3, 100050. https://doi.org/10.1016/j.plas.2022.100050

Bon, R., & Hutchinson, K. (2000). Sustainable construction: Some economic challenges. Building Research & Information, 28(5–6), 310–314. https://doi.org/10.1080/096132100418465

Bordass, B. (2000). Cost and value: Fact and fiction. Building Research & Information, 28(5–6), 338–352. https://doi.org/10.1080/096132100418492

Bourne, L., & Walker, D. H. T. (2005). Visualising and mapping stakeholder influence. Management Decision, 43(5), 649–660. https://doi.org/10.1108/00251740510597680

Boyne, G. A. (2002). Public and Private Management: What's the Difference? Journal of Management Studies, 39(1), 97–122. https://doi.org/10.1111/1467-6486.00284

Brugha, R., & Varvasovszky, Z. (2000). Stakeholder analysis: A review | Health Policy and Planning | Oxford Academic. Health Policy and Planning, 15(3), 239–246.

Cambridge University Press. (n.d.). Incentive [Dictionary]. Retrieved 12 December 2022, from https://dictionary.cambridge.org/dictionary/english/incentive

Campbell, D. E. (2006). Incentives—Motivation and the Economics of Information | Donald E. Campbell | download. Cambridge University Press. https://b-ok.cc/book/608308/abcf6e?dsource=recommend

Carver, C. (2003). Pleasure as a sign you can attend to something else: Placing positive feelings within a general model of affect. Cognition and Emotion, 17(2), 241–261. https://doi.org/10.1080/02699930302294

Chang, S., & Lee, M. (2007). A study on relationship among leadership, organizational culture, the operation of learning organization and employees' job satisfaction. The Learning Organization, 14(2), 155–185. https://doi.org/10.1108/09696470710727014

Cheng, M. M., & Coyte, R. (2014). The effects of incentive subjectivity and strategy communication on knowledge-sharing and extra-role behaviours. Management Accounting Research, 25(2), 119–130. https://doi.org/10.1016/j.mar.2013.07.003

Cheng, R., Gupta, B., & Rajan, R. S. (2023). Do green financial policies offset the climate transition risk penalty imposed on long-term sovereign bond yields? Research in International Business and Finance, 65, 101976. https://doi.org/10.1016/j.ribaf.2023.101976

Chinyio, E., & Olomolaiye, P. (2009). Construction Stakeholder Management. John Wiley & Sons.

Copping, A., & Davies, S. (2016). Creativity and the Construction Project Manager: CIB World Building Congress 2016.

Corvellec, H., Babri, M., & Stål, H. I. (2020). Putting circular ambitions into action: The case of Accus, a small Swedish sign company. In Handbook of the Circular Economy (pp. 266–277). Edward Elgar Publishing. https://www.elgaronline.com/display/edcoll/9781788972710/9781788972710.00029.xml

Dahl, R. A., & Lindblom, C. E. (1954). Review of Politics, Economics and Welfare. The Journal of Politics, 16(2), 386–389. https://doi.org/10.2307/2126043

de Groot, J. I. M., & Steg, L. (2009). Mean or green: Which values can promote stable pro-environmental behavior? Conservation Letters, 2(2), 61–66. https://doi.org/10.1111/j.1755-263X.2009.00048.x

DeSarbo, W. S., Huff, L., Rolandelli, M., & Choi, J. (1993). On the Measurement of Perceived Service Quality: A Conjoint Analysis Approach (SSRN Scholarly Paper No. 2789672). https://papers.ssrn.com/abstract=2789672

Directorate-General for Communication (European Commission). (2022). De EU in 2021: Algemeen verslag over de werkzaamheden van de Europese Unie. Publications Office of the European Union. https://data.europa.eu/doi/10.2775/608262

Dittmar, H. (1992). The social psychology of material possessions: To have is to be. Harvester Wheatsheaf and St. Martin's Press. https://books.google.co.uk/books?id=OQYqAQAAMAAJ

Dokter, G., Thuvander, L., & Rahe, U. (2021). How circular is current design practice? Investigating perspectives across industrial design and architecture in the transition towards a circular economy. Sustainble Production and Consumption, 26, 692–708. https://doi.org/10.1016/j.spc.2020.12.032

Donner, M., Verniquet, A., Broeze, J., Kayser, K., & De Vries, H. (2021). Critical success and risk factors for

circular business models valorising agricultural waste and by-products. Resources, Conservation and Recycling, 165, 105236. https://doi.org/10.1016/j.resconrec.2020.105236

Dorst, K. (2015). Frame Innovation: Create New Thinking by Design. MIT Press.

Eberhardt, L. C. M., Birgisdottir, H., & Birkved, M. (2019). Potential of Circular Economy in Sustainable Buildings. IOP Conference Series: Materials Science and Engineering, 471, 092051. https://doi.org/10.1088/1757-899X/471/9/092051

Ellen MacArthur Foundation. (2013). Towards the Circular Economy (Journal of Industrial Ecology). 99.

Elwyn, G., Frosch, D., & Rollnick, S. (2009). Dual equipoise shared decision making: Definitions for decision and behaviour support interventions. Implementation Science, 4(1), 75. https://doi.org/10.1186/1748-5908-4-75

Esmark, A. (2007). Democratic Accountability and Network Governance—Problems and Potentials. In E. Sørensen & J. Torfing (Eds.), Theories of Democratic Network Governance (pp. 274–296). Palgrave Macmillan UK. https://doi.org/10.1057/9780230625006_17

European Commission. (n.d.). EU taxonomy for sustainable activities. Sustainable Finance. Retrieved 8 March 2023, from https://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en

European Commission. (2020). Communication from the commission to the European Parliament, the council, the European economic and social committee and the committee of the regions. A new Circular Economy Action Plan For a cleaner and more competitive Europe. https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN

Fehr, E., & Falk, A. (2002). Psychological foundations of incentives. European Economic Review, 46(4), 687–724. https://doi.org/10.1016/S0014-2921(01)00208-2

Feldman, D. C. (1984). The Development and Enforcement of Group Norms. Academy of Management Review, 9(1), 47–53. https://doi.org/10.5465/amr.1984.4277934

Finnish Ministry of the Environment. (n.d.). Circular economy incentives. Ministry of the Environment. Retrieved 20 December 2022, from https://ym.fi/en/strategic-programme-to-promote-a-circular-economy/circular-economy-incentives

Freeman, L. (2004). The Development of Social Network Analysis.

Frey, B. (1997). Not Just for the Money. An Economic Theory of Personal Motivation. [Books]. Edward Elgar Publishing. https://econpapers.repec.org/bookchap/elgeebook/1183.htm

Frooman, J. (1999). Stakeholder Influence Strategies. The Academy of Management Review, 24(2), 191–205. https://doi.org/10.2307/259074

Gehner, E. (2008). Knowingly taking risk: Investment decision making in real estate development. https://repository.tudelft.nl/islandora/object/uuid%3A4ad6a43e-1655-428e-b983-aff7d55e48e4

Gerding, D. P., Wamelink, J. W. F., & Leclercq, E. M. (2021). Implementing circularity in the construction process: A case study examining the reorganization of multi-actor environment and the decision-making process. Construction Management and Economics, 39(7). https://doi.org/10.1080/01446193.2021.1934885

Gibbons, R., & Roberts, J. (2012). The Handbook of Organizational Economics. Princeton University Press. https://www.jstor.org/stable/j.ctt1r2ggg

Giorgi, S., Lavagna, M., Wang, K., Osmani, M., Liu, G., & Campioli, A. (2022). Drivers and barriers towards circular economy in the building sector: Stakeholder interviews and analysis of five European countries policies and practices. Journal of Cleaner Production, 336, 130395. https://doi.org/10.1016/j.jclepro.2022.130395

Gould, R. V. (1993). Collective Action and Network Structure. American Sociological Review, 58(2), 182–196. https://doi.org/10.2307/2095965

Guceri, I. (2018). Will the real R&D employees please stand up? Effects of tax breaks on firm-level outcomes. International Tax and Public Finance, 25(1), 1–63. https://doi.org/10.1007/s10797-017-9438-3

Häkkinen, T., & Belloni, K. (2011). Barriers and drivers for sustainable building. Building Research & Information, 39(3), 239–255. https://doi.org/10.1080/09613218.2011.561948

Hamilton, I. (2021). Global Alliance for Buildings and Construction (GlobalABC). 20.

Haraldsson, H. (2004). Introduction to system thinking and causal loop diagrams.

Hart, J., Adams, K., Giesekam, J., Tingley, D. D., & Pomponi, F. (2019). Barriers and drivers in a circular economy: The case of the built environment. Procedia CIRP, 80, 619–624. https://doi.org/10.1016/j.procir.2018.12.015

Hartley, K., van Santen, R., & Kirchherr, J. (2020). Policies for transitioning towards a circular economy: Expectations from the European Union (EU). Resources, Conservation and Recycling, 155, 104634. https://doi.org/10.1016/j.resconrec.2019.104634

Heinle, M. S., Hofmann, C., & Kunz, A. H. (2012). Identity, Incentives, and the Value of Information. The Accounting Review, 87(4), 1309–1334. https://doi.org/10.2308/accr-50156

Heslina, H., & Syahruni, A. (2021). The Influence of Information Technology, Human Resources Competency and Employee Engagement on Performance of Employees. Golden Ratio of Human Resource Management, 1(1), Article 1. https://doi.org/10.52970/grhrm.v1i1.100

Hjelmbrekke, H., Klakegg, O. J., & Lohne, J. (2017). Governing value creation in construction project: A new model. International Journal of Managing Projects in Business, 10(1), 60–83. https://doi.org/10.1108/IJMPB-12-2015-0116

Hobma, F., & Jong, P. (2016). Planning and Development Law in the Netherlands: An Introduction. Instituut voor Bouwrecht (IBR). https://www.ibr.nl/site/assets/files/14035/planninglaw_inhoudsopgave.pdf

Hofstetter, J. S., De Marchi, V., Sarkis, J., Govindan, K., Klassen, R., Ometto, A. R., Spraul, K. S., Bocken, N., Ashton, W. S., Sharma, S., Jaeger-Erben, M., Jensen, C., Dewick, P., Schröder, P., Sinkovics, N., Ibrahim, S. E., Fiske, L., Goerzen, A., & Vazquez-Brust, D. (2021). From Sustainable Global Value Chains to Circular Economy—Different Silos, Different Perspectives, but Many Opportunities to Build Bridges. Circular Economy and Sustainability, 1(1), 21–47. https://doi.org/10.1007/s43615-021-00015-2

Holmstrom, B. (1982). Moral Hazard in Teams. The Bell Journal of Economics, 13(2), 324–340. https://doi.org/10.2307/3003457

Hossain, Md. U., Ng, S. T., Antwi-Afari, P., & Amor, B. (2020). Circular economy and the construction industry: Existing trends, challenges and prospective framework for sustainable construction.

Renewable and Sustainable Energy Reviews, 130, 109948. https://doi.org/10.1016/j.rser.2020.109948

Jakobsson, C., Fujii, S., & Gärling, T. (2002). Effects of economic disincentives on private car use. 22.

Jones, C., Hesterly, W. S., & Borgatti, S. P. (1997). A General Theory of Network Governance: Exchange Conditions and Social Mechanisms. The Academy of Management Review, 22(4), 911–945. https://doi.org/10.2307/259249

Jones, P., & van Ael, K. (2022). Design Journeys through Complex Systems. BIS Publishers BV.

Kibert, C. J. (2016). Sustainable Construction: Green Building Design and Delivery. John Wiley & Sons.

Klein, N., Ramos, T. B., & Deutz, P. (2020). Circular Economy Practices and Strategies in Public Sector Organizations: An Integrative Review. Sustainability, 12(10), Article 10. https://doi.org/10.3390/su12104181

Kooter, E., Uden, M. van, Marrewijk, A. van, Wamelink, H., Bueren, E. van, & Heurkens, E. (2021). Sustainability Transition through Dynamics of Circular Construction Projects. Sustainability, 13(21), Article 21. https://doi.org/10.3390/su132112101

Krueger, R. A. (1994). Focus Groups: A Practical Guide for Applied Research. SAGE Publications.

Kylili, A., & Fokaides, P. A. (2017). Policy trends for the sustainability assessment of construction materials: A review. Sustainable Cities and Society, 35, 280–288. https://doi.org/10.1016/j.scs.2017.08.013

Laffont, J.-J., & Martimort, D. (2001). The Theory of Incentives: The Principal-Agent Model. Princeton University Press. https://b-ok.cc/book/1163023/b4a297

Leising, E., Quist, J., & Bocken, N. (2018). Circular Economy in the building sector: Three cases and a collaboration tool. Journal of Cleaner Production, 176, 976–989. https://doi.org/10.1016/j.jclepro.2017.12.010

Levering, R., & Vos, B. (2019). Organizational Drivers and Barriers to Circular Supply Chain Operations. In L. de Boer & P. Houman Andersen (Eds.), Operations Management and Sustainability: New Research Perspectives (pp. 43–66). Springer International Publishing. https://doi.org/10.1007/978-3-319-93212-5_4

Levitt, S., & Dubner, S. J. (2005). FREAKONOMICS A Rogue Economist Explores the Hidden Side of Everything. https://www.academia.edu/24476071/FREAKONOMICS_A_Rogue_Economist_Explores_the_Hidden_Side_of_Everything

Lu, Y., Khan, Z. A., Gunduz, H., Wang, C., Imran, M., & Qureshi, I. (2021). Comparison of two strategies of reward-penalty mechanism for promoting net zero energy buildings. Sustainable Energy Technologies and Assessments, 47, 101347. https://doi.org/10.1016/j.seta.2021.101347

McInnis, A. (2001). The New Engineering Contract: A Legal Commentary. Thomas Telford.

Miller, K. (2020, March 19). 5 Critical Steps in the Change Management Process | HBS Online. Business Insights Blog. https://online.hbs.edu/blog/post/change-management-process

Ministerie van Algemene Zaken. (2018). Transitieagenda's bij Kamerbrief over Grondstoffenakkoord—Circulaire Bouweconomie [Rapport]. Ministerie van Algemene Zaken. https://www.rijksoverheid.nl/documenten/rapporten/2018/01/15/transitieagendas-bij-kamerbrief-over-grondstoffenakkoord

Mortimer, D., Harris, A., Wijnands, J. S., & Stevenson, M. (2021). Persistence or reversal? The micro-effects of time-varying financial penalties. Journal of Economic Behavior & Organization, 188, 72–86. https://doi.org/10.1016/j.jebo.2021.05.018

Munaro, M. R., Tavares, S. F., & Bragança, L. (2020). Towards circular and more sustainable buildings: A systematic literature review on the circular economy in the built environment. Journal of Cleaner Production, 260, 121134. https://doi.org/10.1016/j.jclepro.2020.121134

Niskanen, J. (2017). Bureaucracy and Representative Government. Routledge. https://doi.org/10.4324/9781315081878

Norouzi, M., Chàfer, M., Cabeza, L. F., Jiménez, L., & Boer, D. (2021). Circular economy in the building and construction sector: A scientific evolution analysis. Journal of Building Engineering, 44, 102704. https://doi.org/10.1016/j.jobe.2021.102704

Olander, S., & Landin, A. (2005). Evaluation of stakeholder influence in the implementation of construction projects. International Journal of Project Management, 23(4), 321–328. https://doi.org/10.1016/j.ijproman.2005.02.002

Oudeyer, P.-Y., & Kaplan, F. (2007). What is intrinsic motivation? A typology of computational approaches. Frontiers in Neurorobotics, 1. https://www.frontiersin.org/articles/10.3389/neuro.12.006.2007

Owojori, O. M., & Okoro, C. (2022). The Private Sector Role as a Key Supporting Stakeholder towards Circular Economy in the Built Environment: A Scientometric and Content Analysis. Buildings, 12(5), Article 5. https://doi.org/10.3390/buildings12050695

Pannucci, C. J., & Wilkins, E. G. (2010). Identifying and Avoiding Bias in Research. Plastic and Reconstructive Surgery, 126(2), 619–625. https://doi.org/10.1097/PRS.0b013e3181de24bc

Paulus, P. B., & Dzindolet, M. T. (1993). Social influence processes in group brainstorming. Journal of Personality and Social Psychology, 64, 575–586. https://doi.org/10.1037/0022-3514.64.4.575

Perry, J., & Rainey, H. (1988). The Public-Private Distinction in Organization Theory: A Critique and Research Strategy. The Academy of Management Review, 13. https://doi.

Phillips, L. J., & Jorgensen, M. W. (2002). Phillips: Discourse Analysis as Theory and Method. CA: Sage. https://scholar.google.com/scholar_lookup?title=Discourse+analysis+as+theory+and+method.&author=L.+J.+Phillips&author=M.+W.+Jorgensen&publication_year=2002&doi=10.4135%2F9781412983921

Plattner, H., Meinel, C., & Leifer, L. (Eds.). (2018). Design Thinking Research: Making Distinctions: Collaboration versus Cooperation. Springer International Publishing. https://doi.org/10.1007/978-3-319-60967-6

Ploeger, H., Prins, M., Straub, A., & Van den Brink, R. (2019). Circular economy and real estate: The legal (im)possibilities of operational lease. Facilities, 37(9/10), 653–668. https://doi.org/10.1108/F-01-2018-0006

Reed, M. S., Graves, A., Dandy, N., Posthumus, H., Hubacek, K., Morris, J., Prell, C., Quinn, C. H., & Stringer, L. C. (2009). Who's in and why? A typology of stakeholder analysis methods for natural resource management. Journal of Environmental Management, 90(5), 1933–1949. https://doi.org/10.1016/j.jenvman.2009.01.001

Roberts, N., Anderson, D., Deal, R., Garet, M., & Shaffer, W. (1997). Introduction to Computer Simulation—A System Dynamics Modeling Approach. Journal of the Operational Research Society, 48(11), 1145–1145. https://doi.org/10.1057/palgrave.jors.2600960

Rode, J., Gómez-Baggethun, E., & Krause, T. (2015). Motivation crowding by economic incentives in conservation policy: A review of the empirical evidence. Ecological Economics, 117, 270–282. https://doi.org/10.1016/j.ecolecon.2014.11.019

Roeder, T. (2011). A Sixth Sense for Project Management. Author House.

Roeder, T. (2013). Managing Project Stakeholders: Building a Foundation to Achieve Project Goals. John Wiley & Sons.

Roland, M., & Dudley, R. A. (2015). How Financial and Reputational Incentives Can Be Used to Improve Medical Care. Health Services Research, 50(S2), 2090–2115. https://doi.org/10.1111/1475-6773.12419

Rotemberg, J. J. (1994). Human Relations in the Workplace. Journal of Political Economy, 102(4), 684–717.

Rubenstein-Montano, B., Liebowitz, J., Buchwalter, J., McCaw, D., Newman, B., & Rebeck, K. (2001). A systems thinking framework for knowledge management. Decision Support Systems, 31(1), 5–16. https://doi.org/10.1016/S0167-9236(00)00116-0

Ryan, A. (2016). What is Systemic Design? The Overlap. https://medium.com/the-overlap/what-is-systemic-design-f1cb07d3d837

Schmeer, K. (2000). Stakeholder Analysis Guidelines.

Schneider, F., & Buser, T. (2003). Context and actor analysis. FutureLearn, Partnering for Change: Link Research to Societal Challenges. CH: Universität Basel. https://www.futurelearn.com/info/blog

Smith, D. K., & Tardif, M. (2009). Building Information Modeling: A Strategic Implementation Guide for Architects, Engineers, Constructors, and Real Estate Asset Managers. John Wiley & Sons.

Steg, L., Bolderdijk, J. W., Keizer, K., & Perlaviciute, G. (2014). An Integrated Framework for Encouraging Pro-environmental Behaviour: The role of values, situational factors and goals. Journal of Environmental Psychology, 38, 104–115. https://doi.org/10.1016/j.jenvp.2014.01.002

Steg, L., Shwom, R., & Dietz, T. (2018). What Drives Energy Consumers?: Engaging People in a Sustainable Energy Transition. IEEE Power and Energy Magazine, 16(1), 20–28. https://doi.org/10.1109/MPE.2017.2762379

Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. Journal of Environmental Psychology, 29(3), 309–317. https://doi.org/10.1016/j.jenvp.2008.10.004

Stickdorn, M., Hormess, M. E., Lawrence, A., & Schneider, J. (2018). This Is Service Design Doing: Applying Service Design Thinking in the Real World. O'Reilly Media, Inc.

Stolterman, E., McAtee, J., Royer, D., & Thandapani, S. (2009, August 19). Designerly Tools. Undisciplined! Design Research Society Conference 2008, Sheffield Hallam University, Sheffield, UK. https://shura.shu.ac.uk/491/

Suprapto, M., Bakker, H. L. M., Mooi, H. G., & Hertogh, M. J. C. M. (2016). How do contract types and incentives matter to project performance? International Journal of Project Management, 34(6), 1071–1087. https://doi.org/10.1016/j.ijproman.2015.08.003

Thibault Landry, A., Gagné, M., Forest, J., Guerrero, S., Séguin, M., & Papachristopoulos, K. (2017). The Relation Between Financial Incentives, Motivation, and Performance. Journal of Personnel Psychology, 16(2), 61–76. https://doi.org/10.1027/1866-5888/a000182

Turner III, D., & Hagstrom-Schmidt, N. (2022). Appendix: Qualitative Interview Design. https://oer.pressbooks.pub/howdyorhello/back-matter/appendix-qualitative-interview-design/

van Bueren, E., Buizer, M., Van den Berghe, K. B. J., Heijkers, B., Meijs, L., Verhagen, T., Dittrich, K., & Sprecher, B. (2022). Perspectieven op circulaire gebiedsontwikkeling: Lessen uit de Binckhorst en andere gebiedsontwikkelingen. https://repository.tudelft.nl/islandora/object/uuid%3Aa19131d2-0da2-4eb1-811e-0baa6cdb940c

van der Werff, E., Steg, L., & Keizer, K. (2013). It is a moral issue: The relationship between environmental self-identity, obligation-based intrinsic motivation and pro-environmental behaviour. Global Environmental Change, 23(5), 1258–1265. https://doi.org/10.1016/j.gloenvcha.2013.07.018

Vandenbroeck, P. (2016). Codifying Systemic Design: A Toolkit (Faculty of Design). OCAD University Open Research Repository.

Venselaar, J., Van der Kelft, D., & Van Aart, R. (2010). FOCISS: A framework for developing a sustainable buisiness strategy. https://repository.tudelft.nl/islandora/object/uuid%3Ad0e40897-6bca-4ea1-ba41-7f898b55d2b8

Wamsley, G. L., & Zald, M. N. (1973). The Political Economy of Public Organizations. Public Administration Review, 33(1), 62–73. https://doi.org/10.2307/974786

Wilkinson, M. D., Dumontier, M., Aalbersberg, Ij. J., Appleton, G., Axton, M., Baak, A., Blomberg, N., Boiten, J.-W., da Silva Santos, L. B., Bourne, P. E., Bouwman, J., Brookes, A. J., Clark, T., Crosas, M., Dillo, I., Dumon, O., Edmunds, S., Evelo, C. T., Finkers, R., … Mons, B. (2016). The FAIR Guiding Principles for scientific data management and stewardship. Scientific Data, 3(1), Article 1. https://doi.org/10.1038/sdata.2016.18

Winch, G. (2010). Managing Construction Projects.

Yousaf, S., Latif, M., Aslam, S., & Saddiqui, A. (2014). Impact of Financial and non Financial Rewards on Employee Motivation.

Zeiske, N., van der Werff, E., & Steg, L. (2021). The effects of a financial incentive on motives and intentions to commute to work with public transport in the short and long term. Journal of Environmental Psychology, 78, 101718. https://doi.org/10.1016/j.jenvp.2021.101718

Zhou, L., & Lowe, D. (2004). Incorporating sustainable construction into pfi projects: An analysis of financial incentives and associated risks. Manchester Centre for Civil and Construction Engineering.

APPENDIX A: DPM Checklist

The circular influencer (Thesis proposal Nina Verschoor)

0. Administrative questions

1. Name of data management support staff consulted during the preparation of this plan.

Diana Popa

2. Date of consultation with support staff.

2023-01-19

I. Data description and collection or re-use of existing data

3. Provide a general description of the type of data you will be working with, including any re-used data:

Type of data	File format(s)	How will data be collected (for re-used data: source and terms of use)?	Purpose of processing	Storage location	Who will have access to the data
Theoretical frameworks	.docx	Repository, online datasets (public)	To build a theoretical basis of the key concepts of the research	Repository, SURF drive	Public
Expert interviews (qualitative interview data)	.vtt, .docx	Interviews	To gain insights in the organizational factors, the circular ambitions (on individual- project-, and organizational level), power index and individual commitment.	iCloud & one drive	Researcher
Focus & discussion group (qualitative interview data)	.vtt, .docx	Focus & discussion group	To get grip on the decision-making processes of the project management stakeholders.	iCloud & one drive	Researcher

4. How much data storage will you require during the project lifetime?

- < 250 GB

II. Documentation and data quality

5. What documentation will accompany data?

- Data will be deposited in a data repository at the end of the project (see section V) and data discoverability and re-usability will be ensured by adhering to the repository’s metadata standards
- Methodology of data collection

III. Storage and backup during research process

6. Where will the data (and code, if applicable) be stored and backed-up during the project lifetime?

- Another storage system - please explain below, including provided security measures
- OneDrive

Personal iCloud.

IV. Legal and ethical requirements, codes of conduct

7. Does your research involve human subjects or 3rd party datasets collected from human participants?

- Yes

8A. Will you work with personal data? (information about an identified or identifiable natural person)

If you are not sure which option to select, ask your Faculty Data Steward for advice. You can also check with the privacy website or contact the privacy team: privacy-tud@tudelft.nl

- Yes

8B. Will you work with any other types of confidential or classified data or code as listed below? (tick all that apply)

If you are not sure which option to select, ask your Faculty Data Steward for advice.

- Yes, confidential data received from commercial, or other external partners

9. How will ownership of the data and intellectual property rights to the data be managed?

For projects involving commercially-sensitive research or research involving third parties, seek advice of your Faculty Contract Manager when answering this question. If this is not the case, you can use the example below.

Following the TU Delft Research Data Framework Policy, the datasets underlying the published publications will be made freely available. During the active period of research, the researcher will manage the access rights to data (and other outputs), as well as any requests for access from other parties. They will be made available no later than when the associated research articles are published.
This study outcome is entirely dependent on the project management stakeholders' incorporation willingness. The participants will be required to sign an informed consent form in order to get their permission to engage in specific research aspects, to evaluate the study objective, to agree to the terms and conditions, and to be recorded. To protect the participants' privacy, they have the option to participate anonymously and in confidence, and this will be maintained throughout the procedure. Each participant in the focus/discussion group must sign a confidentiality agreement in order to talk freely, honestly, and accurately

10. Which personal data will you process? Tick all that apply

- Photographs, video materials, performance appraisals or student results
- Data collected in Informed Consent form (names and email addresses)
- Signed consent forms
- Gender, date of birth and/or age
- Email addresses and/or other addresses for digital communication
- Names and addresses

11. Please list the categories of data subjects

Project management stakeholders of building execution projects.
In this thesis the following stakeholders are part of the project management stakeholders; on the demand side: client, client's employees, client's customers, client's tenants, client's suppliers, and a project manager. On the supply side: architects, engineers, material suppliers and other consultants

12. Will you be sharing personal data with individuals/organisations outside of the EEA (European Economic Area)?

- No

15. What is the legal ground for personal data processing?

- Informed consent

16. Please describe the informed consent procedure you will follow:

All participants will be asked for their written consent for taking part in this research study and for data processing before the start of the interview/ discussion-focus groups.

17. Where will you store the signed consent forms?

- Same storage solutions as explained in question 6

18. Does the processing of the personal data result in a high risk to the data subjects?

If the processing of the personal data results in a high risk to the data subjects, it is required to perform a Data Protection Impact Assessment (DPIA). In order to determine if there is a high risk for the data subjects, please check if any of the options below that are applicable to the processing of the personal data during your research (check all that apply).
If two or more of the options listed below apply, you will have to complete the DPIA. Please get in touch with the privacy team: privacy-tud@tudelft.nl to receive support with DPIA.
If only one of the options listed below applies, your project might need a DPIA. Please get in touch with the privacy team: privacy-tud@tudelft.nl to get advice as to whether DPIA is necessary.
If you have any additional comments, please add them in the box below.

- Evaluation or scoring
- Sensitive personal data

19. Did the privacy team advise you to perform a DPIA?

- Yes

20. Please include below the outcome of the DPIA, what measures did you take?

In addition to pseudonymisation and anonymisation of the results, offering a secure place for data storage throughout the project, as well as pseudonymisation and anonymisation for storage in a secured, non-public repository.

21. Where will you store the DPIA documents (document on data processing features and document on risk assessment)?

- Same storage solutions as explained in question 6

22. What will happen with personal research data after the end of the research project?

- Anonymised or aggregated data will be shared with others

25. Will your study participants be asked for their consent for data sharing?

- Yes, in consent form - please explain below what you will do with data from participants who did not consent to data sharing

After publication, the findings of individuals who did not agree to data sharing will not be included in the dataset. Depending on the results of the research and the permission forms, the consequences of this for transparency and thoroughness will be explored after the completion of the study.

V. Data sharing and long-term preservation

27. Apart from personal data mentioned in question 22, will any other data be publicly shared?

- All other non-personal data (and code) underlying published articles / reports / theses
- All other non-personal data (and code) produced in the project

29. How will you share research data (and code), including the one mentioned in question 22?

- All pseudonymised data will be uploaded to 4TU.ResearchData with restricted access
- I will share my data and code via git(lab)/subversion and also create a snapshot in a repository
- All anonymised or aggregated data, and/or all other non-personal data will be uploaded to 4TU.ResearchData with public access

30. How much of your data will be shared in a research data repository?

- < 100 GB

31. When will the data (or code) be shared?

- At the end of the research project

32. Under what licence will be the data/code released?

- CC BY

VI. Data management responsibilities and resources

33. Is TU Delft the lead institution for this project?

- Yes, leading the collaboration - please provide details of the type of collaboration and the involved parties below

During the duration of empirical study, I will do an internship at Turner & Townsend. This third party will provide the network and data transfers required for this research.

34. If you leave TU Delft (or are unavailable), who is going to be responsible for the data resulting from this project?

TU Delft through 4TUResearch (repository administration) about the repository's stored data.

35. What resources (for example financial and time) will be dedicated to data management and ensuring that data will be FAIR (Findable, Accessible, Interoperable, Re-usable)?

4TU.ResearchData is able to archive 1TB of data per researcher per year free of charge for all TU Delft researchers. I do not expect to exceed this and therefore there are no additional costs of long term preservation.

APPENDIX B: Informed consent form

Informed Consent Form

version 0.1 N.A. Verschoor
Project case:

Delft University of Technology

INFORMED CONSENT FORMULIER

Corresponding name of research	**THE CIRCULAR INFLUENCER**
Aim of the research	This research is coordinated by **Nina Verschoor** and supervised by **Marc Hopman (Turner & Townsend)** and, **Hans Wamelink (TU Delft) and Hilde Remoy (TU Delft)**. You are cordially invited to participate in this research. **The aim of this thesis research is to determine which incentives might be introduced to various stakeholders within a project management team to promote pro-circular decision-making processes.**
Course of events during the investigation	You will participate in an interview/research in which you will be asked about: the extent to which **circular ambitions** have been set and secured, the reasoning behind certain choices/considerations, the organizational ambitions, the contextual factors and dynamics that played a role between the project stakeholders, and the extent to which circular ambitions have been set and secured. The following is an example of a typical question: "What circular construction ambitions do you have within you function?" and "How did you experience the project management team's decision-making processes?" The interview begins with questions regarding general information. This will include questions about the organization, the position, background information, your team function, and your activities. In conjunction with the graduation business, Turner & Townsend, a project case will be selected. On the basis of this project **(project X),** the interview will delve deeper into the circular ambitions of the project, the expertise and knowledge of circular architecture, the choices made, the behavior of stakeholders, power dynamics, and potential incentives. In addition to one's own involvement, the decision-making processes of the other parties/stakeholders participating in this project will be discussed. Everything however will be anonymized prior to release. There will be an audio recording of the interview so that the conversation can be transcribed afterwards (word for word). This transcript will be utilized in subsequent studies.
Potential risks and inconveniences	No physical, legal, or financial risks are associated with your involvement in this research. You are not required to answer any questions you do not wish to. Your participation is entirely voluntary, and you are free to withdraw at any moment.

Reimbursement	You will not be compensated for your participation in this study. You will obtain a deeper understanding of circular decision-making by participation in this study. The overarching objective of this study is to determine what incentives can encourage project management team members to make circular construction decisions.
Data confidentiality	Your privacy is maximum safeguarded and will stay so. No confidential information or personal data about you or pertaining to you will be disclosed in a manner that identifies you. Your data is **anonymized** before our research data is released. Some preconceptions of this: - Your name is replaced with an anonymous, meaningless string of digits or a fictitious name/letter. - your age is not processed, but rather categorized. For instance: age: between 18-25 years / between 25-35 years etc. - your firm's name will be changed with a fictitious letter, for example: company A with function:... (Only your function will be named within the study). At the start of our investigation, your name is immediately given a pseudonym; your to is **pseudonymised** or **'encrypted'**. This way, what you indicate in the conversation can be investigated. Either anonymous data or pseudonyms will be used in a publication. This study's audio recordings, forms, and other documents will be stored in a safe location at Delft University of Technology as well as on the researchers' secure (encrypted) computers. If necessary (e.g., for a check of scientific integrity), the research data will be made anonymously available to anyone outside the research group.
Voluntariness	Participation is purely voluntary in this study. As a participant, you may withdraw from the study at any moment or refuse to allow your data to be used without providing an explanation. This implies that if you choose not to participate in this study prior to the interview, your decision will have no effect. You may also revoke your consent to use your data within five business days (reflection period) of the interview. In such instances, your information will be removed from our files and deleted. If, after 5 business days of consideration, you decide to withdraw from the study, this will have no effect on you. Nonetheless, your data will be utilized in the study, including the protection of your privacy as indicated above, until you withdraw from the study. No additional data will be collected or utilized. Please contact the research leader if you decide to withdraw from the study, if you have any questions or complaints, if you wish to express your concerns, or if you have experienced any form of harm or discomfort as a result of the study.

Voluntariness	Nina Verschoor Nina.verschoor@turntown.com n.a.verschoor@student.tudelft.nl +316 83546269
Toestemmings-verklaring	By signing this document, you confirm that you are at least 18 years old; that you have been adequately informed about the research, how the data will be gathered, utilized, and handled, and the potential risks associated with your participation; and that you consent to participate in the study. You indicate at the time of signing that, if you had any questions, you were able to ask them and that they were addressed clearly and transparently. You indicate that you are willing to participate in this study willingly. You will receive a signed copy of this permission form. I consent to participate in a study led by Nina Verschoor. This paper is intended to outline the terms of my involvement in the project. 1. I received adequate information on this study project. The aim of my participation in this research as an interviewee was explained to me, and I understand what this means. 2. My participation in this project as an interviewee is voluntary. There is neither an explicit nor an implicit requirement for me to participate in this study. 3. I consent to the publication (repository), presentation, and use of the results of this study for subsequent research purposes. 4. As a result of my involvement, I will be interviewed by a researcher from Turner & Townsend as part of TU Delft research. The study will consist of two 45- to 60-minute interviews followed by a 60-minute workshop session. I authorize the researcher(s) to make audio/visual recordings and take written notes during the interview. It is clear to me that if I disagree with one or more of the aforementioned points, I may terminate my participation at any time and without explanation. 5. I reserve the right to not respond to questions. If I feel uneasy during the interview, I have the option to withdraw from further participation. 6. I have obtained an explicit assurance from the study director that I would not be identifiable in any data, reports, or papers provided as a result of the study. My confidentiality is protected as a participant in this study. 7. I have been assured that the TU Delf's ethical committee has evaluated and authorized this study endeavor. I can appeal to the TU Delft's ethical committee for concerns with the research's design and/or implementation. I have received a copy of this consent form, which the interviewer has also signed.

Informed Consent Form

version 0.1 N.A. Verschoor
Project case:

Delft University of Technology

	After the interview, you will receive a report, and upon completion of the study, you will receive the report.	
Signature and date	**Name participant**	**Name researcher** **Nina Verschoor**
	Signature	**Signature**
	Date	**Date**

APPENDIX C: Interview protocol

INTERVIEW PROTOCOL

RESEARCH DETAILS

Research title: The circular influencer**;** a research into the impact of incentives in the circular strategic decision-making processes within project management stakeholders.

University: Delft University of Technology, Faculty: Architecture

Masters: Management in the Built Environment

Reacher: Nina Verschoor

INTERVIEWEE CHARACTERISTICS

Project case: ….

Name interviewee: ….

Function: ….

Company: ….

Work activity/role ….

INTRODUCTION

First, I want to thank you for participating in my thesis research. Before the interview, you signed a consent form stating that I will be recording the interview to analyze the answers. Are you still of the same opinion? You may subsequently change your mind and discontinue your participation without providing an explanation. Lastly, you may decline to respond to any question. Do you currently have any other questions?

Before we begin with the interview, I would like to provide a little introduction of myself and then comment on the specifics of my research. As stated before, my name is Nina Verschoor, and I am a graduate intern at Turner & Townsend. Currently I am writing my master's thesis at the Technical University of Delft as the culmination of my educational career.

Now, some further information on the research content. The purpose of this research is to examine the potential impact of incentives on project management stakeholders, this to improve pro circular decision-making processes. Incentives are described as ‘’*Something that encourages a person to do something. Examples are tax incentives, these have been offered to attract industry to the region, and bonus payments provide an incentive to work harder*.’’.

This interview will ask questions about the project case X, and I want to ask politely to answer the question based on the interactions between these stakeholders. First, some general questions are asked. Following with the circular ambitions, the process questions and lastly, the interorganizational project dynamics. Before we begin the interview, I want to clarify the

definition of circular economy. *A circular economy is an industrial system that is intended and designed to be restorative or regenerative. It replaces the idea of 'end-of-life' with restoration, moves towards circular (reduce, reuse, recycle, and recover) economic models.*

Currently, do you have any questions? Okay, then let's begin the interview!

GENERAL QUESTIONS

I. Would you like to elaborate a bit more about yourself, what is your function, how long do you have this function etc.?
II. How would you describe your typical working activities?
III. What is your typical role within the decision-making processes of a project?
IV. What is your typical role within the project management team? (Consultant, decision-maker, policy writer etc.)
V. Do you have a circular/sustainable drive?
    a. *Yes?* What are the main arguments/reasons/drivers for this drive?
        i. Where does this ambition/drive/mission come from? Individual/societal vs. corporate aims?
    b. *No?* Do you have a reason for this?

PROJECT SPECIFIC QUESTIONS

I. What was your specific role within this project?
II. What were your individual/personal/corporate ambitions for this project?
III. Were the interests and ambitions of each stakeholder safeguarded?
    a. *Yes?* How?
    b. *No?* whose ambitions were seen as more importantly/ which factors led to this?

PROCESS QUESTIONS

I. How was your relationship with the other project management stakeholders?
II. Did you had the feeling that you had power into the decision-making processes within the project case?
    a. Could you make a list of power-influence/index?
    b. What sort of relationships did you have with the other stakeholders? (Informative, alliance, driver etc.)
III. How would you describe the decision-making processes within this case?
    a. Who made the most decisions? And what was your response towards this?
IV. Can you provide an example of a typical decision-making procedure or situation within the scope of this project-case? (For instance, who made any changes ot the procedure and why?)

CIRCULAR AMBITIONS QUESTIONS

I. Did you have any circular ambitions for this project?

    a. *Yes?* Where did this interest come from? (Examples: imposed by your company, own interest etc.)
        i. *Company*: Do you know why your company is interested in the circular construction economy?
            1. Does the company provide circular information/expertise?
        ii. *Self*: Is this circular ambition supported by your company?
            1. *Yes?* how do they offer support?
            2. *No?* how could the company have more interest into this topic?
    b. *No?* Why not?
        i. Do you think your company should be more involved into the circular building practices? And how would you feel supported by your company?
II. Were these ambitions safeguarded throughout the decision-making processes?
    a. *Yes?* By who and how?
    b. *No?* Why and by who not?
III. Can you provide two or three examples in which a non-circular decision defeated a circular one?

INTERORGANIZATIONAL CHECKLIST

Finally, I would want to inquire if the following dynamics were present throughout the case's decision-making processes.

CLOSING

We have reached the end of this interview. I appreciate your participation in this interview; do you have anything more to say? I would want to arrange the follow-up and final interview at this time, during which I will inquire about possible incentives.

Scale	Dynamic	Supported	Explanation
Scale 1: Organizational level 	Top-down support	yes | no | n/a	
	Organizational and sectoral cultures	yes | no | n/a	
	Power and tensions	yes | no | n/a	
	Staffing continuity	yes | no | n/a	
Scale 2: Project related level 	Partnership based on more equality	yes | no | n/a	
	Shared circular ambitions	yes | no | n/a	
	Pioneering leadership	yes | no | n/a	
	Staffing continuity	yes | no | n/a	
	Transparency and trust	yes | no | n/a	
	Project team identity	yes | no | n/a	
	Reciprocal leadership	yes | no | n/a	
	Specific circular role and responsibility	yes | no | n/a	
	Knowledge flows	yes | no | n/a	
Scale 3: Individual level 	Genuinely driven individuals	yes | no | n/a	
	Flexibility; planning	yes | no | n/a	
	Flexibility; budget	yes | no | n/a	
	Flexibility; practical expertise	yes | no | n/a	

Explanation of each dynamic

Top-down support: that the management team be amenable to change. With formal and informal support of the upper management. Lastly, the official circular documentation (policies) should align with the project's culture.

Organizational and sectoral cultures: create attractive examples, create a circular mindset, and encourage innovative solutions within the organizational and sector.

Power and tensions: if there is a tight relationship between the permanent organization and the upper management. Every stakeholder should feel that they have some impact over the processes, regardless of how little or huge that effect may be.

Staffing continuity: are diverse stakeholders participating in the processes, and are these stakeholders exchanging throughout the process (across projects/organizations)?

Partnerships on based on more equality: the involvement of a contract with shares risks between partners.

Shared circular ambitions: if each stakeholder has circular ambitions.

Pioneering leadership: whether a project member is particularly responsible for the involvement of specific ambitions (circular).

Transparency and trust: if the project management team operates with transparency and confidence.

Project team identity: the alignment of project participants with the aims, values and standards of the project.

Reciprocal relationships: partners maintain a close check on the trade of resources, recognize each other's efforts in implementing (circularity) measures, and assist each other in finding solutions to difficulties.

Knowledge flows: the interchange of knowledge streams via documentation, the monitoring of new inventions, and the examination of other reference projects.

Genuinely driven individuals: similarly minded individuals; a genuine interest in specific topics.

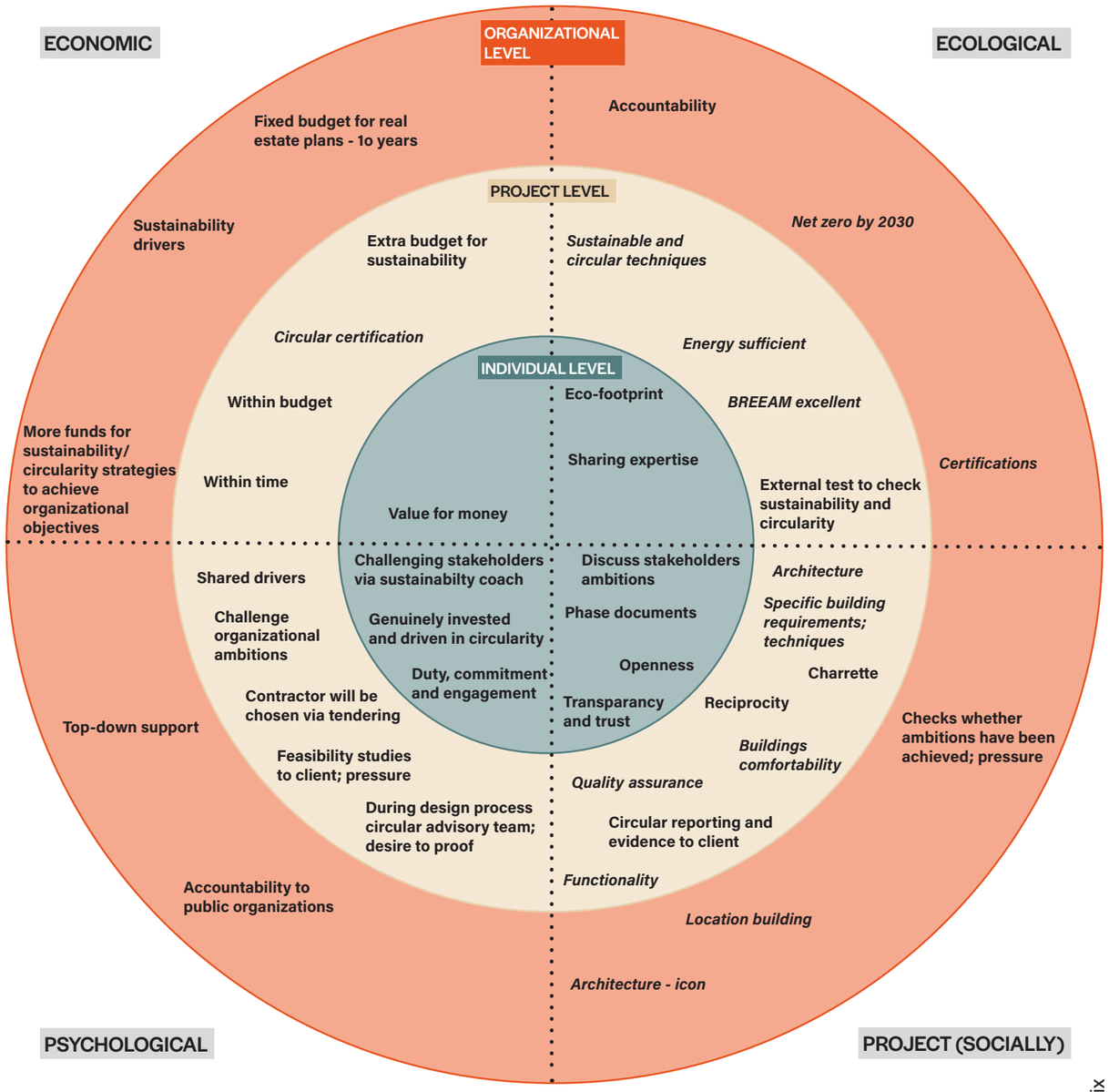
Flexibility: being flexible in terms of planning, finances, and practical expertise.

Specific circular role and responsibility: individuals are aligned to various circular roles and responsibilities.

APPENDIX D: Case A project and process characteristics

PROJECT I Step 2: Case characteristics

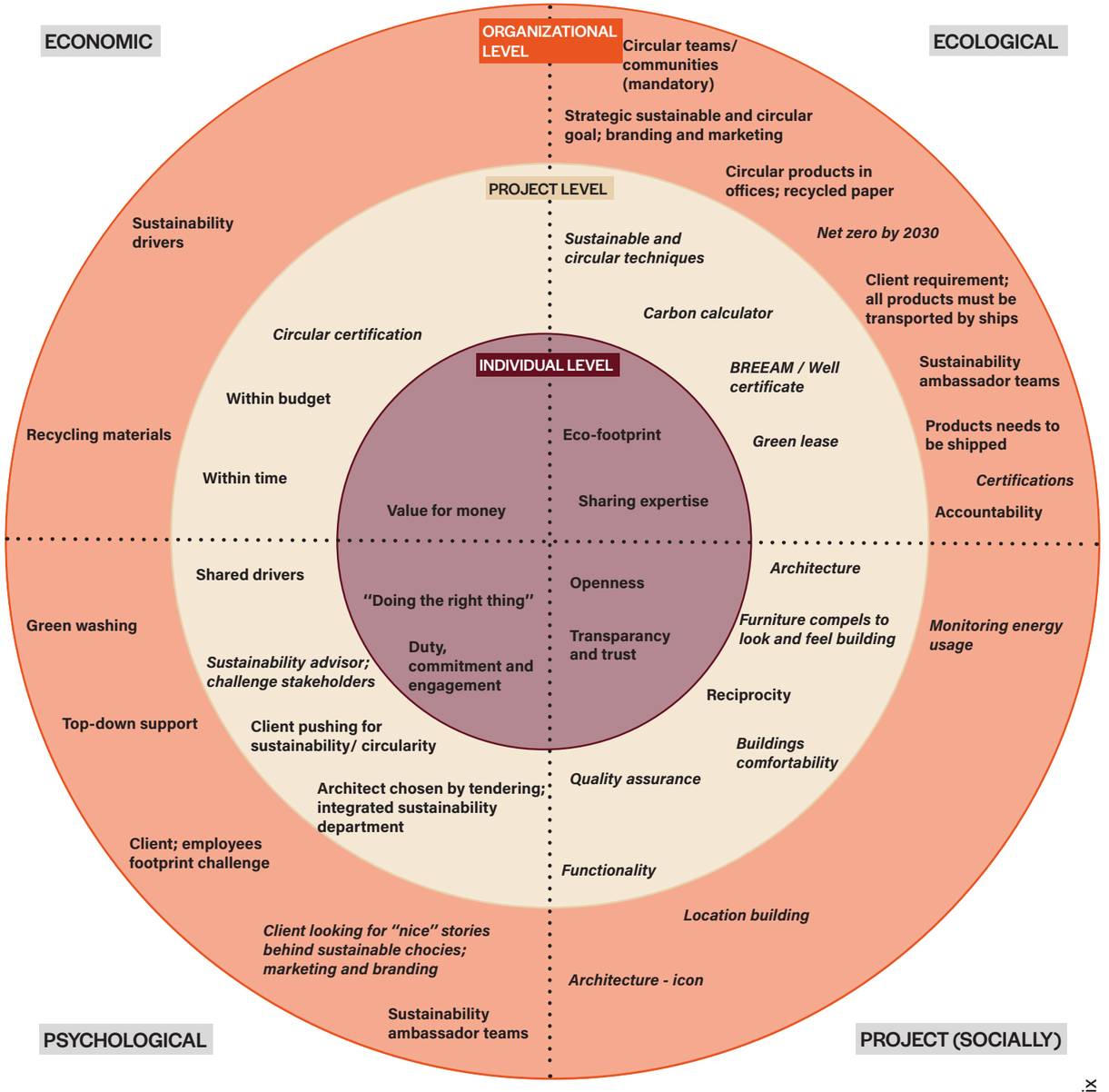
A system value proposition may be used to specify the many value propositions, characteristics, and ambitions. This is accomplished by separating building-oriented (italic letters) values from process-oriented (regular letters) ones. And the various values are assigned to the three distinct scales: organizational, project, and individual. In figure 15, various building-related goals are emphasized; the process-oriented ambitions will be detailed in more depth later.



APPENDIX E: Case B project and process characteristics

PROJECT I Step 2: Case characteristics

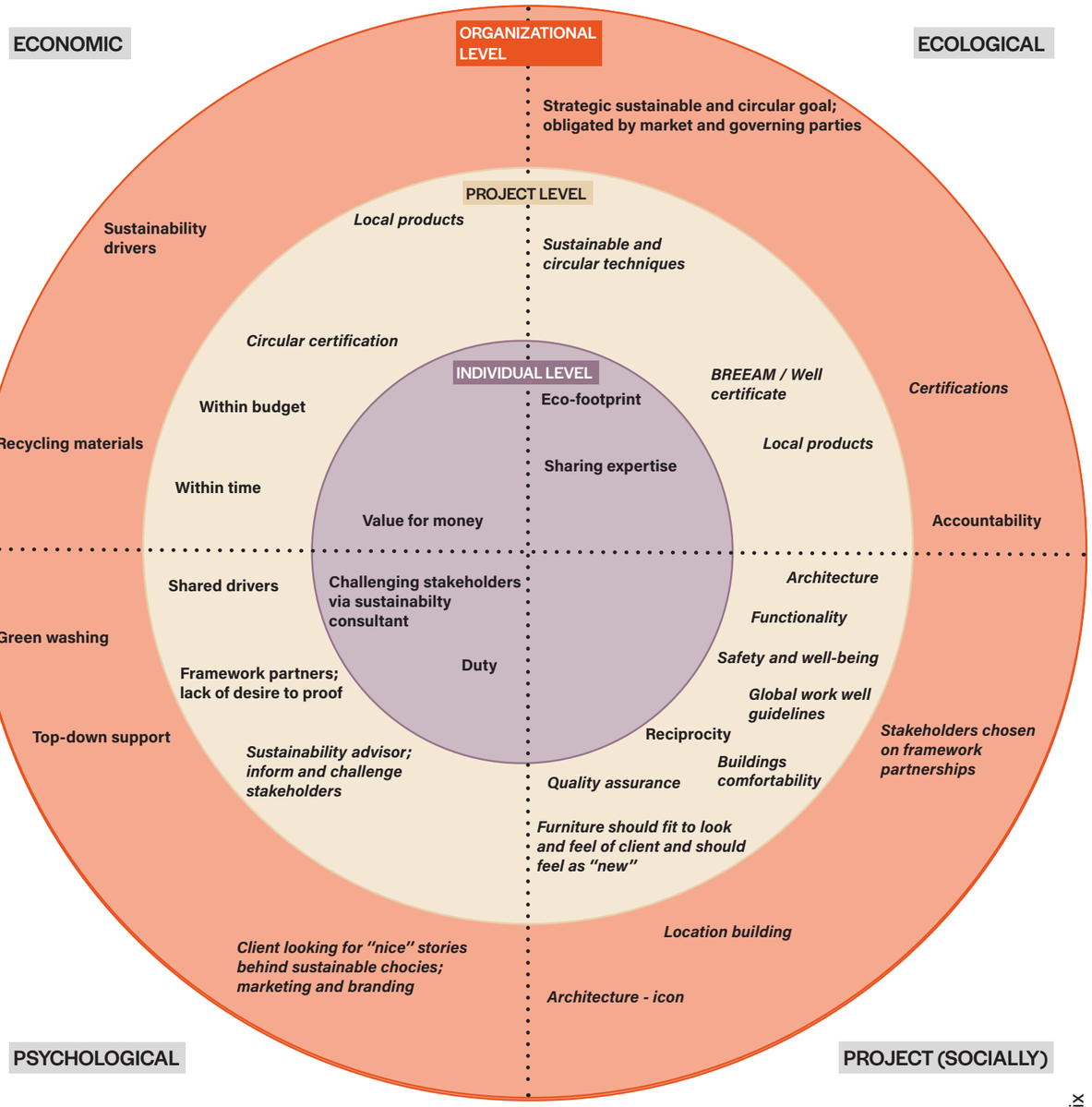
A system value proposition may be used to specify the many value propositions, characteristics, and ambitions. This is accomplished by separating building-oriented (italic letters) values from process-oriented (regular letters) ones. And the various values are assigned to the three distinct scales: organizational, project, and individual. In figure 22, various building-related goals are emphasized; the process-oriented ambitions will be detailed in more depth later.



APPENDIX F: Case C project and process characteristics

PROJECT I Step 2: Case characteristics

A system value proposition may be used to specify the many value propositions, characteristics, and ambitions. This is accomplished by separating building-oriented (italic letters) values from process-oriented (regular letters) ones. And the various values are assigned to the three distinct scales: organizational, project, and individual. In figure 29, various building-related goals are emphasized; the process-oriented ambitions will be detailed in more depth later.



APPENDIX G: Brainstorm interview analysis