

MASTER

Restructuring What We Value: Value Creation for Sustainability Transitions

Studying new perspectives on value and applying them to 'Drenthe Woont Circulair' transition experiment cases

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Restructuring What We Value: Value Creation for Sustainability Transitions

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Restructuring What We Value: Value Creation for Sustainability Transitions

*Studying new perspectives on value and applying them to 'Drenthe Woont
Circulair' transition experiment cases*

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Preface

It was in March 2020 when I had started working on my thesis project and I was more than enthusiastic to conduct my thesis research. The research field within the context of which this study was to be conducted really intrigued my interest, as I believed it could be a panacea for saving this blue dot we live on and cater to societal equity and well-being: Circular Economy. Just prior to starting my thesis, I had spent 2 weeks at home, in India, and that was the first time I went back since my arrival at TU/e for pursuing masters in Sustainable Energy Technology. I remember feeling that those 2 weeks just flew by and just when I felt that familiar comfort and conviviality of being home, I was packing my bags again and flying back. I was looking forward to what lied ahead though, as I had a renewed sense of purpose and motivation to do quality work while enjoying the process, smell the roses per se. In the first week of being back the Covid-19 crisis began to unfold and back then no one had a clue that even after a year we will still be in the middle of a global pandemic. I wish I had stayed a little longer and spent time with my family, but hopefully I will see them soon.

I would be lying if I say that this crisis didn't affect my ability to perform by best work. It has been a trying past year but has also taught me a lot. Uncannily, the title of this research is 'Restructuring what we value' and I feel that while I was starting this research I was at the precipice of an internal value shift, and Covid-19, with its pangs of isolation and lockdowns unleashed that value shift in full. It taught me the importance of belonging, that humans are indeed social beings and a sense of community is essential. It also revealed to me what I value the most, through a realization that we are just part of nature. I also understood how the capitalist system we live in affects every aspect of our lives and has entrenched its roots in the culture and values of our society. You will read about this in a scientific way in this thesis report, but I experienced that shift in my cognition too. Ironically, I would not be able to afford to pursue my studies here and live in the Netherlands if my parents didn't generate enough capital to sustain my endeavours. Nevertheless, I am a mere speck in this societal cog, but I can choose and live according to my values. All in all, this last year has been challenging yet fulfilling, on a personal and academic level, and I am thankful for every moment that has gone past me.

First, I would like to express my sincerest gratitude to my supervisor, Frank Veraart, who has of course guided me through my thesis research with valuable insights and direction throughout the process and different stages, but he also has been a voice of reason and belief in moments where I was doubtful of my own abilities. He was always supportive and understanding, guiding me through the difficult parts of conducting this thesis research. On this note I would like to thank my supervisors from Drenthe Woont Circulair project, Ruth Mourik and Alex van Oost, firstly, for taking me on as an intern for N.I.C.E.-Northern Innovation lab Circular Economy and providing me the opportunity to be involved in the project where I could learn and improve my abilities and also do meaningful work which hopefully will be valuable for the project as well. They have been supportive and generous with their time and helped me in tackling obstacles which occurred while performing the research. I am thankful for their guidance as they were also instrumental in helping me find relevant data, connecting me with stakeholders and asking me pertinent questions which challenged me to find solutions. I express my sincere gratitude to my fellow junior employees, my fellow researchers from N.I.C.E., Brian Bayon, Ferdinand van der Zee, Olga Korosteleva, and Welmoed Claus as they were exceptionally supportive in helping me collect data, and also actively involved in discussions pertaining to my research. I would also like to thank Mr. Wouter Huuskens, who was also very helpful in providing me data for my research and was very generous with his time as he was interested in the theme of my research and was always available for discussions. I am grateful to Henny Romijn for being a mentor to me. I love the conversations I have had with her. I also thank her taking the time to read my thesis and provide me with valuable feedback. Lastly, I would like to thank my parents who have been a pillar of support and positivity and have aided me to overcome all challenges.

Uday Laiker

Executive Summary

Background | There is an immediacy to transition to a sustainable model for growth and consumption now, as the call for mitigating climate change, lowering the emissions and reducing raw material consumption, has been there for a number of decades already, but the change has been peripheral and far too slow. Post industrialization, under the imaginary of infinite resource availability, a linear economic system was developed, where the idea central for establishing it was creating more and more demand for consumption of products/services so that businesses can satisfy it. This idea has manifested in a complex economic system where generating a never-ending amount of capital seems to be the only concern, and efforts to contribute towards sustainability remain peripheral.

Businesses need to transition in the way they operate and organize and innovate towards products services that provide positive effects to the user, environment and broader society. In academia and practice alike the term value creation is central to economic processes and business activity. When it comes to sustainability it translates to sustainable value creation and discussions shift to social value and ecological value creation. The approach to creating value by businesses is scrutinized widely and blamed for perverse effects of businesses on environment. There is a call for change in value creation and this thesis project is embedded in that pursuit.

Research Context | This thesis research is being carried out within the context of a project where the ambition is to implement circular economic principles and practices within the built environment sector, specifically construction of circular housing projects. *'Drenthe Woont Circulair'* (DWC) is an initiative in the region of Drenthe in Northern Netherlands, where housing projects at six different sites within Drenthe have been assigned to be built embracing circular economic process and practice. DWC project environment is rooted in sustainability transition research and study, wherein it is being approached as a sustainability transition experimental space with six different cases under the umbrella project, which will be designed by distinct teams. Within this experimental space the ambition is to enable collaborative efforts to solve wicked challenges that arise when innovating for transformative change. DWC's aspires to challenge the normative way of doing things with a definitive aim of transitioning to a totally circular construction sector in Drenthe region in the long term. Actors within DWC had questions regarding value creation in a circular economy transition context and developing new perspectives on value creation is one of the leverage points for successful transitions.

Research Question/Aim | Businesses need to embed sustainability in their design thinking and operations, and those objectives are correlated with value. The purpose of this study is to research conceptually what is meant by value creation and how it can be understood in context of sustainability transitions. Thereafter, analyze the changes in the views on values in practice for DWC project. For that purpose, the following overarching research question was formed:

How does value creation change in sustainability transition experiments?

Research Design | The research design for this study was qualitative in nature. The project has been approached as an exploratory qualitative research study. To answer the research question first a theoretical analysis was performed where conceptual understanding was developed by reviewing literature and the question was answered theoretically. This was instrumental in providing a framework for analyzing the project cases, and this empirical study was approached as an exploratory qualitative case study to discern how is value creation being approached within the project cases of DWC and what are the implications in comparison to concepts developed through the theoretical study. This thesis research completed an entire research cycle where we first discuss literature and

theory which led us to identifying a framework which could be applied in practice, and then we collect data from real world cases to analyze and make inferences. We then analyze this data and present it descriptively following with discussion and reflection on the main results. Through reflecting on concepts studied and empirical analysis we further develop theoretical concepts and contribute an added layer to existing theory.

Methods | The theoretical framework discussed as a conclusion to studying the research problem conceptually was identified to be ideal for using in DWC case analysis. For our exploratory case studies, the framework was translated into a methodical research instrument where data collected can be coded with ease. Data was collected for all six projects, wherein the main sources of data were the 'vision documents' and 'team composition documents' provided by the consortia involved in development of the projects, as these documents revealed extensive discussion of values. Three interviews were conducted with consortia members from three of the six projects. Several informal discussions were also instrumental in data collection. A non-participatory role was played in a joint brainstorming session amongst stakeholders, where the discussion was related with the theme of this research study. A scoring system was developed additionally to the operationalized framework to score and categorize the data coded, revealing new insights into the discussion of values. (content is revealed in subsection Results below)

Ethical Considerations | Permission for using data from the projects was taken from the relevant stakeholders. Consent for taking notes during interviewing and recording them was asked for. Remaining objective in the analysis of cases was paramount and strived for while conducting the research and analysis.

Results: Theoretical analysis | Capitalist values only pertain to amassing endless amounts of wealth and consequential of this singular interest, we face devastating consequences of climate change and an ever-increasing divide in social and economic equity. This permeated in business sphere where traditional business models are just focused on economic value creation for the enterprise itself. For business models, the concept of value creation is central and even more so for sustainable business models as for generating sustainable outcomes the process of creating value should in itself be sustainable. Sustainable value creation starts with proposing sustainable value for a broad range of actors and stakeholders. For proposing sustainable values, it was essential to determine what are the values that need to be created for transformational change, and how can they be created in practice. The value framework identified in literature which includes values from four perspectives: economy, psychology, sociology and ecology for stakeholders that be assigned to four levels of value. Having the multiple value approach is essential strategic shift for value creation in context of sustainability transitions. This was turned into a methodological approach to conduct the empirical analysis.

Results: Empirical analysis | Operationalizing the value framework for DWC projects proved to be an ideal way to check the value embeddedness in the designs for circular social houses, as developing innovative housing could cover all perspectives of value as people's lives are intertwined with the place they call home, and it also plays a role in their wellbeing. So, value framework operationalization with the scoring set up revealed that the projects have well developed value propositions accompanied by designs and creation mechanisms for the perspective of ecology. Circular economic design principles were addressed in the visions for development. The psychological value concepts were addressed by some consortia in a more nuanced way, whereas some just mentioned statements that loosely connected to the value concepts in this perspective. Similar result was obtained for sociological perspective of value. Economic value concepts were comparatively addressed weakly by the consortia.

Conclusion | Conceptually understanding value creation in context of sustainability transitions was achieved and it pertained firstly to a shift away from economic value monism and conceptualizing multiple value forms. To create these values the rudimental step is embedding them in value propositions. The value framework was identified for analyzing the value embeddedness of DWC pilot projects. It can be concluded that DWC projects have embedded multiple value perspectives in their visions for designing circular social houses and implementing these designs will lead to holistic value creation. Future transition experiments can learn from DWC case analysis. A Consequential lesson is involving the stakeholders from different levels of value, most importantly the ecosystem level and societal level actors for affecting change in discourse and normative thinking. It also aligns different views and creates new ones when such collaboration is operationalized.

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1 Project Background

1.1 Introduction

The immediacy of climate change mitigation and sustainable development is compounded by the fact that we are headed towards intense resource scarcity. During the process of industrialization, a core assumption of infinite resource availability was made, and a complex '*linear*' economy has since been established, which revolves around creating and satisfying demand (State of Green, 2018). This economic system, built on the principles of 'take, make, waste', while *disregarding the environmental and social limits, focusses only on generating capital, amassing wealth*, and that too in a vehemently disproportionate manner. If reforms are not made to address the current *business-as-usual* paradigm, total demand for limited resource stocks is expected to reach 130 billion tons by 2050 (Accenture, 2014), which essentially means a more than 400 per cent overuse of Earth's total capacity. Needless to say, merely reaching that point is physically impossible and the economic impact of resource scarcity on this scale would be devastating (Accenture, 2014) (Webster, 2017). Transitioning to a sustainable model for growth is inevitable.

The call for sustainable development was made almost four decades ago by the World Commission on Environment and Development (WCED, 1987), but the progress towards a sustainable model has been slow. Companies are increasingly becoming interested in sustainable practices, but even after that fact the condition is worsening, with plethora of negative social, environmental and ethical conditions attributed as direct consequence of economic growth and our current capitalist system. We are part of a society in transition, but a transformative change in business thinking and practice is needed for a successful transition to the paradigm of sustainability. Central to this barrier for transformative business practices is *the approach and understanding of value creation* by organizations (Porter & Kramer, 2019). Mentioned above is the prerogative of all economic activity, generating revenue and amassing wealth, and that indicates the view on creating value that is prevalent in business thinking.

Business intuitions remain caught up in the narrow view of value creation, which is aimed at financial profitability in the short term, wherein even the values of customers and their important needs are often not considered. This prevailing conceptualization of value and value creating mechanisms in business and economics have come under increasing scrutiny by scholars and practitioners alike. The discussion of embedding sustainability in business is linked to creating extra financial value i.e. social and ecological value. ***The problem lies in understanding the concept of value***, as it is a multifaceted and elusive concept which in business and innovation management practice and literature is a central construct. *The challenge becomes more complex when the discussion is about sustainable value and even more so when we link it to transformational innovation for societal transitions.*

The goal of this research is to understand and study new perspectives on value specifically in a sustainability transition context. In the next section we explore the problem more definitely and frame our research.

1.1.1 Problem Exploration and Framing

One of the most material-intensive sectors of our global economy and responsible for a vast amount of energy consumption is the built environment and construction sector. A study from the 1990s showed that globally, almost 40% of the material and one-third of the energy produced was consumed by the built environment (Webster, 2017). Moving ahead, almost two decades later, the building industry's consumption still amounts to 40 % of the materials entering the global economy and 32 % of total final energy use (Leising et al., 2018), while only a fraction (approximately 20-30%) of the

materials are reused or recycled at the end of life of a building (Webster, 2017). The sector remains the largest consumer of raw materials, also accounting for 25-40 % of the global carbon dioxide emissions. Incremental approaches to make buildings energy and material-efficient have not been able to mitigate the adverse effects and we need a radically different approach, a transition away from the norm where the approaches in the past can contribute as a part but not the whole. (Pomponi & Moncaster, 2017).

'Circular Economy' (CE) provides an alternative growth model for the sustenance of our planet reversing these trends, and it has been gaining attention over the last decade, among scholars, practitioners, and policymakers, thus becoming high on political and societal agendas (Rood & Kishna, 2019); (Kirchherr et al., 2017); (Ghisellini et al., 2016); (Bocken et al., 2017). In a condensed form the concept of CE is defined as: "... one that is restorative and regenerative by design, which aims to keep the products, components, and materials at their highest utility and value at all times." (Webster, 2017). Circularity, rather than being considered as the 'new sustainability paradigm', is an inherent prerequisite for a successful transition to a sustainable model for growth and development.

This research study was carried out as part of the project *Drenthe Woont Circulair (DWC)*, which translates as *Drenthe Lives Circularly*. The DWC project environment is constructed as a novel *sustainability transition experiment*, a testing ground, aiming to put pressure on business as usual practices in the building and construction sector. The ambition is to implement circular social housing in the province of Drenthe, with the *long-term goal of aiding the transition to a circular construction economy* by 2040 (van Oost & de Vin, 2020). We will delve into the DWC set up in detail in section 1.4 below, but now we move on to present the theme of the problem that was explored in this thesis research.

Innovations aimed at societal transitions, or *transformational innovations*, demand a transition in the way we work and organize as well. They need a different approach; It concerns a systemic change, where we need to develop and adopt new ways of working, creating, and sharing the things that we value (Jonker & Faber, 2019). The concept of business models was originated to provide a lucid representation of complex business ideas and the way they are implemented. Simply put, business models describe the way business is done (Zott et al., 2011). The concept gained academic and practical importance when it was linked to being an enabler of implementing innovative solutions (Chesbrough & Rosenbloom, 2002).

Embedding sustainability in business thinking is crucial for organizations for transitioning towards a model of sustainable growth and development. Sustainable business models (SBMs) and their innovation has been an emerging agenda, both in research and practice. It is viewed as an approach for organizations to create a balance in economic, social, and environmental dimensions within their business activities. Circular business models, and tools for their innovation, have also become a relevant research stream and scholars have addressed business models as the way of implementing circularity, beyond the design and innovation of circular products and services and into the system (Webster, 2016) (Carra & Magdani, 2017). *Interestingly, in business modelling/thinking and innovating for new products and services the entire discussion revolves around value and value creation.*

Looking from a business perspective, DWC's ambition is to bring together a diverse network of stakeholders from multiple backgrounds, for innovating, in a collaborative manner, towards transformational change. DWC's project environment wants to embrace the ideals of open innovation, where a *co-creation of value* can occur for all actors involved in DWC. *But the question arises what does 'value' address in this context? What is 'it' that will be created?* Stakeholders have their aspirations, but they are also ambiguous about *what is it that they will gain from participating in such*

an experimental project, and 'how' can they innovate to change the conventional view of creating value to creating value for society at large. Within the agenda of transition research one of the leverage points for successful transitions, and a relevant, recurring dilemma for actors involved in DWC, is understanding value creation in a sustainability transition context.

1.2 Research Questions

The Drenthe Woont Circulair transition experiment provided an interesting opportunity to explore new perspectives on value when innovating products/services for societal transformation. To that goal, the overarching research question guiding this research was formed to be:

How does value creation change in sustainability transition experiments?

To answer this question, it was first important to explore what is meant by *value* and *how the creation of value* has been approached traditionally, as learning the underlying reasons that make the traditional approach unsustainable will lead us to understand what changes can be affected. Following from there, an inquiry into *what entails creating value in the context of sustainification*, and what will value creation address from a transformational innovation perspective was viewed as logically the next step to follow. All these rhetorical questions express quite a few challenges and concepts that needed to be addressed for understanding value in transition experiments, and the following set of sub-questions were developed:

Sub questions:

- RQ 1. How is value creation viewed traditionally?*
- RQ 2. How can value creation be understood in the context of transformative innovation for sustainability?*
- RQ 3. What are the determining elements for creating value towards sustainable transitions?*
- RQ 4. How is value creation being approached by actors involved in the DWC experiment? (Differences/similarities with literature)*
- RQ 5. What are the implications of this research study for Drenthe Woont Circulair?*
- RQ 6. How can lessons learnt through this analysis be relevant for future transition experiments?*

A setup of this thesis expressing what do the different chapters deliver to the reader and in which of those chapters the RQ's are answered is presented in the next section below.

1.3 Thesis Set-up

Figure 1 was developed to represent a roadmap for the entire research conducted in this thesis. This roadmap depicts the different stages in a chronological manner, laying out a chapter wise progression of this report indicating the focal points of discussion in each chapter and adding reference for where the research questions have been answered. In this chapter we started with defining the problem and developing the research questions for this thesis research. The rest of the chapter reflects the background knowledge of the Drenthe Woont Circulair project, which is essential for understanding the context of this thesis research also legitimizing the research questions. Some of the concepts are also being presented here as they will not be included as part of building the theoretical argumentation for the DWC analysis in the next chapter: Theoretical analysis, but are relevant for this research study.

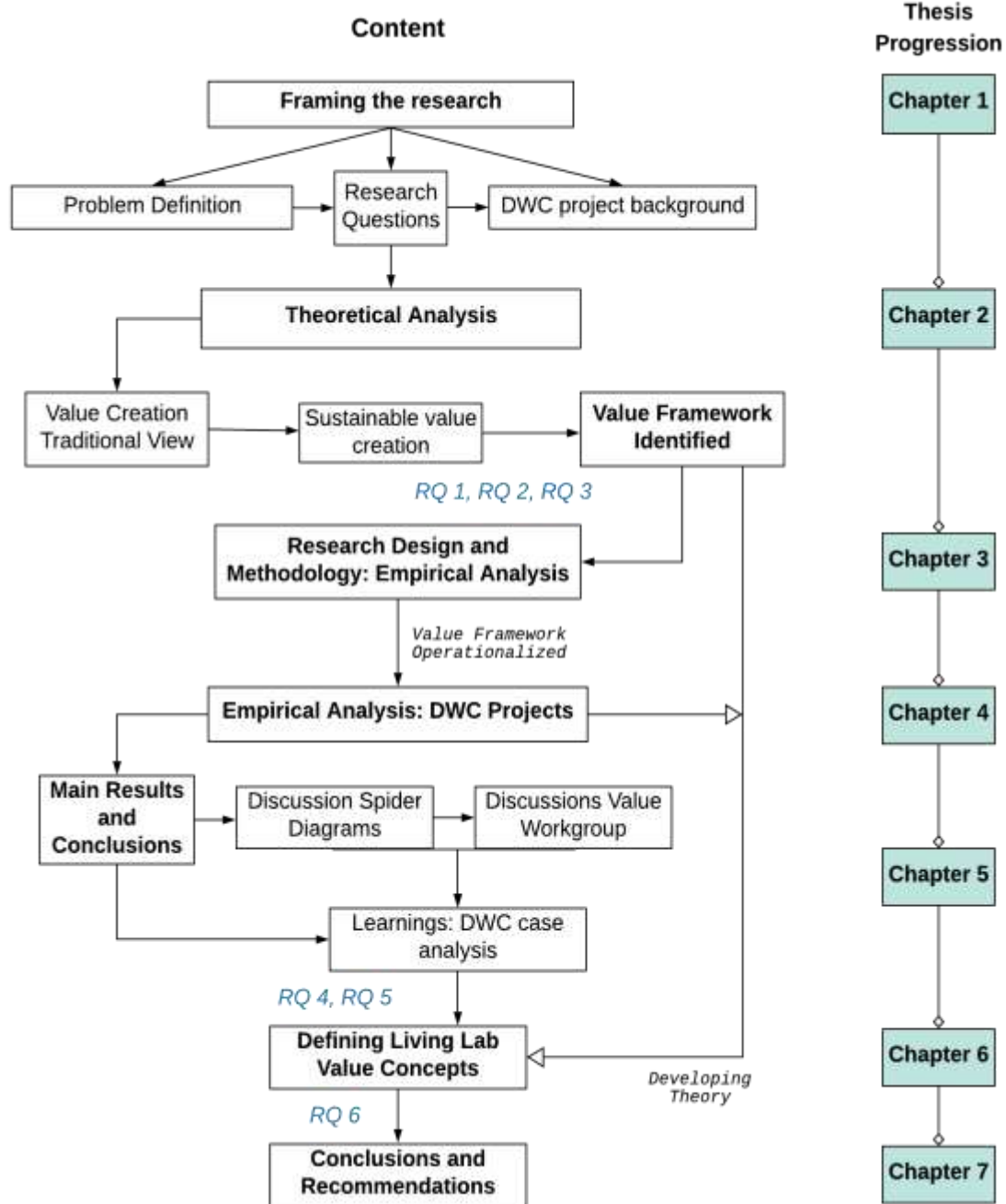


Figure 1: Thesis Research Roadmap representing progression of this thesis report

To answer my questions, the next chapter in this thesis report starts with an exploration of the concept of *value*, as it was a recurring question for some actors involved in DWC projects and *value creation* for sustainability is becoming quite an important dimension within sustainability transition research. This chapter will focus on the first three research questions and through the theoretical analysis will identify a conceptual framework to study value creation in practice. In chapter 3 these theoretical insights and the conceptual framework are translated into a methodological approach to study values in practice by analyzing the DWC pilot projects. In chapter 4 the analysis of the DWC cases through the operationalized framework is presented and the results and conclusion from this analysis along with some pertinent reflections are discussed as part of chapter 5.

Chapter 5 also consists of the discussion of work done in the value workgroup within DWC living lab environment, and all background information necessary for this workgroup is provided in chapter 3 in section 3.3.2. After presenting the results and reflecting on the operationalization of the framework for DWC cases, I move on to derive theoretical concepts from the experience and pertinent findings drawn out from the empirical analysis. Reflecting on the DWC case, which is established as a living lab (discussed in detail in section 1.4.1 below), it was explored as to how can the living lab concept relate when viewed through the lens of the framework and this forms Chapter 6 of the report. Through this last step we complete an entire research cycle, where we first study theory, design a method to conduct empirical study and then through the analysis of the empirical cases further contribute to theory. This research cycle is presented in Figure 2 below.

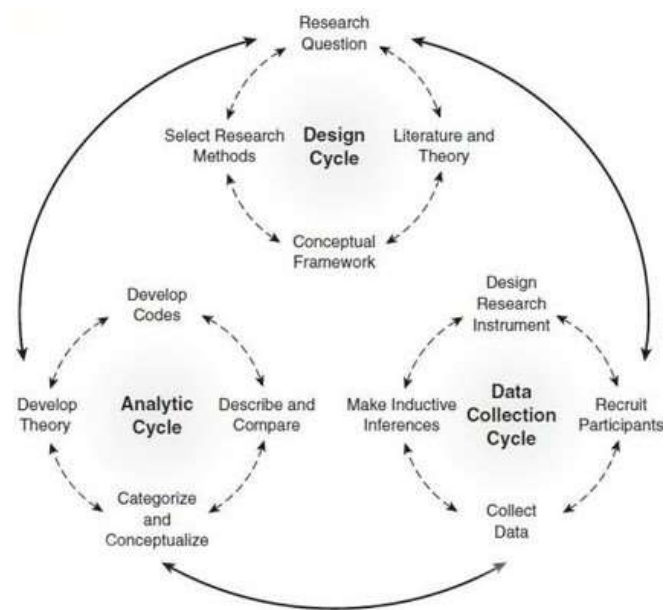


Figure 2: Research cycle diagram (taken from *Qualitative Research Methods* (Hennink et al., 2020))

Chapter 7 presents the conclusion of this research study. It also discusses the limitations that arose from challenges faced during conducting the research and ends with providing recommendations and future research avenues for DWC and future transition experiments in general.

1.4 Transition Context: Experimental Testing Ground

DWC is a joint effort by the 8 housing associations operating in Drenthe, and it stemmed from an earlier initiative, the ‘Drenthe expedition for energy-neutral living’, which was set up in 2016 (van Oost & de Vin, 2020). Together with Northern Innovation Lab for Circular Economy (N.I.C.E), the housing associations expanded their agenda to achieve a circular construction sector in Drenthe, following which the initiative of DWC was conceived: an exploration in addressing the uncertainty for achieving circularity in the construction sector. The partners are motivated to combat climate change and are aware of the negative effects and inefficiency that the construction sector has as of now (van Oost & de Vin, 2020).

DWC’s mission statement is about “radically changing the way we build, work and live” for providing a livable planet, also to the next generations. They state: “circular construction must become the *new*

normal" (N.I.C.E., 2019). To that goal, Drenthe Woont Circulair wants to look at products, processes and collaboration in a different way which requires a turn in *thinking and doing*. Within the DWC project environment – de Preoftuin (experimental garden) – *a safe experimentation space* is aimed for where *learning is paramount* to seek solutions with lasting impact. We will explain more in-depth below what these concepts represent. The next section explores the *Living Lab* context of DWC.

1.4.1 Living lab

Drenthe Woont Circulair presents itself as a testing ground, a *living lab*, where ‘learning by doing’ is to be carried out in a collaborative environment, sharing knowledge and experience, and in the process, finding answers to *why, how and what* of a shift to circular housing, thereby eliciting the best practices that will affect fundamental change in the current system (van Oost & de Vin, 2020). The DWC living lab has been approached as a sustainability transition experiment, which can be defined as:

“An inclusive, practice-based and challenge-led initiative designed to promote system innovation through social learning under conditions of deep uncertainty and ambiguity” (Turnheim et al., 2015, p. 2).

To further expand the potential of transformative learning, stakeholders involved in DWC are considered as part of a ‘Community of Innovative Learners’ (CoIL), where actors from diverse backgrounds including knowledge institutions, government and researchers have been arranged to facilitate open communication and knowledge sharing to facilitate learning.

A community of innovative learners in this experimental space is a substratum of the ‘Living Lab’ environment set up in DWC, and a living lab involves an all-inclusive approach, particularly focused on a user-oriented design perspective. The European commission information society and media define living lab as: *“User-driven open innovation ecosystem based on a business–citizens– government partnership which enables users to take an active part in the research, development and innovation process”* (Dell’Era & Landoni, 2014). Hossain et al. present living labs as: *“A living lab is a physical or virtual space in which the aim is to solve societal challenges, especially for urban areas, by bringing together various stakeholders for collaboration and collective ideation”* (Hossain et al., 2019). Studying these definitions, it can be concluded that, a challenge led, open and co-creative environment, embracing the user as central to innovating and where actors are brought together from many disciplines to test solutions for societal problems, is what inculcates ‘Living Labs’.

1.4.2 Project Cases within the DWC umbrella initiative

Together with the backing of the 8 housing associations, DWC made an open call to companies to become a part of this transition experiment. The DWC Living Lab consists of 6 pilot projects of 6 of the 8 housing associations, both demolition and new construction. In total, this concerns about 110 homes, spread throughout Drenthe (N.I.C.E., 2019).

An overwhelming response was received wherein a total of 31 consortia consisting of 175 companies, submitted their ideas for the construction of circular social housing, reflecting the intrinsic motivation of companies wanting to be sustainable. *“Circularity, Cooperation and Learning goals”* were taken as the criteria to assess the entries, as only 10 of the consortia were to go through to the final phase of selection (N.I.C.E., 2019). These consortia then presented their innovative ideas, along with submitting vision documents, which were analyzed by a professional jury consisting of experts relevant in context to DWC. Transition to a circular construction economy was the overarching view and assessment criteria for their visions were aligned accordingly by the jury (N.I.C.E., 2019).

The 6 winning consortia to be a part of DWC are (*The Projects - Drenthe Lives Circularly*, n.d.):

- Circulair Toekomst Consortium (Circular Future Consortium)
- Dit is Thoes (This is Thoes)
- Het Consortium (The Consortium)
- Trias Argentariae (Triassic Argentaria)
- Drenthe woont natuurlijk circulair (Drenthe naturally lives circularly)
- Plan C

These consortia consist of more than 25 companies and include architecture firms, designers, constructors, sustainability start-ups, recycling companies, demolition companies and many other stakeholders from distinct fields of work and research such as biologists, industrial ecologists, research institutes and universities etc., which demonstrates the diversity in actors involved. The selected consortia have been matched with the 6 housing corporation projects to be constructed. The matched consortia and housing association, forming the construction teams, are presented in Table 1 below.

To reflect on the timeline, after the construction teams were finalized the DWC living lab project has four phases:

1. Design phase
2. Construction preparation phase
3. Implementation phase
4. Evaluation phase

This thesis project is being conducted within the timeline of the *design phase*, where the matched teams work together to make a spatial translation of the ambitions and wishes of innovating circular social houses.

Table 1: Matched consortia with housing corporations and their projects

S.no.	Consortia	Housing Corporation	Details of the housing projects
1.	Circulair Toekomst Consortium (Circular Future Consortium)	Woonservice (home service)	New construction of 7 homes on the Roelof Tuinstraat in Valthermond.
2.	Plan C	Actium	New construction of 20 ground-level homes for small families and single and double households in Kloosterakker in Assen.
3.	Het Consortium (The Consortium)	Woonborg	New construction of 15 family homes in Roden.
4.	Dit is Thoes (This is home)	Lefier	New construction of 5 houses in Klazienaveen

5.	Drenthe woont natuurlijk circulair (Drenthe naturally lives circularly)	Domesta	Combination of new construction of 4 houses with the demolition of 6 houses. It is the intention that the materials of the houses to be demolished will be reused in the new construction project.
6.	Trias Argentariae (Triassic Argentaria)	de Volmacht	New construction and demolition of 15 houses in Gieten.

1.4.3 Strategic Niche Management Principles

Scholarly work in understanding and governing transition processes has led to an emergence of theoretical frameworks and strategies that underlie the broad scope of transitions. Detailing these approaches individually is beyond the scope of this report. Duneworks B.V., in collaboration with N.I.C.E., is involved in the monitoring and evaluation (M&E) of the DWC living lab throughout the timeline of the project. ‘Strategic Niche Management (SNM)’ and ‘Multi-Level Perspective (MLP)’ principles are being used in the DWC learning, monitoring and evaluation, and governance objectives. The monitoring and evaluation approach for DWC has incorporated these frameworks to record, reflect and learn from impactful moments within DWC living lab environment.

The framework imbibes SNM principles (Grin, 2016; Loorbach & Wijsman, 2013) and identifies 5 impact points that are essential to integrate into the project and form the base of the monitoring and evaluation framework as well to observe and govern the progress being made. They are:

1. Doing/Experimenting
2. Together/Networking
3. Visioning/Setting Visions and Agendas
4. Learn/ Reflexive Learning
5. Direction/Governance

Learning is a part of the transition management framework but also is the fundamental value behind the monitoring and evaluation of any transition experiment. Presently, monitoring and evaluation activities have been focused on the operational level (operational, tactical, strategic) where the focus is to observe the process changes happening at the level of the construction teams and scout groups that have been formed within DWC.

1.4.3.1 Transformative learning

Transformative learning is approached in a way where no action is wrong or a failure but a contribution to the understanding of what works best. While experimenting for transitions, it is important to make sure that besides the transfer of knowledge, the actor’s thinking is influenced such that it triggers behavioral and mental change. Systemic change through social innovation implies social learning i.e. restructuring social interactions, redefining actor roles, knowledge, language and practices (Loorbach et al., 2017). The M&E framework within DWC is set up to record and learn on all 5 impact points stated above and form a *knowledge academy*. The impact point ‘Learn’ has the objective that the construction teams have learned on a personal level, by developing new competencies such as knowledge, attitude, skills etc.

DWC is going to continuously involve actors in social learning, also conducting ‘*Living Lab Days*’ in the design phase, which are essentially workshops where stakeholders will be involved in interactive

theme sessions. Sustainable business thinking and modelling is high on the agenda for actors as part of this learning environment.

1.5 Why a value-based analysis?

Traditionally, companies and organizations have just focused on 'economic value', creating and capturing it i.e. monetary gains for themselves and their supply chain. Since then corporate social responsibility (CSR) has been trying to address concerns about the degradation of our environment and our social structures, and companies were forced to adhere to set norms for CSR. That does not address the fundamental flaw, i.e. the negative side effects on the environment and society as a whole, which aren't considered in the process of value creation (Glinik & Vorbach, 2019). Sustainable business thinking aims to include and emphasize other forms of value, namely environmental and social, going beyond delivering economic value to customers and the firms themselves. In business management and corporate sustainability discourse, this forms the triple bottom line that a sustainable offering must deliver; *economic, environmental, and social value*.

In transformational processes (transition), where adoption of new products/services aims to have lasting consequences beyond their use or consumption (den Ouden, 2012), it needs to be elicited how the intended effect or the aspirations for change can be reflected in the product/service offered to the consumers. This is a prerequisite for modelling a sustainable innovation and subsequently the business operations for transformative change, as the sustainability principles must be operationalized through the business model so that sustainable outcomes can be generated (Glinik & Vorbach, 2019). The question we face is what elements of business effect and change the view on the value being created and how can we do things differently to provide value for society at large. Change in business thinking and practices of a company can be pragmatically complex, moreover so in the case of innovation systems where the ultimate aim is a transition from the present dominant system. Analyzing these challenges in a real-world context was interesting and relevant, also giving insight into differences/similarities in the practice and academic discourse.

2 Theoretical analysis

Approach: Theoretical Study

In previous sections, it became clear that the focal lens through which the theoretical grounding and analysis of the DWC project are to be carried out is that of creating sustained value for society at large. This chapter contributes towards understanding and explaining the fundamentals for achieving that goal. Starting from a semantic inquiry of 'value', as it was important to understand first what the word truly represents. Continuing the discussion of 'value' and 'values' into a slight philosophical debate, section 2.1 culminates in setting a precedent for the argumentation that follows in the rest of the theoretical analysis; a lens to sieve through literature from varying research fields.

Section 2.2, *Capitalist Values* divulges knowledge regarding prevalent problems in the dominant economic system, addressing RQ 1 and taking a view on fundamentally flawed elements influencing values in the current capitalist system. This flows into the next section where we shall dive into a traditional business operations perspective, establishing a firm base in exploring what needs to be changed per se. Next section: *Key Concepts: Sustainable value creation*, elicits the concepts for further understanding the relevance of value creation, addressing RQ 2 and laying down the foundation for empirical analysis as the framework operationalized for conducting the empirical study of cases is discussed here. Chapter 2 ends with addressing RQ 3 which concludes the theoretical analysis.

2.1 Interpreting 'Value'

'Value' and 'value creation' are terms quite widely used in business models, innovation management, and innovating sustainable business models, wherein they are often left undefined and are used vaguely. Consequentially, it is important to explore what is meant by 'value', how value creation has been approached historically and why that view needs change.

"Those who don't learn from the past are doomed to repeat it" – George Santayana
(Santayana, 2011, p. 284)

Let us start with an inquiry into the word 'value'. Oxford Dictionary of English defines 'Value', when considered as a noun, as "the regard that is held to deserve; the importance, worth or usefulness of something". The other way it can be interpreted is "principles or standards of behavior; one's judgement of what is important in life" (*Value - Definitions Extracted from the Oxford Dictionary*). To be accurate, and articulate our discussion coherently, the second definition presented above reflects more on 'Values' and it is relevant to note here that there is a distinction between the two (e.g. their community have internalized their *ancestral values*). 'Value' is used in reference to the worth of something whereas 'values' is consistent with principles, ethics and morals that define what is important in life. The latter presents a more nuanced and holistic view and comes a priori to 'value' i.e. the worthiness of an entity or something intangible, which in essence is determined by the *values* that are held by an individual or collectively. Ethical principles or 'values' lead one to have a *preference or importance* for a specific state of being or products and services, and that leads to allocation of 'value' or *worthiness* to those distinct preferences which can further be *measured or evaluated*.

This line of discussion is more from a philosophical side and is not to be sustained, but it is important to understand that the 'value' of a product or service is not just ultimately a property, to put it into scientific terms. We are not talking about the intrinsic value of a material substance, i.e. the value something possesses independent of evaluation through human experience and judgement (Pascual et al., 2017), instead, the values being discussed are in relation to human beings. The question of something having value is a subjective matter rather than an objective one, where value resides in something based on how we feel or perceive the object in question. The objective view of value is

equally important when the innovation of products and services are concerned. The objective value resides in the product itself due to its composition. An object formed out of any rare or precious metal will have more objective value than one that is produced from, for instance, a plastic material. Now from a subjective view the latter object could have more *subjective value* to an individual as he/she might be attached to the object in question on account of it being a gift from someone close or a cherished possession that has been in possession for a long time. It attaches an emotional and sentimental quality which makes it more *valuable*. Both views need to be considered to understand the needs towards designing for societal change (den Ouden, 2012). The ultimate ambition is to understand how we can instill *values* that can lead to the restructuring of these systems towards a more sustainable society but to determine that, it is fundamentally important to look back and determine what has enabled the necessity for the transformation from a value perspective.

The stress is upon the subjective view or ‘*values*’ to investigate what we collectively, as a modern civilization, have valued in the last few decades that has led to the rapid decline of our planet’s environmental health and equivocally of our social structure. The next section contributes an answer to this question, critically analyzing the way our global economic system has shaped up.

2.2 Capitalist Values

“The Art of Money Making”

The rationality for progress and development prevalent today relates entirely to creating economic gains or monetary wealth. In the *modern capitalist society* that we have quite rapidly built and escalated after industrialization, economic growth is the primary national agenda for every nation and economic value is seen as paramount (Sun et al., 2015). The scope of enquiry in this system has been reduced to the market centered dimension of economic process, which has been reinforcing the modern idea of development (Cruz et al., 2009). Aristotle originally conceptualized economy (derived from the word *oikonomy*) as ‘the art of living and living well’ which included the study and practice of diverse domains concerning the production of use-values in areas such as agriculture, crafts, hunting and gathering, mining and even warfare, also discussing the value of ethics and aesthetics (Harvey, 1982). In recent years though, it has been reduced to “the art of money making” (den Ouden, 2012).

Capitalism was viewed and institutionalized as a vehicle for perpetually creating more wealth and greater social prosperity: meeting human needs, improving efficiency, creating jobs and hence building wealth (Park, 2015) (Porter & Kramer, 2019). But in actuality, the conception remained quite narrow ignoring the complex, *multidimensional, social, cultural and psychological motives and aspirations, or values of human beings, and equivocally ignoring environmental and ecological dimensions* (Cruz et al., 2009). This vehemently reductionist view has been stratified globally in most economies with national, regional and local (municipality level) policies being shaped accordingly, and in turn, giving companies and intuitions the free will to focus on exploitative practices. With little to no accountability, businesses have been garnering wealth at the expense of broader society and ignoring the ‘human’ and ‘ecological’ needs. The evidence for this is found in the way the degree of development is assessed in almost all economies worldwide.

GDP: Rooted in Capitalist Values

The deification of ‘Economic Growth’ is exemplified by the system of measuring development on the national level that is prevalent, the ‘Gross Domestic Product’ (GDP), which is deeply rooted in ideas of accumulation, profit and added value (Polychroniou & Foster, 2018). The flaw lies in viewing GDP as a measure of human development, which it is clearly not reflecting, because social and environmental costs are treated as “*externalities*” and are not considered at all in the accounting of income (Polychroniou & Foster, 2018), thereby misrepresenting the *true cost* of any activity (Schor, 2005).

These misgivings and failure to measure human development and well-being by the GDP approach have been very well documented in Literature (Cruz et al., 2009) (England W., 1998) (Polychroniou & Foster, 2018). Moreover, this bolsters the argument that the entire capitalist system measures growth and progress in terms of 'cash flow', as opposed to what might be beneficial for people, the planet and in essence society as a whole (Polychroniou & Foster, 2018). This idea of measuring growth based on the accumulation of 'capital' has permeated through all levels of our social structure right from the political entity of the 'state' to the individual, dictating the cultural identity, individual and collective ideation, and rationale for choices.

Unsustainability: Consequence of Capitalist Values

Capitalism's manifestation in our current prevalent economic system and equally in people's lives is grossly enabling unsustainability (Thinley & Hartz-Karp, 2019). The set of capitalistic 'values' can be represented by an identity matrix i.e. it values a singular entity, which is 'endless accumulation of wealth/resources' without being conscientious of the repercussions. The point of this argumentation is to reveal how capitalism values, or rather, excludes valuing the 'human' and 'environmental' dimensions, which should be the starting points of any economic activity. The *linear economy* is a construct of that exclusion or the way that capitalism 'values' nature and human needs. Products are designed with negative use-values, purposely shortened life spans or planned obsolescence (Rivera & Lallmahomed, 2016) *without considering user's motivational values and cultural relevance* and hence it is destructive to our environment and social well-being.

Consequential of this singular interest, we as a society face devastating consequences of climate change and an ever-increasing divide in social and economic equity, where the people in the lower range of this spectrum live in utter poverty and even the most basic human necessities are not fulfilled (Park, 2015) (Cruz et al., 2009).

Concludingly, the current system is embedded in a capitalist world view, which traditionally has permeated all economic processes, production and manufacturing, entrepreneurial activities, governmental decision making and policy instruments, and even assessment of growth and development. There has been a deliberative disregard for the adverse effect of these activities on our environment, along with an inconsideration for inclusivity in wealth distribution and societal well-being.

In section 2.3 below, we shift the focus to businesses and institutions elaborating on how they rationalized these capitalist values in their core operations that create a barrier for sustainable growth. The concept of 'Corporate Social Responsibility' was linked to sustainability goals, both social and environmental, through mandated policy instruments upon a global call for change towards sustainable development (Nijhof & Jeurissen, 2010). We briefly discuss how it is a fundamentally flawed approach when transitioning to a sustainable society is the goal, before presenting concepts that shall illustrate what is indeed functional for that goal.

2.3 Traditional business perspective

The argumentation through the discussion of capitalism and subsequently its values is done to acknowledge that it is the dominant system (landscape) in which businesses operate, and consequently, the rationale for conducting business was reduced to maximizing profits. Taking the same approach and looking through the lens of *value* and *values*, traditionally, *value* in business has been equated with money (Breuer & Lüdeke-Freund, 2017). Even scholars debated that the role of business in society is exclusively to increase its profits (Moratis et al., 2018) (Taylor et al., 2018). So, *creating value* relates to monetary value captured, most of all for the firm itself (Chesbrough & Rosenbloom, 2002), and this view is dictated by the *values* of the actors in business organizations.

These (capitalist) values that represent the motivation and underlying beliefs for conducting business operations are important to address because businesses organize their strategic operations around the singular interest of accumulation, and this narrow view creates a barrier to transformational change. It is a problem that is complex and coming closer to provide a change in perspective and practice is an ambition of this research project.

The need for a transformational approach becomes clearer when we reflect on how sustainability has been approached in the business sphere until now: through corporate social responsibility. CSR became the vehicle for forwarding sustainability goals by organizations, but initiatives that stem through CSR are not contributing to a model for sustainable growth in actuality. Let us explore why in the next section below.

2.3.1 Why we need to shift away from CSR

CSR as a concept is defined as coordinated business actions aimed to achieve a more sustainable world (Fleming & Jones, 2013) and it became quite relevant in the last few decades for businesses to address the environmental and social sustainability goals. CSR activities of organizations act as a ‘plug in’, compensating for damage that has already been done through core business operations, where creating monetary value is paramount (Fleming & Jones, 2013). Hence, CSR remains peripheral uncoupled from core operations of companies, and usually, it is related to brand management or marketing and communications department, to cite that the organization is ‘making a difference’. Often, the reality is the exact opposite of that portrayal, wherein CSR initiatives by companies are “strategically embedded in perverted motivations and are exploited to create benevolent images of malevolent corporate practices” (Moratis et al., 2018, p. 2). The incremental and peripheral approach of CSR is not aiding any real change, and *businesses approaching their sustainability goals through CSR only creates barriers unto those ambitions, where institutional barriers and the narrow conception of value creation processes are left intact* (Moratis et al., 2018, p. 3; Nijhof et al., 2010).

We discerned through the sections above that traditionally, *value* is correlated entirely with economic value, which translates into *conducting business operations* solely towards that goal. Before we can discuss what entails creating value in a sustainable way and how can we restructure values unto that end, it is a prerequisite to *comprehend how value, value creation and business modelling are intertwined*, and thereafter briefly discuss business models in a traditional sense to characterize ‘what’ needs to change (section 2.4.1). In the next sections, we develop the conceptual understanding towards creating value for sustainable transitions and how all the key concepts discussed become relevant for the analysis of our case: Drenthe Woont Circulair.

2.4 Key Concepts: Sustainable value creation

2.4.1 Value and Business Models

The entire discussion in business modelling is based around value, and value creation is central to any business modelling/models (Bocken et al., 2013; Lüdeke-Freund et al., 2019; Moratis et al., 2018; Nosratabadi et al., 2019; Osterwalder & Pigneur, 2010; Visser, 2018). Albeit BM’s became popular in scholarly debate and relevant in practice in the mid-1990’s (with the advent of the internet), they can be viewed to be essential to economic activity since pre-classical times (Zott et al., 2011). Osterwalder and Pigneur (Osterwalder & Pigneur, 2010) present the business model as a tool that describes how an organization ‘creates value, delivers value and captures value’. In a comprehensive literature review on business models by Nosratabadi et al., the authors describe BM’s as conceptual representations of the value flow and the interactions between value elements of an organizational unit, namely proposing, creating, delivering, and capturing value (Nosratabadi et al., 2019). *Hence, the concept of value is indeed central to business modelling and operations.*

2.4.2 Value Proposition

All conceptual interpretations of business models *are done to organize the process of 'value creation'*. In this logical representation of value creating processes the first and fundamentally most relevant building block is 'Value Proposition'. A rudimental definition for value proposition in business literature is given as a clear simple statement of the tangible and intangible benefits of a new solution, together with an approximate price (Äyväre & Jyrämä, 2017). Osterwalder and Pigneur (Osterwalder & Pigneur, 2010) present that value propositions illustrate the bundle of products and services that create value for a specific customer segment. Proposing value requires a real understanding of the user, and the fundamental problem for which the solution is being offered. It will be discussed in detail in section 2.4.5 how creating holistic value propositions take precedence while innovating for societal transformation and how should they can be created, but for now we discuss their relevance as the fundamental block of business modelling in general.

So, the first and essential logic of value creation leads to a value proposition which, conventionally, describes what added value, financially, socially, and ecologically is created and for whom (Schaltegger et al., 2016). What follows from here represents the second building block which is the way the value proposition is organized. This relates to activities, within the individual organization as well as in conjunction with the value-chain partners or network organizations, where the parties involved work together, making use of their resources in form of their strengths and competencies, to create and deliver a product/service. The second building block can be related with 'value delivery' (Osterwalder & Pigneur, 2013). Some authors also distinctly add another element of 'value creation' here (Osterwalder & Pigneur, 2013), but as argued previously value creation is the underlying logic of the business model itself, and we view it to be redundant as a building block. The third and consequential block concerns with the revenue modelling, or *Value Capture*, of offering and selling the organized value proposition (Proka et al., 2018).

So, value-creating processes are an organization of the value that is proposed. As a first step to creating value, the outcomes that are desired should be proposed and then they are delivered through activities in the network of actors involved in producing and offering the product or service. *Value propositions are the rudimental block of any business model.*

2.4.3 Traditional Business: Through a BM lens

Now that an understanding of underlying strategic logic and operations involving value creation, *which essentially represents a business model*, has been built up, let us take a step back and reflect on the prevalent problems in traditional business thinking.

We previously argued that traditionally businesses are primarily rooted in the solitary pursuit of financial profitability. Such a 'for-profit' outlook focusses on organizational value appropriation, where the business model is aligned with securing and expanding the focal organization's competitive advantage. This normative 'egocentric' view of conventional business models has since been stretched out to create value for shareholders in the value-chain, but value chain logic still focusses on economic value production in the form of profit for the shareholders (Breuer & Lüdeke-Freund, 2017). The efforts to use some of this profit for providing benefits to larger society and environment through CSR is inadequate, as it is managing the consequences of damage that has already been done (see section 2.3.1 above).

Thus, a major flaw of such business thinking is the deliberate total exclusion of costs incurred from environmental and social perspective or alternatively stated the cost of damage to the environment and social structures, as these are viewed as externalities and not as a factor to be considered in performing business activities (Moratis et al., 2018). Also, it characterizes short termism in their

thinking which is a significant barrier to a transition view, where a long-term vision and agenda setting is required (Loorbach & Wijsman, 2013). These two flaws provide a succinct representation of 'business-as-usual' paradigm. In my opinion, *business as usual is not about 'creating value' at all, it's all about capturing value.*

These strategies served well for traditional business operations and products, but when societal transformations for sustainability are concerned, they serve as barriers to the societal goals and transitioning to creating value sustainably.

In the next sections, we move the discussion to understand how we can understand values and value creation in a sustainability context, now that we have established what is wrong and why it needs to change. We start the discussion by illuminating what is meant by *sustainable value*, and why is it relevant for theory and our DWC case in this next section.

2.4.4 Sustainable Value & (Sustainable) business models

Sustainable business models research has matured over the last decade with numerous typologies, frameworks, canvases, and systematic reviews and case studies addressing the diversification of the field in market sectors, also exploring their conjugation with other academic research streams (Bocken et al., 2014; Evans, Vladimirova, et al., 2017; Freudenreich et al., 2020; Hope, 2018; Joyce & Paquin, 2016; Schaltegger, Hansen, et al., 2016). The defining common theme that cuts across all these sustainability-oriented business models and their archetypes is the *deliberative extension of their focus towards ethical and environmental considerations to create social and ecological value* (Schaltegger et al., 2016). In previous sections, an argument has been built that business models are value-creating strategic logics of an organization, and it is this fundamental essential quality of the lens of business models that make it relevant for sustainability (Schaltegger, Lüdeke-Freund, et al., 2016) and the discourse of sustainable value creation here, for this project. The pitfalls of the 'egocentric view' of conventional value creation logics are the antithesis of sustainable value creation, and we shall elaborate on that below.

Creating Value Sustainably

Embedding sustainability in business means focusing not just on sustainable outcomes, as focusing on outcomes *doesn't change the underlying structural barriers and silos* present in conventional antecedents (Baldassarre et al., 2017). Instead, when it comes to sustainability the process of value creation is at the heart of what comprises a sustainable business model. Value proposition, value delivery and value capture originate from value creation, and can only truly integrate and progress aspects of sustainability when the value-creating processes *are in themselves sustainable and create sustainable outcomes* (Moratis et al., 2018). What supersedes all other elements and is the first step to designing a sustainable business model is: *'designing sustainable value that incorporates economic, social and environmental benefits which are conceptualized as value forms'* (Evans, Fernando, et al., 2017).

Designing Sustainable Value

Designing sustainable value means that the *value proposition* must provide ecological, social and economic value through offering innovative products and services, and the value proposition must extend beyond the normative customer, shareholder view to a broad range of networked stakeholders, where environment and society are viewed to be central from that stakeholder perspective (Proka et al., 2018; Schaltegger et al., 2016). The multi-actor *'value architecture'* must co-create collaboratively to deliver the proposed value, and the value-creating *'business infrastructure'* must be rooted in the principles of sustainable or circular supply chain management, where they all can take responsibility for production and consumption systems (Freudenreich et al., 2020; Jonker &

Faber, 2019). Lastly, *the economic value capture mechanism* and financial model should distribute economic costs and benefits equitably among all actors involved while regenerating natural and social capital beyond its organizational boundaries (Proka et al., 2018; Schaltegger et al., 2019; Schaltegger et al., 2016).

'What' Values should be designed?

For holistically addressing the value proposition, it is relevant to analyze *'what' values will be created* through an offering that would be instrumental in incorporating sustainability at the company level as well as the system level. Even for transformative social innovation, economic value generation is crucial to achieving a sustainable business operation, but they are just a part of the larger value which is to be delivered. *'Intangible values'* also play an important role especially for the organizations involved in the value network addressing these systemic challenges. Some examples of intangible value are knowledge, reputation, exposure and attention for the organization, but this gives a rather narrow view of the intangibles, which could be more important in transition context, also considering that the actors will potentially indulge in social learning leading to behavioral change. *What* inculcates such *social and ecological values* and *how can they be translated* for the networked view of stakeholders, beyond just customers and shareholders and reaching society at large, is the pivotal determining factor for enabling transformative potential of innovating product-service systems towards sustainability transitions.

The discussion henceforth brings forward the question: *How can sustainable value be proposed in a co-creative way by actors involved in innovating for transformation so that the desired sustainable outcomes can be generated?* This is certainly complex when it comes to implementation and there aren't many positive examples where co-creation of sustainable value has occurred. It's a wicked challenge and is quite relevant to research presently as there are ample amount of ambiguities and dilemmas regarding how to achieve it.

Transformative innovations include the design of product-service systems towards challenging the prevailing dominant regime (Loorbach et al., 2020). They aim for systemic change, creating value for society at large and to achieve that, stakeholders involved in these innovations or innovation systems need to change their normative thinking (discussed in sections 2.2 & 2.3) and practices (den Ouden, 2012; Proka et al., 2018): *essentially their perspective on value creation.*

2.4.5 Value Propositions for Transformations

Business modelling for transformative innovation can be viewed as the enabling of a network of diverse actors with an entrepreneurial mindset to create and further develop markets for societal innovation, shifting and transforming the markets they operate in, acting as catalysts for sustainable development (Glinik & Vorbach, 2019). Central to such business model innovation is *rethinking the value proposition* of the innovative product/service that is being offered where values are proposed for all the stakeholders in the innovation system. Loorbach et al., (2018) explicitly state value propositions to be the first building block for operationalizing their conceptual framework presented for transformative business models.

For transformative change, ultimately the aim is widespread adoption of the innovation by the users. That can take place when the *value proposition* of the innovation would create sustainable use-value, in addition to tangible value, i.e. the sustainable flow of goods, services and revenue, such that it contributes to the transition, and what is considered *niche* presently can scale up and replicated to be a dominant system (Geels, 2002). But when it comes to systemic transitions, the discussion of value should be fundamentally realigned, wherein the question arises, *how* should the innovation be designed, or *what values should it address* in the proposition to *create sustainable value*. These

questions are addressed in depth in section 2.5 below, where the *Value Framework*, which provides the most holistic perspective on *values* and how can *value propositions be designed to embed those values in an innovation or innovation system* is discussed.

The framework discussed below will be used to examine different projects and the contributing organizations that form the DWC testing ground. The methodology for operationalizing this framework in the empirical context is reflected in Chapter 3. Reasoning and motivation for choosing this particular framework over other tools/frameworks discovered while studying literature is discussed in section 2.6 after an understanding of den Ouden's framework has been developed. Having a conceptual understanding of the framework will serve as a testament to why it was chosen over other tools and frameworks.

2.5 Value Framework

Elke den Ouden's **Value Framework (VF)** (den Ouden, 2012) is formulated as a tool for creating meaningful innovations through *inculcating values from different perspectives: economic, psychological, sociological and ecological*. It answers perfectly the pivotal question of *what are the values that need to be inculcated and how they can be embedded* in the design when innovating for societal transformation (den Ouden, 2012).

This framework, according to the author, should specifically be used by organizations, actors or researchers for analyzing and aiding the process of *Transformational Innovation*, which we discussed in the section. A grassroots explanation of the framework as the author had intended will be given in what follows.

2.5.1 Levels of value

VF addresses *values* at four societal levels i.e. the values attached to the user need to be included in that of the organization, those of the organization should be reflected at the ecosystem level and values associated with the ecosystem need to be aligned with the values of the society at large. These levels reflect the following:

2.5.1.1 Value for the user

The user is the ultimate target of innovation. "Value for the user addresses the definition of a value proposition that is attractive to the user. That means it is important to deeply understand the motivational values of the user, especially for innovations that aim to change user behavior" (den Ouden, 2012, p. 14). An important factor here is that the user experience should be engaging and pleasurable as it will also lead to widespread adoption of the innovation.

2.5.1.2 Value for Organization

As an organization, whether it is for-profit or non-profit, the aim is to innovate, design, produce new products and services that create sustainable value for itself, by providing added value for its customers, and at the same time, it also creates value for its employees. The goals and visions of the organization and the individuals working on the project or innovation are guided by a mission statement that encapsulates the value of the organization.

2.5.1.3 Value for the Ecosystem

Ecosystems stretch beyond the traditional value chain, the supplier-customer network, or the 'extended enterprise', which also includes suppliers to suppliers and customers of customers in the context of transformational innovations. The term 'ecosystem' stems from biology and is defined as: "... the complex system of living organisms, their physical environment, and all their interrelationships in a particular unit of space" (The Editors of Encyclopaedia Britannica, 2020). Analogous to biological ecosystems, business ecosystems consist of complex networks of actors, where knowledge,

competencies and strategic relationships are of utmost importance and are essential for creating value. “Ecosystems include all stakeholders that have a direct or indirect role in the various phases of the innovation: the definition, creation, realization and extension” (den Ouden, 2012, p. 17). In ecosystems, the value proposition of the service drives the creation of shared value and the members of the ecosystem co-evolve with changing propositions.

Society may also be considered a stakeholder in the ecosystem, e.g. the installation of a community garden for a neighborhood may well be beneficial to the population of bees in the surrounding area, and hence they can be the part of the ecosystem as well.

2.5.1.4 Value for Society

Society is the highest level of value and users; organizations and ecosystems are all part of society. Understanding societal issues are fundamental to the creation of meaningful innovations.

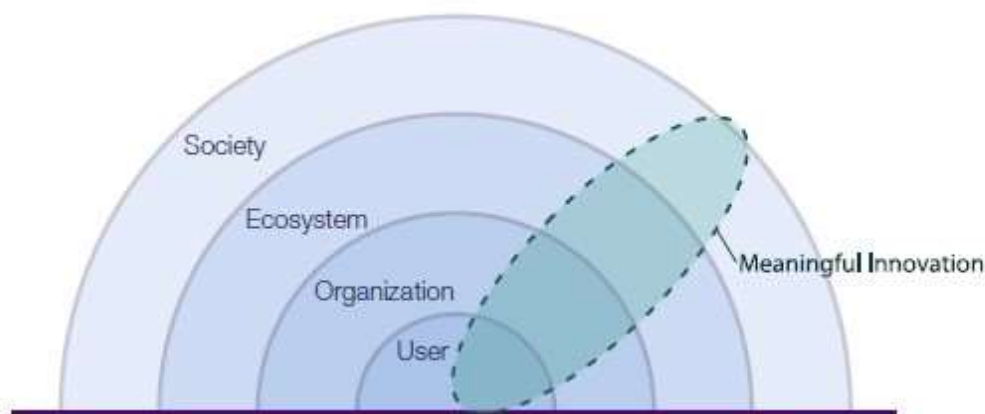


Figure 3: Levels of Value (den Ouden, 2012)

2.5.2 Value from different Perspectives

This framework considers values from the following views: Economy, Psychology, Sociology, Ecology. The innovation itself should be of value to all the relevant stakeholders but moreover, it should contribute to their values as well (den Ouden, 2012). In the context of transformative innovation, it is essential to study both, the subjective and the objective value of products or services, as we discussed in section 2.1 briefly. Innovators need to consider what are the things that are valued by the user, and why. It is important to view their feelings towards new solutions (den Ouden, 2012).

2.5.2.1 The Economic View

Economics distinguishes microeconomics, in which the unit of analysis is an individual such as a household or a company; and macroeconomics, which considers economic stability and prowess on a much larger scale for e.g. Gross Domestic Product (GDP) of a nation and other indicators of people’s economic welfare. The microeconomic definitions of economic value fit more with the levels of customer and organization, while the macroeconomic definitions fit with society as a whole.

2.5.2.2 The Psychological View

Traditionally psychology has mostly been concerned with negative aspects like depression, but positive psychology is a relatively new counter reaction to this negativity and focusses on the aspects that make life worth living. Values in the psychological perspective define what people strive for: the human values, as well as how they influence their behavior: the motivational values. Its applicability to the four levels of value is therefore also related to the drivers of the people taking the decisions at these levels.

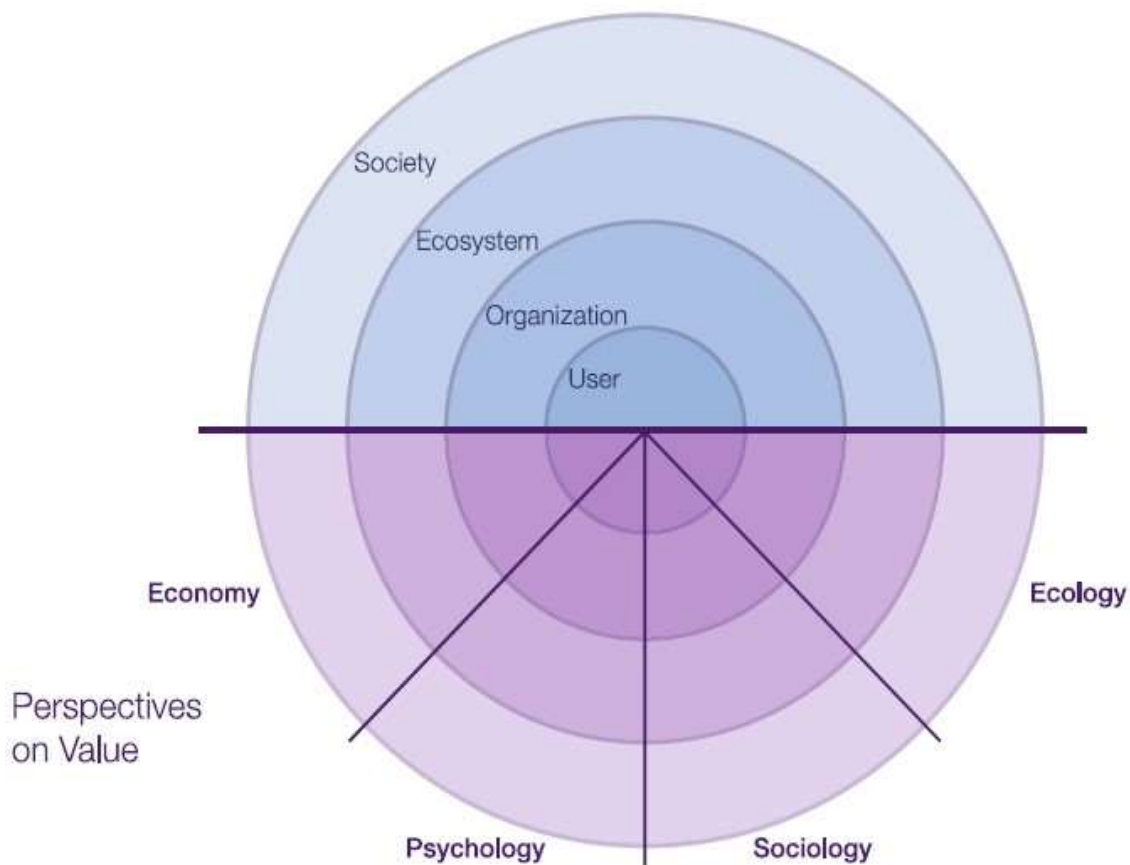


Figure 4: Perspectives on Value - Integrated View (den Ouden, 2012)

2.5.2.3 The Sociological View

Sociology is the study of the development, structure and functioning of human society. Social value is defined as the non-economic value that society puts on a resource and that is recognized by most, if not all, people, such as the benefits to human health of clean air and water. In general, it can be said that sociology focuses on social relationships, and it is in relationships that things (products and services) take on value.

2.5.2.4 The Ecological View

The ecological view reflects sustainability at all four levels of value previously discussed. This view aims to protect our environment from destruction and views 'Nature' as a value itself. "Value in the perspective of ecology considers the earth as a whole, with man just being part of a larger ecosystem" (den Ouden, 2012). The ecological perspective is the most comprehensive of all the views as it covers not just social relationships of human beings but their relationships with their physical surroundings.

This framework then goes on to derive ‘value concepts’ for each level through the lens of the different perspectives.

2.5.3 Value Concepts

Den Ouden expresses the economic value for the expected users of the system, product or service to be the *value for money*, which reflects the usefulness of a product/service and value or the price of a product/service compared to the value or price of another product/service. The economic value that companies strive for is *profit*, and for an ecosystem it is *financial stability* and *resilience* which the author clubs under a singular term *stability*. The economic value for society is summarized as *wealth*. The concepts of ecological value refer to an individual’s *ecological footprint*, *eco-effectiveness* at a company level, *sustainability* at the ecosystem level and the *Livability of the environment* at the society level. The Livability of the environment relates to biodiversity as well as the physical beauty of nature. The social value for the user translates into *belonging*, which is an important parameter in determining people’s happiness. At the company level, the social value is summarized as *social responsibility*, which represents the impact of a firm’s behavior on society. Value at the ecosystem level from a social perspective translates into *reciprocity*, reflecting a system to which all parties contribute and from which they benefit. At the societal level, the ultimate value is the greatest happiness of the greatest number of people and *meaningful life*. The psychological perspective is rooted in positive psychology, where the definitions of value translated as value concepts for different levels are: For the user the *happiness* is the most inclusive merit and innovators need to consider the values of users and communicate it to them effectively, which will also increase overall happiness. Organizations should strive for establishing and contributing towards their *core values*, their reason of being. For an innovation system to be successful the ecosystem members should share the mission by cultivating *shared values*. People use society as a reference to judge their personal quality of life and wellbeing, so from a societal view the innovation should contribute to societal *wellbeing* (den Ouden, 2012).

Each of the social sciences—economics, psychology, sociology, and ecology—is indicated on a radius, together with the overarching value concepts for each level. An innovation is considered valuable if it addresses the four levels from all four perspectives; in other words, when a positive check is made for all the items stated in the framework. An innovation is considered valuable for a user if it provides economic value through value for money; psychological value through happiness; sociological value through a sense of belonging; and ecological value by reducing the user’s ecological footprint. Similarly, an innovation is considered valuable to an organization if it creates profit, enhances the organization’s core values and contributes to its social responsibility and eco-effectiveness and so on (den Ouden, 2012). These concepts will be explained in more detail while discussing them as part of the empirical analysis.

Figure 5 below provides an integrated view of the different levels, the four value perspectives and the value concepts corresponding to both those elements of the framework.

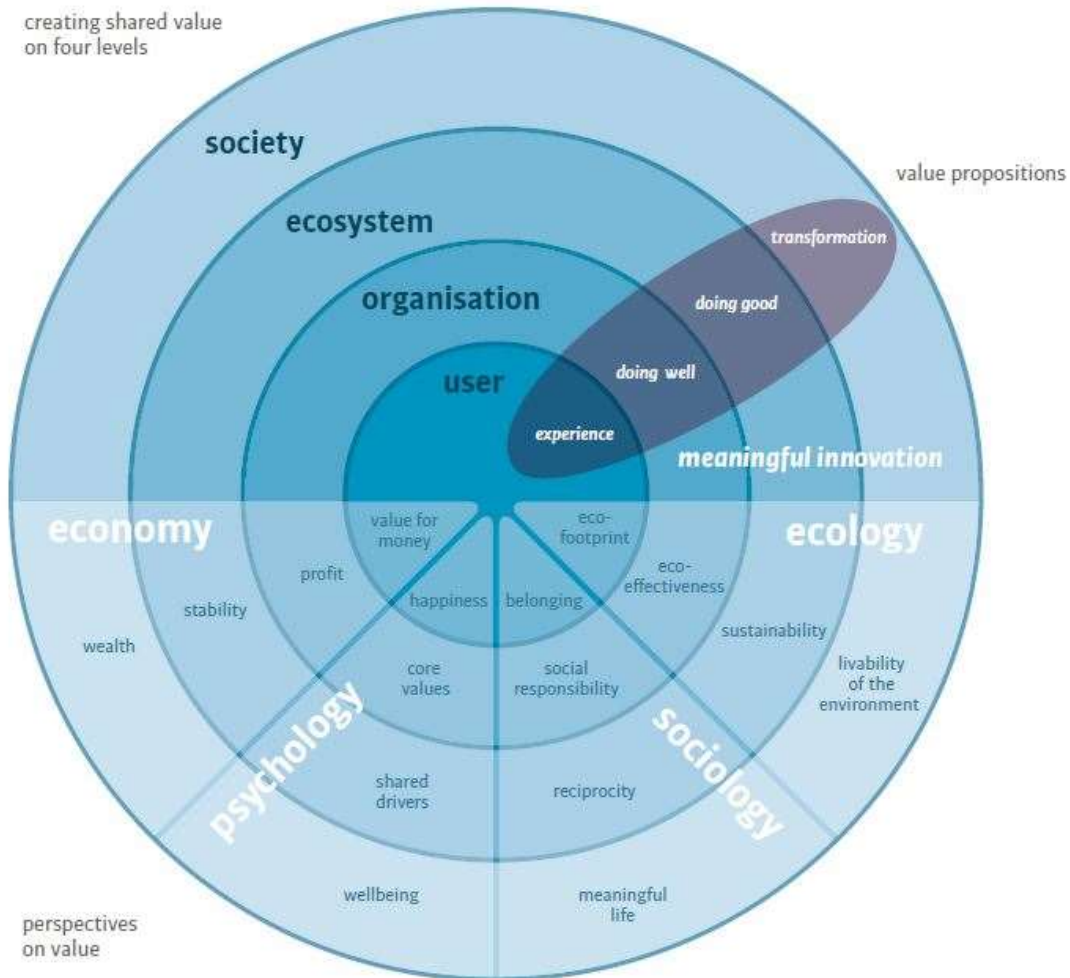


Figure 5: Value Framework - Depicting value concepts through the four perspectives for each level and gross meaning of value propositions as a culmination of expanding them through the use of the framework (den Ouden, 2012)

2.6 Value Framework Viability

It's important to establish why this framework, among others, was operationalized. Reiterating, to design sustainable value (see Section 2.4.4 and 2.4.5), embedding of the sustainable outcomes that one wants to achieve through transformational innovation i.e. value that is to be created, is the preliminary step. den Ouden's Value Framework introduces and defines value concepts from four social science perspectives: *Economic, Psychological, Sociological and Ecological*, incorporating four different levels where stakeholders can be placed with the 'User' being central for innovating and designing value (as illustrated in previous section 2.5). This framework addresses the most comprehensive, holistic view of value, in the entirety of the literature studied. Studying the book by Elke den Ouden, "Innovation Design: Creating Value for People, Organizations and Society" quite thoroughly, was inspiring as there was a certain depth of discussion for 'values' within each of the aforementioned perspectives, where the author presents all the possible values representative of that perspective. The discussion is also curated in a way that it relates to the four levels of value, where the scale on which the values are being discussed e.g. In the discussion of the perspective of economy the author discusses microeconomic values which relates more on an individual level and macroeconomic values which corresponds on a societal or meta level. In this way the value discussion of each perspective is culminated in defining value concepts for the four levels of value.

The necessary strategic shifts as part of designing sustainable value played a major role in choosing the VF over other tools in consideration (See Appendix 2), as den Ouden’s framework aims to incorporate, both, implicitly and explicitly the objectives discussed previously. *The following table is developed through matching concepts studied in literature (that reflect an answer to RQ 3) with the framework and illustrates how the VF tries to address these fundamental changes.*

Table 2: VF viability strengths defined and matched with literature studied

	Strategic Shifts	Framework Strengths
1.	Move away from the solitary aim of economic value appropriation to multiple value conceptions	Values to be considered in transformative innovation holistically: Ecological, psychological, Sociological, and Environmental values
2.	Shifting away from the ‘egocentric’ Organizational view	Designing value propositions for stakeholders at all levels of society with the user being central: ‘User, Organization, Ecosystem and Society’
3.	Rethinking Value Propositions for embedding values in the design of transformative innovation	VF was designed as a tool for creating Value propositions that are meaningful at every level
4.	Engaging the multiple stakeholders recognized and addressing their subjective and normative values	The Value concepts have been defined for the stakeholders within the defined levels and tool designed to be capable of using collaboratively

The ‘Value Mapping Tool’ also called the ‘Cambridge Value Mapping Tool’ (Bocken et al., 2013) and the ‘Sustainable Value Analysis Tool (SVAT)’ (Evans, Fernando, et al., 2017) were studied thoroughly as well. They were lacking when compared to the VF based on the points mentioned above, but the primary argument against them is that they haven’t considered the concept of value embeddedness in their conceptual framing, where normative values are not challenged and there is no discussion of values that need creation. Hence, this value framework was deemed to be an apt and valuable tool to be used for analysis in DWC projects, superseding other frameworks discovered along the course of studying literature.

2.7 Conclusion

Through the course of this chapter, we have explored and debated values in classic BM approaches and more holistic approaches proposed in transformative experiments. We developed a concrete argument about what entails the changing view of 'value' and value-creating mechanisms for sustainability transitions starting from exploring what has been done wrong, what needs to change to address that issue and where do we start for that change to happen. In following this process, we have answered the first three sub-questions set for this research study.

Summarizing, capitalistic 'values' exclude the social or human and environmental dimensions of healthy growth and progress, and its manifestation in economic systems results in destructive, exploitative business practices with singular interest i.e. accumulating monetary wealth. This manifestation has also deeply entrenched its roots in cultural and social norms and drives people's consumer and lifestyle behaviors. We need to move away from this monism. Trying to contribute towards sustainability goals and social inclusivity through corporate social responsibility is fundamentally flawed, and CSR activities remain peripheral, and often an outlet for communications and public representation departments doing appraisals of their company's image, meanwhile the exploitative mechanisms or 'business as usual' carries on.

Value creation is the central piece to any business model/modelling and becomes more relevant when business transition towards sustainability is the problem that needs solving. The fundamental underlying block to creating sustainable value is '*proposing sustainable value*', and all other activities that will lead to creating sustainable value revolve around fulfilling that '*value proposition*'. Addressing unsustainability in traditional business operations, first, entails the move away from egocentric view of organizational value capture, to value network thinking which essentially means proposing value for a broad range of actors, organizations and other institutions, directly and indirectly, influencing the offering, where society and environment need to be central from a stakeholder perspective. When societal transformations are concerned, these connections in a network of actors from diverse backgrounds innovating for sustainability, with different perspectives from their own capabilities, enable the shift in markets towards sustainable development. The essential step is then, rethinking and designing sustainable value which embeds the sustainable outcomes that are desired to be created in the innovative products/services or innovation system itself. Values that positively influence the social and environmental well-being and ensure economic sustainability for all the actors contributing to the innovation system, should be included in the '*value proposition*' of the offerings. This culminated in determining the value framework discussed above, which includes these facets for creating sustainable value. This approach is novel and not many examples of co-creating values from a multi-value perspective are found in literature or practice (Bocken et al., 2015; den Ouden, 2012). It is a complex issue and using this framework in a setting that aims for a contribution towards sustainability transitions was an ideal opportunity for furthering the field of multiple value creation research and analysis.

In the next chapter, the methodology for conducting the empirical study, where the VF is applied to the case of DWC is reflected. This to show the different elements that were used to Analyze the perceptions of the actors on values, through suiting the framework and making it applicable for DWC projects.

3 Empirical Analysis: Methodology

3.1 Introduction

This chapter will lay out the process for operationalizing the *Value Framework* identified through the theoretical analysis (presented in section 2.5) for performing the empirical analysis within the DWC living lab environment. Methodologically, this analysis will take the form of an explorative, qualitative case study (Creswell & Creswell, 2018). The following sections will elicit the steps to be taken for conducting the empirical analysis, wherein the roadmap for collecting and coding data, and setting up a scoring system for analyzing data is reflected.

3.2 Research Design

With the backing of empirical evidence from discussions with stakeholders and studying grey literature, it was established that DWC projects are in the initial phase of experimentation, where the design, strategic operations and alternatives of building circular social houses are being investigated by the stakeholders within DWC, namely the 'Design Phase'. This was another ideal condition for using the framework by den Ouden, where the aim is explicitly defined as *designing propositions* for creating meaningful transformational innovations.

The research goal for this empirical study was exploring and analyzing how the stakeholders within DWC understand values, where my role as a researcher was a non-participatory analysis of their visions, designs and view of value creation in DWC context (Creswell & Creswell, 2018). Initially, the VF was under consideration to be used as a tool in a collaborative, workshop setting wherein, stakeholders from the 4 levels of value in the VF construct would be involved in brainstorming sessions for ideating value propositions. It would have been an ideal opportunity for conducting action research (Miles et al., 2014) where insights from the interpretation of the VF value elements by different stakeholders would reveal contrast and clashes in their *values*. Nevertheless, it was not possible to research in that method. Why was it not possible is discussed as part of the limitations of this study in section 7.2, but in short the paramount reason is the COVID-19 pandemic.

So, the essential aim of this study became to analytically explore DWC operationalizing the VF, and beyond that aiding the stakeholders to reflect on their designs to innovate, generating the potential to create value at every level. Through that process, reflecting on the resultant data, the aim is to provide contextual information on how the DWC living lab is moving onwards to integrate these value concepts in their designs, and this shall be reproduced for all the projects within DWC, hence establishing our study as a multi-case exploratory research study (Yin, 2018).

A broader scope within DWC for conducting this research study is present, with the ambition of finding new perspectives on value. Throughout the project, I have been part of this larger exercise, this scouting group consisting of stakeholders looking for new perspectives on value: the 'Multiple Value Explorer Group'. By interacting and presenting my research work within this group, the objectives of this research study were being influenced based on interpretation by the stakeholders of the research work and the subsequent questions that were raised. Reflecting on the research questions, the primary focus was designed to be an analysis of value embeddedness in design and business thinking of DWC pilot projects. Through the course of conducting this research study, complementing and interesting elements came to the forefront. They will not form the core of the empirical analysis chapter but shall be delved into as part of Chapter 5: Discussions and Conclusion | Empirical Analysis.

3.2.1 Project Architecture

As a precursor to charting out the method for data collection and analysis, I want to chart out briefly an overview of the project's internal architecture. The starting point was through an initiative of the housing corporations wherein a 'Steering Committee' was formed, consisting of representatives from each of the eight housing corporations and they have diverse backgrounds, which enables diversity in the group and a difference in perspectives to understand complex problems. There is a 'core team' which has representation from housing associations where the responsibility is to oversee the implementation, on a process level, of pilot projects. The role of the program manager was created to orchestrate the overall functioning of the DWC project and cater to the creation of timely programs for conducting collaborative work sessions and agendas through reflection on the running status within the DWC projects. This is discussed to show, that from a managerial perspective, there is an emphasis of connecting the distinct institutions and bringing them in closer contact (van Oost & de Vin, 2020).

The scouting groups part of DWC according to the latest agenda-setting and group creation are:

1. Multiple value models | from business case to value case (Exploring)
2. Circular demolition | from demolition to harvesting
3. Circular practical tools | from means to end
4. Resident participation | from burden to lust
5. Government lobby | from nuisance power to change power

At the time of conducting this research the 'Multiple Value Workgroup' and the 'Circular Demolition working group' had started their exploration efforts. Stakeholders from across the milieu of organizations part of the DWC initiative have been connected from within these working groups, with other stakeholders being involved through their agency and interest to collaboratively search for solutions. These efforts are aided by student researchers interning for the organization N.I.C.E., which supports the DWC endeavor primarily in its visioning and learning agendas, with M&E (see section 1.4.3) being part of that. Student researchers are carrying out their internships or thesis projects within the DWC project, trying to solve specific problems. The influence of this research study on DWC's agenda of new perspectives for value creation as part of the 'Multiple Value Explorer Group' will be discussed later in section 5.2.

3.3 Data collection

In this section, the sources and methods for collecting data for the goal of operationalizing the framework will be discussed. We listed the set of projects that form the DWC testing ground wherein the six distinct consortia are shown matched with their partner housing associations and specific project sites they will be working on in section 1.4.1 (Table 1). The following text will illustrate how data was collected for these projects and why is it relevant.

Establishing a thorough understanding of the umbrella project's milieu and structure, was crucial for determining the theme and scope of this exploratory, qualitative research study. Quite a few documents and internal project reports, which can be categorized as grey literature, were studied, along with informal exploratory inquisitions with my supervisors from within the DWC project, to develop the necessary background knowledge for conducting this research. These open ended discussions and documents were crucial for defining the case(s) (Miles et al., 2014), both the overarching DWC project as well as the individual cases within it. An informal log of discussions and

literature read in this stage was kept and notes were made on all issues concerning the scope of this study. Below, the main sources of data and how it was collected is elaborated upon.

3.3.1 Vision Documents

The various projects, part of Drenthe Woont Circulair testing ground (proeftuin) or living lab, are being designed collaboratively by the consortia and housing association that they were matched with. Ideas for innovating the circular houses were presented in 'visie boekjes' or vision documents, where consortia members discuss their ambitions for being a part of the circular economic transition through ideologies, design considerations and theoretical frameworks that they would like to use in their journey of constructing circular houses.

These documents were significant for DWC's consideration, as selection of the consortia to be involved in DWC was done based on them. Hence, they presented a useful opportunity to operationalize the Value Framework for determining what values have been included in the discussion of their visions/plans in the documents. Along with the vision documents some consortia also developed documents presenting the composition of their consortium, elaborating the roles that different members have and vice versa. This information was provided in the 'Teamsamenstelling' (Team Composition) document which was provided in addition to the vision document.

These vision documents and supporting texts, consisting of development visions, scenarios and designs for innovating circular houses, turned out to an ideal starting point for analyzing how the different project proposals have internalized the value domains in their design thinking and also provided an in depth view about their internal collaborations, i.e. members that comprise the consortium, as part of innovation for DWC. Therefore, they are being understood to essentially consist value propositions for innovating circular social houses and provided the base for the empirical analysis.

3.3.2 Multiple value workgroup

As the background for this research was being formed through reading literature and addressing the research questions theoretically and developing the argument, which was also shaped by exploratory enquiries around 'value' by the stakeholders within DWC, the research conducted in that preliminary step was introduced to a working group that was created within DWC project architecture. This group of stakeholders, namely 'Multiple Value Explorer/Working Group', consisted of members from three different consortia, and correspondingly from the housing associations, the project manager and non-participatory monitoring team members from the DWC project. This group of individuals was chosen as they represented genuine interest in questions around value and value creation. They had the motivation to devote their time to this group's agenda, and the lead in initiating these brainstorming sessions was taken by a focal actor from the 'Circulair Toekomst Consortium'. This group was valuable in gaining access to actors and gathering data pertinent to our research, where I was actively involved in individual discussions with the stakeholders and present in a non-participatory role in the group meetings. How this was done is explained next.

The preliminary findings attained through studying literature including the den Ouden Framework were deemed to be relevant for sharing with the group members to initiate discussion along the lines of holistic value. These were compiled in a presentation that was recorded in an audio format, wherein an explanation of the concepts was provided for each slide. This was shared with the working group along with supplementary information in the form of a reading list with a summary of those documents and key pointers relevant for DWC.

After introducing the research conducted there were 2 subsequent discussion meetings with stakeholders from this group, initially, to understand their questions, through individual discussions with a couple of stakeholders. This was followed by subsequent joint discussion sessions with all the stakeholders, wherein ideas were exchanged by the stakeholders and agendas were set for collaborative exchange of knowledge and ideas. Two such discussions were held that were relevant for gathering data.

The discussion sessions among stakeholders were monitored as part of the monitoring and evaluation exercise being conducted for DWC, and as these discussions were conducted in Dutch, the monitoring reports were the source of data for my evaluation. I was present in a non-participatory role for one of these meetings to answer any queries that might arise in due course of the meeting. From these meetings, I got access to the stakeholders' views on values and value creation directly from them and contacted stakeholders for conducting interviews to gain further information.

3.3.3 Interviews

Interviews were conducted following the introduction of research work and subsequent discussions within the value workgroup, to gain further knowledge regarding the embeddedness of values in design and business thinking. The interviews conducted were with members from 3 different consortia and within those consortia, the representatives are from the focal firms that coordinate activities with other members of the consortia, along with collaborating with the matching housing associations for modelling of their projects. The stakeholders were from the following 3 consortia: Dit is Thoes, Circular Future Consortium, and Plan C. Only one interviewee gave consent for recording the conversation. All the interviewees are referred to anonymously when presenting the analysis in the next chapter. These interviews were quite instrumental in verifying the data derived from the visions presented in said documents (section 3.3.1 above) and also were functional in implicitly affecting the reliability of the data that was collected before conducting these individual interviews.

An interview protocol was created to ask questions Appendix 5, and it was designed to be a semi-structured interview where follow up questions were to be asked based on the responses of the interviewee (Castillo-Montoya, 2016). The vision documents and team documents were already studied, and an initial value mapping had been done when the interviews took place and based on that the line of questioning and discussion was created. Semi-structured interviewing is ideal for open ended and in-depth discussions, where the interviewee is actively listened to and questions follow as the discussion proceeds (Creswell & Creswell, 2018)(Miles et al., 2014).

The analytical approach of using the framework determined that the discussion and visions on value concepts represented in the data gathered are primarily from the view of organizations within any consortium, where the focal firm has compiled the vision and team documents. The interviewing was conducted with representatives from those companies and they were the majority of the members in the value workgroup too. Perspectives on value from the user level and some other actors in the system were not directly available, and it will be reflected on in section 7.2.

3.4 Data Coding & Analysis

VF operationalization consists of two integral steps, the first being identifying stakeholders and defining them in accordance with the 'levels of the VF' with respect to the explanation provided by the author (dDen Ouden, 2012). The documents produced by these stakeholders were subjected to a coding activity backed by the understanding of different layers within the framework: 'User, Organization, Ecosystem and Society'. Vision documents, team composition documents and grey literature was functional in gathering the information needed for the coding exercise, with the interviews also functional in clarifying some discrepancies in the process of analyzing and coding that

data. This functional step is discussed in section 4.1, where the VF layers or levels have been contextualized and analyzed for DWC project environment, and this has also been illustrated in graphics for ease of understanding providing an overview of all levels of value (Miles et al., 2014).

Table 3: Value matrix translated from the framework

		<i>Levels of value</i>			
		<i>User</i>	<i>Organization</i>	<i>Ecosystem</i>	<i>Society</i>
<i>Value Perspectives</i>	<i>Economic view</i>	<i>Value for money</i>	<i>Profit</i>	<i>Stability</i>	<i>Wealth</i>
	<i>Psychological view</i>	<i>Happiness</i>	<i>Core Values</i>	<i>Shared Drivers</i>	<i>Wellbeing</i>
	<i>Sociological View</i>	<i>Belonging</i>	<i>Social Responsibility</i>	<i>Reciprocity</i>	<i>Meaningful Life</i>
	<i>Ecological View</i>	<i>Eco - Footprint</i>	<i>Eco - Effectiveness</i>	<i>Sustainability</i>	<i>Livability of the Environment</i>

Any meaningful transformative innovation should aim to target all the levels of value inculcating all value perspectives. This matrix represents one comprehensive view on value, where you can match each view with the level of value to find the corresponding value concept.

The second integral step which is also focal to our analysis is addressing the value elements defined for each level. The ideation of the consortia presented in their vision documents were matched with corresponding value domains on the four different levels and through the four different value perspectives. So, through delving into the documents mentioned previously, the values discussed were brought forward and coded. To sieve out the values discussed through ideas the VF was simply translated into a matrix format (Table 3: Value matrix translated from the framework) to have clarity

in coding certain implied ideas into the corresponding value element. Matrix coding is an effective display technique in qualitative research methods as they disseminate information in a systematic way and enable the reader to infer on discussions provided in the text (Miles et al., 2014). All coded information is in the form of short quotes, phrases or abstractions made from graphical depictions of concepts and designs.

Text explaining VF (den Ouden, 2012) was delved into quite thoroughly as part of the theoretical backing of this analysis and was referred to variably while performing this exercise. A shorthand explanation of the VF available in the text 'Advanced Design Methods for Successful Innovation' (den Ouden et al., 2013) was also used as a quick reference tool for performing this exercise.

3.5 Scoring and Analysis

Through performing the coding of 'Values' sieved out from the vision documents, it was discovered that the discussion was varying in depth and elements were found to have different levels of detail through the vision documents and corresponding data sources. Some values are made explicit through quite detailed views and ways to create them while some other values have just been mentioned by their name in the documents. Based on this observation and retracing the ambition of this analysis, the idea was to set up a scoring rubric which should aim to quantify these qualitative discussions in a manner that represents the *completeness, competency, importance and coherence of value elements discussed in the designs and visions of the consortia*. It is a criteria-based scoring which is developed through studying literature pertaining to value creation and value propositions. It is a viable contribution to operationalizing den Ouden's value framework and any subsequent analysis through it. In the next sub-section, the scoring rubric has been explained with the relevance for the score allocation.

3.5.1 Scoring

The score represented in Table 4 below has 5 levels from 0 – 4, where a score of '0' refers to the fact that the value element has not been addressed at all, and '1' conveys that the particular value has been addressed casually, as is illustrated in the table. From here the levels show increasing orders or detail and depth of value embeddedness, where these scores are setting up distinct levels of qualification in the discussion of values. Retracing to the discussion in the theoretical analysis, these scores represent the completeness of value proposition and has been inspired by the theoretical discussion as well, where a score of '4' is given when the value element is an integral part of the innovation i.e. it is the core value proposition and is complemented by well-defined mechanisms and considerations that will cater to the embeddedness of the value element in innovation design or product/service.

This scoring system is not part of the original framework as intended by the author and was set up additionally, as an added layer of sophistication to the value proposition analysis. Table 4 explains the scoring matching the scores with the determining factor representing that score.

Table 4: Scoring Rubric developed for DWC case analysis through operationalizing value framework

Score Explanation

0	No specific mention of the value concept either by name or implied through ideas, visions, and planning activities
1	The value/value concept has been stated/discussed, but there is not much emphasis towards including it as part of the innovation
2	The value concept has been given importance and has been discussed through ideas/action plan 'or' mentioned by name multiple times
3	The value concept is quite an important part of the vision and has been complemented by design considerations of product/services that can help in creating it
4	The value concept is integral to the vision for innovating as well as development and has been backed by concrete design elements which cater to creating that value

3.6 Data Reliability and Subjectivity

The reliability of data collected through the documents was established by gathering validating information through discussions and interviews with stakeholders, where they corroborated the coded data, and provided insights into the actual meaning of some phrases, further explaining the importance of some of their design approaches and philosophies (Creswell & Creswell, 2018). This was instrumental in improving the scores of initial scoring exercise for the consortia done prior to interviewing. Interviews and discussions were conducted for three of the six consortia. Representatives from the rest were not accessible to provide input (see section 7.2: Limitations of the study).

Subjectivity is implied in this analysis as it is based on my cognition of the data found within the project environment, but effort was made to be accurate and precise in understanding the conceptual information needed for performing the value analysis, where I tried to reduce it as much as possible by adhering to the definitions and explanation provided in the VF and using them to match with the data i.e. in interpreting the value elements and translating them for the data collected for DWC.

The addition of scoring that has been developed for this analysis also implies subjectivity, and again, the scores connect the framework to literature and set up levels of depth in discussion of values and defining 'value propositions. During scoring the value concepts for different projects objectivity was paramount, and I tried to reflect that in justifying the scoring, which will be illustrated in the next chapter.

4 Empirical Research: DWC Testing Ground

4.1 Layers in DWC

4.1.1 Introduction

As presented in section 2.5 where the value framework's theory was discussed, den Ouden defines four levels of value, namely: *User, Organization, Ecosystem And Society*. As a primary step to analyzing the projects with the operationalized framework, it was important to deduce which stakeholders and actors are relevant to the four levels of value. Societal level encompasses the preceding levels and culminates their value concepts to provide us the highest and broadest level of value that is society. Defining stakeholders for societal level is slightly ambiguous because the innovation system is aimed to bring about transformation in the society, as society supersedes and is inclusive of the other levels of this framework. In essence, the entire point of the innovation is aimed at bringing permanent societal change, and hence, it can be concluded that at the core of the value proposition of DWC is innovating for societal transformation. Society provides the bigger picture and the reference scale for the individuals to judge their own personal condition from every perspective, therefore, it is deeply connected with every level of value, with the 'user' level being the most interconnected.

4.1.2 Defining Stakeholders for 'Levels of Value'

For Drenthe Woont Circulair (DWC), the levels of the value framework are not so straightforward to define. The paradigm of transformation requires new relationships and alignment of stakeholders with the vision of transitioning to a circular built environment, and DWC has been able to connect multitude of actors through creating a conducive environment for collaborating and sharing knowledge, and the innovation system does not conform to strict boundaries of the framework and allotting for e.g. a singular organization at the organizational level.

4.1.2.1 User

Coming back to determining how the stakeholders can be aligned in the levels of the value framework, for circular social houses the 'user' corresponds to the tenants that will be inhabiting the house, young nuclear families, couples, individuals or even older folks. The proposed sites for the circular houses are spread over Drenthe, where the demographic of possible tenants is bound to be different in all likelihood. It is important to consider the needs of the tenant for providing them value from the different perspectives of the framework, and hence enable widespread adoption by the users.

The author in her definition for the user level states that the user is the ultimate target of the innovation (system), where he/she is the client who is expected to use the system, product or service directly (den Ouden, 2012). But when we delve into mapping and discussing the value concepts for

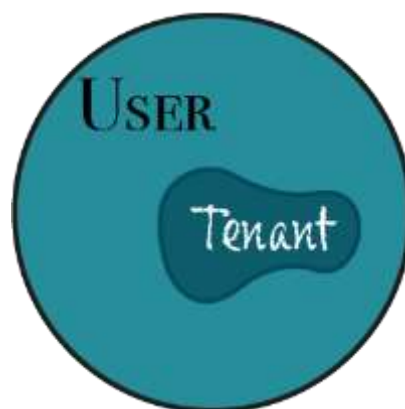


Figure 6: User level

the user level, *it is not the tenant's or future possible resident's direct view that is being mapped and Analyzed*. Nowhere in our analysis, the user's direct preference or viewpoint is reflected.

Now, *the buyer and the user may not always be the same person or an individual entity*. In our case the innovative circular social housing projects are being owned by the housing association or in many cases together with the members of the consortia, but the *user still remains the tenant, where the value proposed is for the prospective future tenant*. The innovative housing should *maximize the value for their money, contribute towards positively influencing the tenant's happiness and provide a sense of belonging*, and the house should be defined in a way that *reduces the tenant's eco-footprint*. The level of value and the concepts for that level are not separate and cannot be considered as such.

Ideating on behalf of these future tenants is the responsibility of the organization offering the innovation in conjunction with other actors that reflect on user's needs, aspirations and their cultural and social aspects that should be incorporated in the design of the innovation system. Organizations try to ideate for making product/services that have a transformational effect through influencing the views and behavior of the tenant, where *the overall experience of using the innovation system is pleasurable and enables the user to see themselves in a new way*. Jumping ahead in the discussion to provide an example: many consortia have mentioned that they collaborate with resident consultants or have researchers in their own organization that focus on understanding the residents and their needs. These actors are not part of the 'User' level of value, but they ideate to provide value for that level.

Also, the logic of mapping values completely fails if we add any other stakeholders as part of the user level. For instance, if I add the resident consultant in the user level, then it means that the innovation is being designed also for the *resident consultant's wellbeing, contributing to their 'happiness' and 'belonging' and similarly reducing their 'ecological footprint' while maximizing 'value for money'*. There can be many other actors, that form the *wider notion of the people involved in decision making, aiding the design and in implementing the innovation and they are addressed in the level of the ecosystem and organization for our case*. But this is true for innovations in general as well and is also stated by the author in her text explaining the levels of value (den Ouden, 2012).

The author proposes that the framework “serves as an analysis and inspirational tool to increase the value of a proposition” (den Ouden et al., 2013). It can be used in multiple ways to maximize the value creating ability of the innovation (den Ouden, 2012). In section 3.2 it was mentioned that there was an initial consideration of using this framework in workshop mechanism, but it was not possible and hence only an analytical approach was adopted for operationalizing VF in DWC case. In a workshop setting, where ideally stakeholders from all levels of value must be present, one can involve the users, in our case representatives for the area and/or community where the houses are to be developed, gaining direct insight on the proposed designs that create value for the residents.

4.1.2.2 Organization

The second level in the framework is defined for the actors that initiate, propose, design, develop/create, and market new innovative products and services for transformational innovation. On first instance, the housing associations that will be 'owner' of the circular social houses seem to be the ideal fit for this level. In DWC environment though, the line is blurred because the design and development of circular houses is being done in conjunction with the consortia matched with the 6 distinct housing associations (Table 1). The lead organization in the consortia and the housing association are both part of the organizational level. This becomes even more relevant as a couple of consortia representatives mentioned that they have been looking for new business model for product

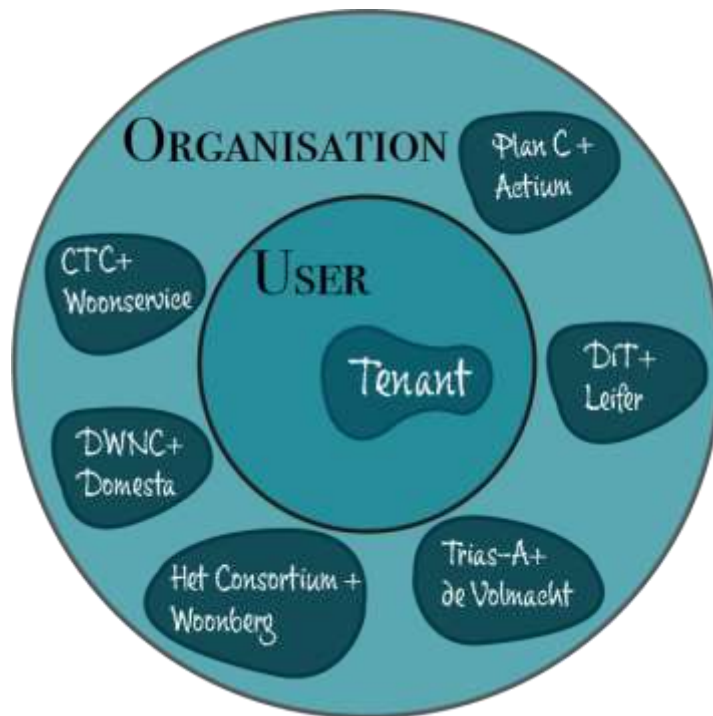


Figure 7: Organizational Level

as a service, and also archetypes relating to a joint offering with the housing association. The collaborative discussion sessions have been themed in some of the matching of consortium and housing association along discovering strategic business partnerships.

4.1.2.3 Ecosystem

Based on the expanded view of ecosystems, the entire DWC testing ground can be defined as the ecosystem for innovating circular houses. The vast network of stakeholders orchestrated by DWC in this transition experiment constitutes the ecosystem level, where N.I.C.E. had a supportive role to play in achieving that, and hence it is included and playing a central role in the ecosystem. Government organizations like the municipality of Drenthe and local level officials, Non-Governmental organizations (NGOs), other housing associations not directly involved with the particular project and even the ones which lie outside Drenthe Woont Circulair, consortia members, construction companies, building contractors, demolishers, recycling companies, material suppliers (new and recycled), sustainable material suppliers, sustainability consultants, sustainable building advisors, resident consultants, architects, manufacturers of innovative products, services and appliances, maintenance and servicing companies and other companies that contribute to the making of the houses are all part of the ecosystem. These actors have been mentioned by all consortia, where they have been mentioned anonymously in a similar way as mentioned above. Some of these actors are also yet to be identified.

Some consortia have distinctively expanded their view on collaborating with partners outside the usual 'construction value chain', which includes anthropologists, biologists, sociologists, prospective suppliers of bio-based materials, hydrogen advisory agency, social demographer, ecologists, philosophers, industrial ecologist, financial network expert, environmental psychologist, health scientist, IT & blockchain expert, partnering universities (Circulair Toekomst Consortium, 2019a; Dit is Thoes, 2019a, 2019b; Drenthe Woont Natuurlijk Circulair (DWNC), 2019b, 2019a). A cross-sector integral approach by these consortia is shown by visioning to involve these actors in the process. Some

consortia mention hiring outside collaboration and process management experts, or communication experts (Drenthe Woont Natuurlijk Circulair (DWNC), 2019b; Plan C, 2019) to create flow of knowledge and expertise, enabling the co-creative potential of this project environment. Even representative organizations of residents, social and environmental groups not directly part of DWC are actors in this innovation ecosystem because sustainable value creation entails creating value on a larger scale. Creating value, moreover so, entails thinking about ways to create value for these actors thus presenting opportunities for the designers/developers to recognize elements of value being added and fill gaps by capitalizing on opportunities that would otherwise be missed (Bocken et al., 2015). Research organizations and institutions are also valuable actors in this level.



Figure 8: Ecosystem Level

4.1.2.4 Society

Coming to the highest level, 'Society', theoretically it entails all the other levels within it. To define actors that would benefit from transformational innovation at the societal level entails going beyond the view of just the projects, and beyond the involved actors within these projects. As an initial prognosis, the adjacent housing neighborhoods, interest groups, flora, and fauna in the surroundings, competing organizations and housing associations, higher level governmental operators, the province, in this case Drenthe, local green cover and fauna for Drenthe, and the broader environment all form the societal level.

Stakeholders have been defined for the 4 levels of the framework for DWC and now we move on to discuss and Analyze the value elements and their embeddedness in the next section presented below.

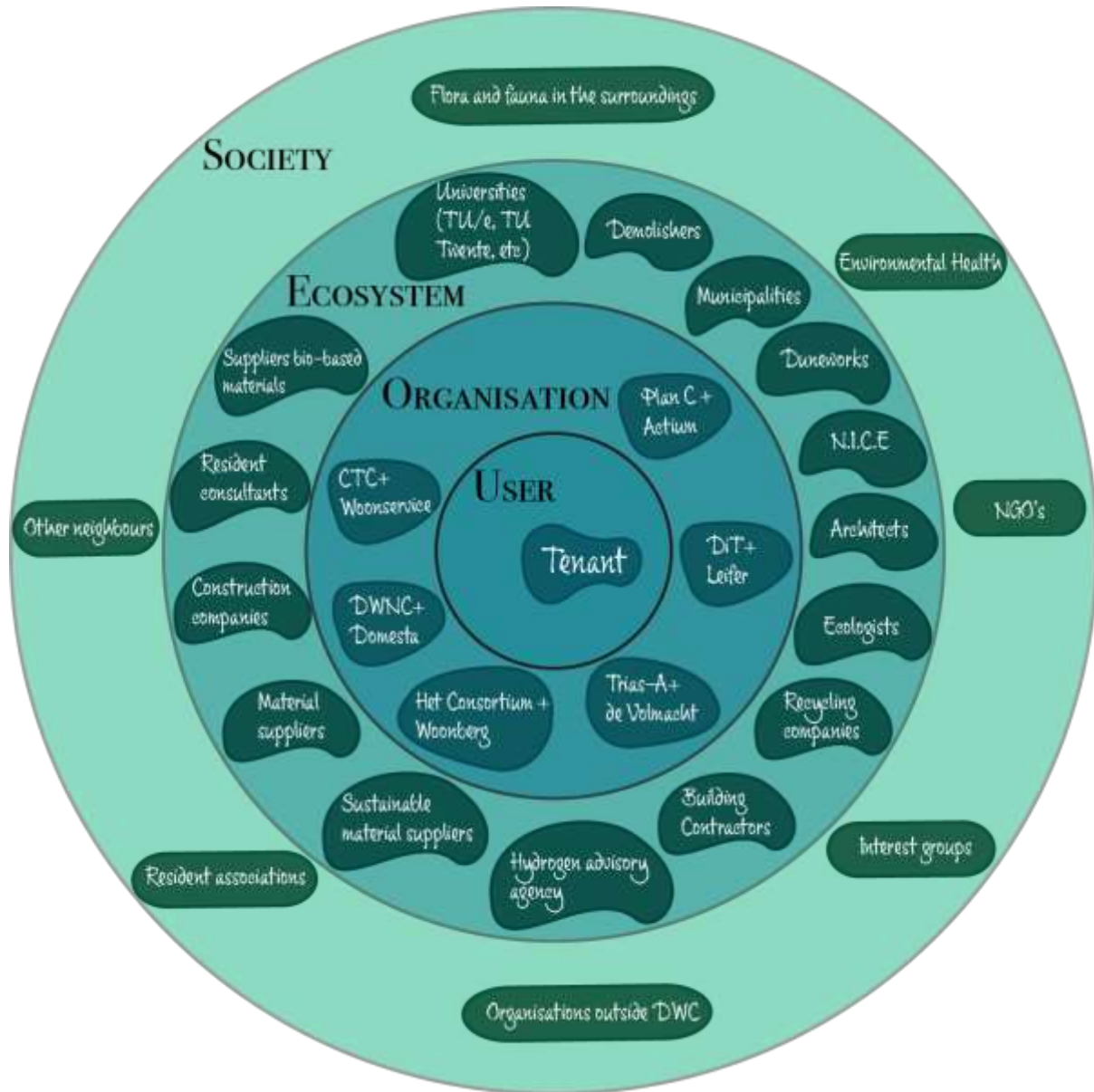


Figure 9: Societal level (including all levels)

4.2 Value analysis: Drenthe Woont Circulair

4.2.1 Introduction

Let's start the discussion with briefly creating a premise for analyzing the value propositions found for projects involved in DWC, where the aim is to innovate for creating 'Circular Social Housing' and thereby to aid the system transition towards a circular economy in the built environment sector down the line.

Within the built environment sector, the focus is on housing. Starting with the analysis, prior to collecting, coding, and processing the data, I was still delving into the Value Framework along with reading the grey literature in the form of reports concerning the initiation of DWC testing ground, the 'Circular Compass' document (DWC, 2019) which was shared as a guide for illustrating the important concepts in circular design, systems thinking and circular economic metrics, and the selection documents for the consortia, titled 'Juryverslag' (N.I.C.E., 2019). Through these documents it was highlighted that out of the seven characteristics of a circular economy (a model of circular economy characteristics chosen within DWC to be seen as a guide) the focus is on three characteristics: 'Wellness, Materials and Value', and taking that as a factor of consideration among various others, the jury had selected the consortia as well.

This was intriguing as, after understanding the value concepts in the framework, it seemed that this framework is ideal for illustrating the value creation possibilities, because innovative housing has the potential to create value from all the four perspectives of the VF. It was my opinion that innovating for transformative housing sector in an urban setting could potentially maximize value embeddedness through internalizing sociological, ecological, and psychological value concepts as building a living space must coalesce these different perspectives for holistic living and transformative potential for their circular housing projects. Innovating to build a house is not a singular product or service, *it is an amalgamation of quite a few products and services* depending on the offering one wants to provide the tenant with.

This casual hypothesis was legitimized when many of the vision documents revealed the emphasis on healthy living and wellbeing alongside circular design visions, and in an interview with one of the consortia members it was revealed that the interviewee personally chose the urban built environment sector to apply his expertise, specially housing, because it sits precisely at the intersection of the social and ecological aspect of sustainability and societal wellbeing, but of course due to the intensive material usage of the sector, innovating for environmental sustainability takes precedence in his view. So, now let's explore the value propositions of DWC projects that have been discovered by operationalizing the VF value perspectives.

4.2.2 Value mapping and Analysis Structure

The value mapping for each consortium was done by addressing 16 value elements in VF, by coding the pertinent value discussions through designs, ideas and discourse brought forward by the consortia, which were then scored in accordance with the rubric created (section 3.5) for value proposition analysis. The original value maps/matrices coded for each consortium are added in Appendix 3 and their respective scoring tables for each value element within those maps are contained in Appendix 4, and for discussing them here the representation has been changed for coherence: The purpose of value analysis is to see the value embeddedness through the expanded view of the VF, so we shall report on the same perspective by perspective, as through the course of performing the exercise it was found that the scoring analysis and its discussion can only be coherently done if the value perspectives are considered central and for each perspective the value elements are delved into per project.

The individual maps were then restructured, by reassembling the value concepts for each perspective and per project into a tabular format. This format is replicated for all 4 perspectives: 'Ecological, Sociological, Psychological and Economic'. For each of these tables, the vertical axis denotes the 6 projects that were Analyzed, and the horizontal axis contains 4 value concepts corresponding to the perspective and matching to the level of value: 'User, Organization, Ecosystem, Society'. The score allotted through analyzing the mapped values for each project has also been reflected in the tables, alongside the coded value statements.

These maps with the four views of value are discussed below, focusing on why the value has been mapped for that concept and what is the relevance of the score. After this, the scores of values mapped for all 6 projects are represented in spider diagrams (Figure 14 & Figure 15). The discussion of those diagram forms the conclusion to our empirical analysis. We start the discussion with the ecological perspective of value. In table 8, on the next page, the values mapped for the ecological perspective can be found.

The reader is urged to step back and read methodological sections of Chapter 3, particularly the section on Scoring (section 3.5) and the scoring rubric to understand the text presented further.

Ecological Perspective

Table 5: Value map and scores for the ecological perspective

	User	Organization	Ecosystem	Society
	Eco - Footprint – 4	Eco – Effectiveness - 3	Sustainability – 3	Livability of the environment - 1
Dit is Thoes (DiT)	Setting up of user practices and initiatives such as: Food production, energy production, most sustainable & circular supply selection, reducing the usage of water and inherent water cycle; Circular Communities; Focus on the Meso level in their internal Framework	Building circularly and hence designing solutions for sustainability; Less ecological impact; Circular social housing; 10-R framework; CLEAR framework has ambitious theoretical discussion for Circularity on a micro, meso and macro level; Heavy discussion of setting up relevant KPI's	Circular building; Waste as recourse; material scarcity being addressed; Setting up of relevant KPI's; CLEAR (vision) on building the circular construction community; Reducing wasteful practices; Reducing wasteful transportation of equipment and materials during the construction phase; sharing practices with other consortia	Saving the essential resources for the next generations;
	Eco - Footprint – 3	Eco - Effectiveness – 4	Sustainability -3	Livability of the environment - 4
CTC - Cut the crap / Circular future consortium	Influencing behavior; Composting Toilet; Lesser footprint with green energy consumption; Natural Shading & Vapor Open cooling in the design for the House	Focus on Use Phase energy use (deemed to be more important) Tightening the environmental performance requirements of the buildings - enabling circular construction; Bio based building materials; Usage of Hydrogen in the design; 9-R framework and IRIS model-examples of techniques that can be used; Less paper and more digitalization	Circular construction sector; Enabling reuse of materials through circular design strategies; Local supply chains and circular materials - selection of partners with that criterion; Sustainable building advisory agencies	Recovering the green cover through designing for reuse of materials; Tapping into existing structures and transforming them to avoid building anew - hence avoiding consumption of new land and building resources; Embracing Biodiversity - Making green cover, also for shading part of the design and making these gardens also friendly/accessible for animals and insects
	Eco - Footprint – 1	Eco - Effectiveness - 2	Sustainability - 3	Livability of the environment - 4
Plan C	(Influencing behavior is mentioned); Design choices made to influence conscious and unconscious behavior of inhabitant	Designing for circularity and preserving environment; "10-R model and systems thinking"; Biomimicry, biophilic design, working with resourced and recycled materials; Quality resilient and sustainable living environment	Thinking in an exosystemic way and bringing different disciplines together; Bottoms up approach; All partners of the consortia have been experienced in sustainable design and have a proclivity to make a difference;	Creating and maintaining a healthy living environment; Biophilic designer - Bio Inspired Innovation - (BII); Biomimicry, biophilia and circular society will provide the environment and surroundings some much needed breathing space; or every felled tree a new planted back;

	User	Organization	Ecosystem	Society
	Eco - Footprint – 2	Eco - Effectiveness – 4	Sustainability – 3	Livability of the environment - 2
Het Consortium	High quality living space where energy consumption is kept to a minimum; Aiming for energy neutral living	Reuse of raw materials: i.e. high-quality recycling and reuse; Reducing usage of new materials Purchasing of bio-based raw materials which are also reusable; Modular assembly of the living spaces; hence promoting reuse; Modular Prefabrication; Easy replacement for changes in the energetic and performance requirements in future; Use of the house and all equipment as a service which will prolong the use phase and promote reuse	Future Proofing the building; Closing the cycle by the collaboration of all consortium members; building as a temporary composition of demountable components and materials; "OnelinkLCA" - for mapping environmental impact; Dutch environmental database for all calculations; "Making living CO2 neutral"; Materials passport - Madaster platform	"LIVING" - philosophy for the design mechanism; Let people live without exhausting the earth resources; Making sure the raw materials used have the least impact on Earth and that it can recover; Less waste and material loss in the process of prefabrication
	Eco – Footprint - 2	Eco - Effectiveness – 3	Sustainability – 4	Livability of the environment - 2
DWNC	The use phase of the constructed buildings will also have to be co2 neutral and low nitrogen; Using greenery as natural shading and as warming in winters (natural air conditioning)	Bio-based and ecological materials being used in construction; No toxic elements present in the construction process; Search for locally sourced materials; maintenance, future renovations; assembly and disassembly, and reuse; Sustainable materials and building with ease of disassembly; Wood is important in construction process as it imparts a great deal of benefits to the environmental and social health	Co2 neutral and low in nitrogen emissions; By using local, natural materials, we also contribute to a better health of the residents; Reducing impact of logistics by storing and sourcing locally; possibilities become inventoried and catalogued using the Madaster, New Horizon or another materials bank; Rethinking is number one on the priority ladder; Setting up a network of local suppliers for bio-based materials; BREEAM-NL, DGBC and WELL can be innovation points are obtained for innovative technologies and methods that demonstrate the durability of a project	Social living environment for people and nature that is in balance; Circular building means developing, using and reusing the built environment without natural resources unnecessary exhaustion, polluting the living environment and affect ecosystems; Closing natural cycles; (main focus) bio-based and ecological building
	Eco - Footprint – 4	Eco - Effectiveness – 4	Sustainability - 4	Livability of the environment - 3
Trias – A	Collective energy production; Reducing energy consumption by the resident; Rainwater harvesting (reducing water usage from municipal source); Reducing the energy used through heating and cooling by using materials that prevent overheating in summers and loss of heat in winters; Design elements for maximizing natural lighting (kitchen, living rooms and bedrooms, also windows in ceiling) that reduce electrical energy consumption	Using less materials; Material passports recording all the necessary data of the building construction material input and output; Catering to the specific demographic, the need for space changes and design activities can be attributed to save space and energy, maximizing efficiency, and providing benefits in other segments; Durable structures that have a prolonged lifespan (contributing to circularity); Adaptive power and high-quality reuse; Use of materials with thermal mass; Vapor open materials;	Less material usage and more sustainable materials sourced locally; Maximum integration of renewable energy; Energy Bank: Area level energy generation and not building level; Use of the 10R model for circularity; Using old houses as material banks; (thinking about housing that is not susceptible to wear and hence has a truly prolonged life; reuse of the house (materials); Bio-based materials being used and moving away from materials in the technical cycle: sustainable materialization is deemed to be very important	(Caring for animals and nature); soil and water management in consultation with an ecologist; Preserving the flora and fauna of the surrounding area and also take care of the materials being to develop pavements etc.; Cherishing the natural environment (flora and fauna) and new spaces preserves biodiversity, also taking special care of species which are most at risk; Insect population deteriorating: hence planting shrubs and trees provide biological value;

4.2.3 Ecological Perspective | User: Eco-Footprint

For the level of value representing the user the value concept that should be imbibed and inspire propositions for design is eco-footprint. The discussion of design elements and visions, and corresponding products or services proposed that implied or explicitly were aimed towards positively contributing to reducing the users' average environmental footprint also influencing their choices to be more conscious towards protecting the environment were mapped in this value element.

All consortia have paid attention in their ideation to influencing users' eco footprint, and I found there is quite a variance with respect to how they propose to create that value. Essentially, this observation inspired and formed the premise for scoring these different value concepts. Let's delve into that, starting with Plan C. As you can see (Table 5), they have mentioned that they want to influence user behavior stating that "design choices will be made to influence resident's behavior" (Plan C, 2019) and a score of 1 is allotted to portray that. Now, Het Consortium illustrate that they aim for energy neutral living and complement it with the design choice of a "high-quality living space where energy consumption through product and service use is kept to a minimum" (Het Consortium, 2019). DWNC has presented similar insights where they state that the "use phase of the buildings will have to be CO₂ neutral and low nitrogen emissions". They also add the design choice of "using greenery for natural shading and as warming in winters, trying to achieve natural air conditioning" (Drenthe Woont Natuurlijk Circulair (DWNC), 2019b). So, here the allotment of the score is 2 as there is a revelation about how they aim to embed that value in their design, whereas that is not perceivable through the study of the vision document for Plan C.

Now, CTC consortium has added more emphasis to their vision of influencing user behavior, by lessening the user's footprint through green energy consumption (Circulair Toekomst Consortium, 2019b), and though an interview with a lead member of the consortium it was revealed that in their design natural shading and vapor open cooling is incorporated for maximum possibility of natural ventilation. They also mention that rainwater harvesting will be included in the design of their homes. Furthermore, they aim to use a composting toilet in their housing project, adding another product that inherently will influence in a conscious and unconscious way the choices of the user. Hence, due to clear design choices and emphasis on this concept a score of 3 is allotted.

DiT has mentioned in their vision to focus particularly on the individual level and cultivate practices for the inhabitants that actively aim to reduce the ecological footprint and affecting their conscious behavior such as "producing food locally within a community, affecting their choices through selecting most sustainable and circular supplies within that community, designing to reducing the water usage and inherent water cycle creation" (Dit is Thoes, 2019b). This value concept is not without emphasis as clearly, they state upfront "one must always start with the individual" (Dit is Thoes, 2019b), hence, the vision is quite ambitious and definitely central to their mission of innovating. A score of 3 is allotted to this value concept, because the proposition, in my view, is still abstract based on the data gathered from the vision document and discussion with stakeholders. It would be interesting to see how they implement their vision in practice.

As reflected in the table above, Trias-A, had portrayed their design elements for reducing the eco-footprint of their inhabitants throughout their vision documents, with well-defined steps to make that happen by including creation mechanisms to the discussion of the value concept. This was found through value statements and schematics of their designs shown in the document (Trias Argentariae, 2019b). Hence, it is scored as 4. Some of the ideas are the same as other consortia, like rainwater harvesting, and reduction of energy consumption by the residents. Design elements for maximizing

natural lighting were clearly illustrated and they mentioned the use of materials for construction that prevent heat loss in winters and prevent overheating in the summers (Trias Argentariae, 2019b).

4.2.4 Ecological Perspective | Organization: Eco-Effectiveness

At an organizational level, the ecological value concept coined in the framework is eco-effectiveness which corresponds to embedding ecologically conservative and restorative design in their innovations. It's important to go beyond incremental improvements, where some organizations see 'not polluting' as embarking on a green journey, and design for 'transformations'. In defining this concept, den Ouden has referred to cradle-to-cradle design, which is essentially circular design, central to the discussion of this concept, and at its full potential it ideally embodies the concept of ecoefficiency (den Ouden, 2012). Drenthe Woont Circulair is aimed at that exact approach of building a circular construction economy. With reference to Table 5 one can effectively see that this value concept has quite well-developed propositions. Before going further into the explanation of relative scoring, the distinction between the levels of the organization and ecosystem levels was said to be slightly amorphous when defining which stakeholders should be grouped in which level. So, there is bound to be a slight overlap when it comes to the level of organization and ecosystem in mapping these values, as they correlate and cross boundaries, but the effort was made to keep the overlap at a bare minimum, and this will be touched upon in the next value concept's discussion.

All vision documents talk about the circular economy transition and the theories, frameworks, lenses, and design elements are aimed to imbibe circularity. Interestingly, there are varying design choices, but there is of course some similarity in value propositions when they talk about designing for circularity. DiT, CTC, Plan C, and Trias A, all have mentioned designing for circularity and using the 9-R framework and 10-R frameworks (CE frameworks for supporting design starting from 'redesigning' and decreasing in circularity as you go down the R-Ladder) in their vision documents (Circular Toekomst Consortium, 2019b; Dit is Thoes, 2019b; Plan C, 2019; Trias Argentariae, 2019b). Plan C mentions biomimicry, biophilic design and working with resourced and recycled materials. There is specific focus on the value concept and there are statements mentioning these ambitions to design circularly and sustainably, but what the score allotted to Plan C, which is a score of 2, reflects is an abstractness to the discussion, where some specifications as to how they will go about creating this value remained implicit and assumed. Bringing that to forefront will reveal the completeness of the value proposition.

DiT have revealed, through their lens of the framework, theoretically and methodologically how they want to apply their framework, CLEAR, throughout the different phases and on 3 levels i.e. micro – individual, meso – community, and macro – society to learn and, through an iterative process, design the most circular houses, communities and ultimately aiding in the transition at a meta level. Their vision for circularity and goals are quite ambitious, so the value proposition is quite emphatic, but through their document the revelation of design elements in form of concrete plans remained implicit so a score of 3 is allotted. This is how the pragmatic differentiation is done through the scoring for all value concepts in our analysis.

Het Consortium, Trias-A, and CTC have all illustrated, through their visions, the design choices, specificities of material selection and offering of services that will implement their circularity vision, and through adding these specific plans and mechanisms their value proposition is complete. Implementation of these plans will lead to the value creation, and hence their value concept score allotment is a '4'. Het Consortium has a special focus on modularity as they put forward modular prefabrication of components, which is quite relevant for circular design, and they elaborate on the ease of disassembly to aid that design element. Capturing the essence in this statement; "We see a

building as a temporary composition of remountable components and materials, which retain their value at the end of the life cycle. You live in a resource bank!” (Het Consortium, 2019). Purchase of locally sourced bio-based material and recycled and upcycled material is part of their plan. Use of a house and equipment as a service will prolong the use phase lifetime, along with promoting remanufacturing and reuse at the end of life phase. CTC, along with stating design elements in their document, specifically mention that in their organization they promote digitization, thus saving paper, which is important as companies need to add such initiatives more to their internal operation too.

4.2.5 Ecological Perspective | Ecosystem: Sustainability

At the ecosystem level, the value concept is sustainability. I shall refrain from defining it as it is a moot task here. We can say this research and DWC projects are all being conducted with the value of sustainability. What it means here is that a company alone acting with eco-effectiveness is not enough, *the entirety of the ecosystem should work with the disposition, mindset, innovativeness, and relationships that are embedded in sustainability* (den Ouden, 2012). This means that the requirement of the actors that create a healthy ecosystem is sharing the values of transparency, integrity, and responsibility (Den Ouden et al., 2013). So, with that in mind it is clear that the value propositions that aid these pursuits, also from a circular economic perspective of systems thinking and collaborative effort, have been coded and scored for this value concept. Many propositions that are coded in eco-effectiveness also contribute implicitly to the sustainability of an ecosystem. The visions that contribute specifically to the development of sustainable strategic partnerships and aid the creation of sustainable business have been coded here additionally.

All consortia have been allotted a score of 3 or 4 for this value element as they explicitly mention the need for collaboration with their ecosystem partners. In their documents, they mention the varied partners that form their consortia, and through interviews with 3 of the consortia, it was extracted that they do collaborate with their partners effectively. DiT has their own framework for holding joint ideation sessions and have mentioned explicitly that they have partners that are experienced in circular design. They also mention the aim of building a circular construction community (Dit is Thoes, 2019b). Plan C has elucidated the same about their collaboration with other stakeholders within the ecosystem level and mention bringing different disciplines together to instill sustainability (Plan C, 2019). CTC has also laid down emphasis on a circular construction sector and collaborating with sustainable building consultancies (Circulair Toekomst Consortium, 2019b).

DWNC has stressed on sourcing of natural materials, locally by setting up a network of local suppliers for bio-based materials (Drenthe Woont Natuurlijk Circulair (DWNC), 2019b) and Trias-A have also emphasized sustainable materialization sourced locally and these propositions match the essence of the value concept coherently. Trias-A’s vision document had laid out concise, detailed steps that will contribute to the 10R model of circularity and hence it was allotted the maximum score for the completeness of the value proposition (Trias Argentariae, 2019b).

4.2.6 Ecological Perspective | Society: Livability of the Environment

Livability of the environment relates with the importance of a connection to nature for human health and wellbeing and also the physical beauty that nature provides. Preserving nature has to be part of the innovation and can be an starting point for designing meaningful social innovations as well (den Ouden, 2012).

CTC gave importance to recovering green cover by promoting designing for reuse of materials, treating the existing structures as material banks, and transforming them to avoid building on new land. They mention plans for embracing biodiversity and making gardens friendly to animals and insects. In their design, they are also adding a community garden which shall further add to the Livability of the

neighborhood (Circular Toekomst Consortium, 2019b). Since the concept has been delved into with concrete design considerations it has been allotted the maximum score. Similarly, Plan C with their lens of 'The Good Life Philosophy' has provided propositions for this value concept with a focus on "letting the environment of these homes breathe by embracing biophilia, bio-inspired design" and they "connect circular living to the living space and its surroundings as well" (Plan C, 2019). Wood is a big part of their design and they indicate "planting a tree in place of every tree felled by their construction process" (Plan C, 2019).

Trias-A mentions caring for the animals and nature (preserving flora and fauna is mentioned on multiple occasions in the document), preserving soil and water by consulting an ecologist. "Choosing materials consciously for making pavements, cherishing the natural environment, and paying attention to the species most at risk" etc. (Trias Argentariae, 2019b) Value element has been sufficiently addressed through visions. Het Consortium and DWNC both had similar approaches with more focus on preserving the resources as the built environment is a resource-intensive sector. It can be discerned by the values mapped in Table 5. So, in their visions, the Livability of the environment and its positive effect on humans is not addressed explicitly but remains implied and I have coded the discussion through that implication in this concept. The score allotted, a '2', reflects that. DIT didn't have a focus through their visions for this concept and through an implication of circular design it could be said that they will be saving the resources. A score of 1 is hence allotted.

A graphical representation of the scores for the ecological value concepts is given below.

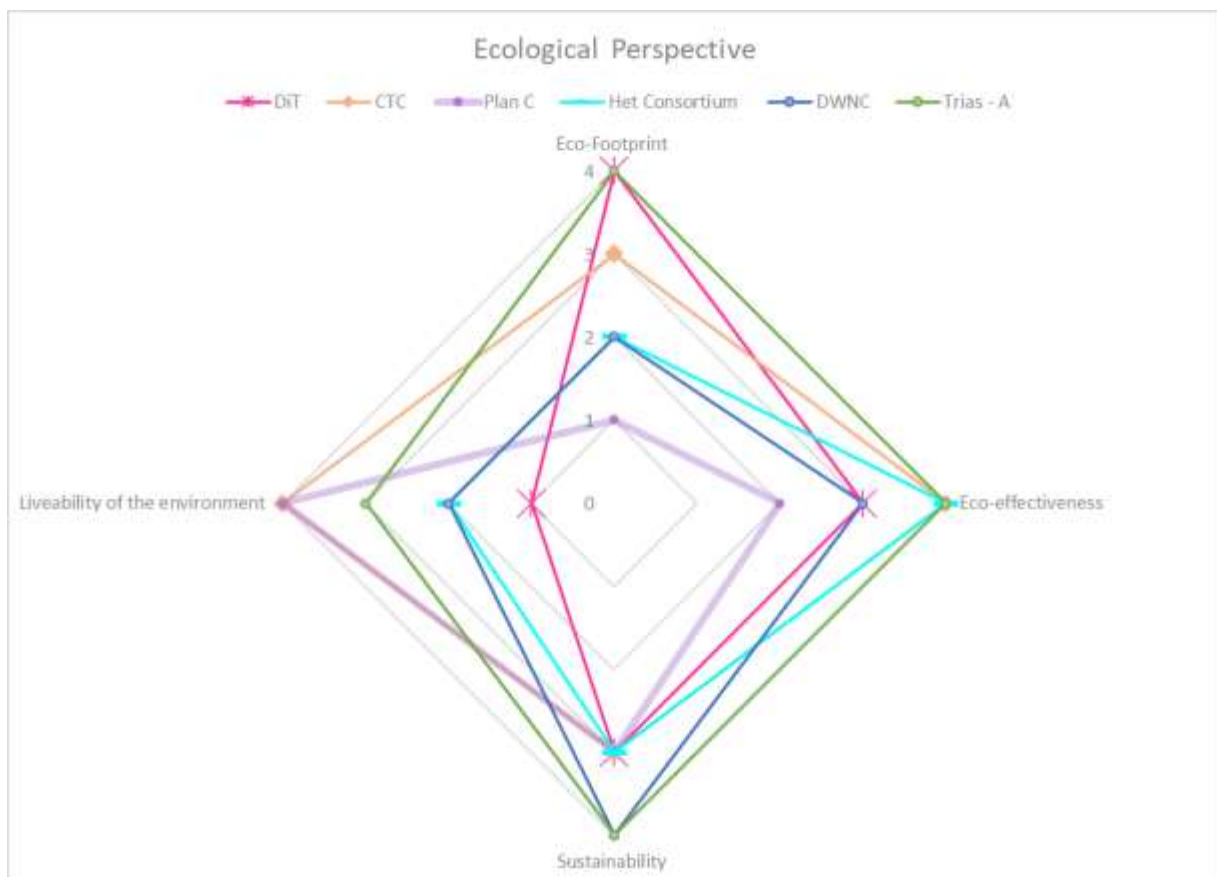


Figure 10: Value analysis scores for Ecological Perspective value concepts

On the next page below, you will find the value map for the psychological perspective and a discussion of the value concepts for the same will follow that.

Psychological Perspective

Table 6: Value map and scores for the psychological perspective

	User	Organization	Ecosystem	Society
	Happiness – 2	Core Values - 2	Shared Drivers - 3	Wellbeing - 2
Dit is Thoes	Pleasant environment for balancing work, life, and play; “Social and cultural factors have been thought about” Mentions happiness is paramount; Starting Point: “What do people need to be happy and how do we facilitate them”	Beyond just circular construction, built environment has large impact on society so they design with taking that in account; Working together; Circular construction Community	Building a sustainable, circular community; Share knowledge and collaborate with other 5 consortia; CLEAR framework assures cross-sectoral, interdisciplinary, integral view based on systems thinking; Assessment methods set up to maintain track of collaborating partners vision on circularity beyond just raw materials	Meta level in their Framework is focused on society; Intimation of outlook on level of Humanity; Living in healthy and natural surroundings; Design tailored for modern needs - integration of work and personal lives with attention for children (play) leading to happiness
	Happiness – 2	Core Values – 2	Shared Drivers – 3	Wellbeing - 3
CTC - Cut the crap / Circular future consortium	Focus on resident satisfaction and their experience is mentioned throughout the document! Collaborating with a resident advisor/consultant to gain specific insight	Moving away from theoretical discussion and bring the knowledge to Practice; Least impact on environment - best method and design; "Integrity as a foundation"; New Perspective on Value	Initiate the change in construction and implement circular economy collectively; Changing view of welfare form 'money' to conservation of Earth's ecosystems; Mention of paying attention to the individual and common drivers - sustainability etc.; Open Communication across all ranks; Platformization using smart technology; Go beyond DWC with further collaborations	Collaborating and catering to the needs of the partners involved in the project directly, prospective residents and other organizations involved; Wellbeing as a consideration "we encourage resident satisfaction of at least 7.5 by focusing on actively increasing ownership and pride
	Happiness – 4	Core Values - 2	Shared Drivers - 2	Wellbeing - 4
Plan C	(Mention happiness of people as a criterion for designing) (Satisfaction of resident mentioned as central) Involvement of a Resident consultant in the design phase and beyond; Social safety; Lifestyle and needs of people are central to the consortia's design - emphasis on loss of social structure and rising alienation; Resident consultant acts as a buffer between the designers and prospective tenants; Targeting the needs of the specific inhabitants; Stress on a healthy living environment; User, in this case inhabitant of the home, is central to the design philosophy; Inhabitants behavior is one of the focus points	Circularity in building and going beyond proven concepts; Focus on people and their wishes in their design; “Collaboration is key” “The Good Life Philosophy”	Members of the consortia are varied but the vision is the same - building circularly and thinking in an ecosystem way; "Trust, Ownership and intrinsic motivation"; Common denominator - members have worked with circularity	Balance in Ecology, Tech, & people; Adding the journey of customers in the designing, construction, and management processes: e.g., linking maintenance with tactical operations; Designing for biophilic, livable environment will be beneficial in overall wellbeing of people; "well-being of residents cannot be separated are seen from the surroundings"; "The Good Life" philosophy where rather than technology people are central with focus on happiness and healthy lifestyle - also focusing on psychological wellbeing

	User	Organization	Ecosystem	Society
	Happiness – 1	Core Values – 2	Shared Drivers - 1	Wellbeing - 1
Het Consortium	Increasing loneliness and alienation from the world is being addressed and the need to bring some change	The philosophy of "Living" Circular living;	Thinking in systems; Collaborating differently in an innovative process;	Changing Lifestyle on a societal level;
	Happiness – 2	Core Values - 2	Shared Drivers - 2	Wellbeing - 2
DWNC	Comfort of resident will be considered in the designing process; Health and wellbeing of the user is stressed; Effect of using bio-based material connected to good health in detail; Adapt housing to the specific needs of the residents with the flexibility of the housing corporations	Circular economy answers to the over consumption of earth's resources; Willing to learn and change the normative way of doing things; Concentration on using bio-based materials; Innovating all aspects of the business	New generation of social housing; Fundamentally different basic attitude from all members of the chain; Inducing shared responsibility with the supply chain partners;	Health and wellbeing of society is on focus; Natural building materials will be having a good impact on health of people
	Happiness – 3	Core Values - 2	Shared Drivers - 1	Wellbeing - 2
Trias – A	User experience is starting point (SO - social); User health and satisfaction is implicated by every aspect of the building; Philosophy of design implicates that the needs of the residents are central and building the house is done around that; Special focus on needs of the target group	Being fully circular by 2040; Learning by doing and from the mistakes	Radical transformation of the construction chain	Mentions integrating the impact of the building on the ecosystem level; Circular economy supports the health and wellbeing of the people and nature; an eventual change of behavior in inhabitant's consumer habits, thereby creating societal change

4.2.7 Psychological Perspective | User: Happiness

Moving on to embedding value for meaningful transformative innovations, the concept of value for the User is 'Happiness', as it is deemed by the author as the most inclusive merit to an individual's psychological well-being after a thorough discussion of positive psychology, human and motivational values and what drives subjective wellbeing (den Ouden, 2012). Meaningful innovations should have the capability to improve the user's overall life satisfaction and appeal to their latent values that will increase adoption by improving overall happiness (den Ouden et al., 2013). Let's dive into addressing this concept through the visions of the project.

Plan C's vision presents a vision of focusing on the needs and requirements of the resident, where their approach of 'The Good Life' philosophy is seen to reflect centrality around the satisfaction and happiness of the user (Plan C, 2019). Mentioned in the document and then further corroborated through an interview is that understanding the people who will be inhabiting their buildings is important. To facilitate this philosophy, they have researchers working on the issue and also collaborating with resident consultants from outside the focal company (Plan C, 2019). The Value map above clearly depicts that the well-being of the user is definitely center stage to their proposition, consequently, the score of 4 reflects that. Trias-A, similarly, have a vision of concentrating on 6 major points, which they label as a "6S typology; social, site, structure, skin, services, space plan, and stuff" and in each of these categories, as they discuss their ideas and plans including elements from the 10-R ladder for circularity, the user i.e. the resident for our case is found to be central. The choices, aspirations, and subjective wellbeing of the future inhabitants have been stated to be a consideration (Trias Argentariae, 2019b).

Het consortium has been allotted the score of 1 as they mentioned one or two statements regarding the resident's comforts (Het Consortium, 2019), so it was not discernible if this value proposition has been given emphasis when it comes to implementation of their designs. DWNC laid out some good conceptual arguments that will have a positive effect on resident's health and state that they will account for user's needs in their designs (Drenthe Woont Natuurlijk Circulair (DWNC), 2019b). For DiT and CTC the map shows that they have discussed user satisfaction, where for CTC it was revealed through a discussion with a focal stakeholder that they consult a resident consultant for designing and getting to know the demographics of their prospective inhabitants. DiT's vision document, conceptually, has put the individual central as a point to focus within their framework and they state that people's need is their starting point (Dit is Thoes, 2019b). A score of 2, which denotes importance to the value concept has been allotted.

4.2.8 Psychological Perspective | Organization: Core Values

This concept deals with the mission statements that encapsulate the values of the organization, their drive, and their purpose to innovate and operate. These values are important to guide the behavior and thinking of the employees, and they are usually embodied in slogans and symbols within the organization (den Ouden, 2012; den Ouden et al., 2013).

DWC's mission statement is making the transition to a circular economy by 2040, wherein the housing associations have pushed this agenda. The core value of the project environment is embedding circularity in construction process and business practices. So, consortia that became part of DWC, selected on criteria of circularity, cooperation, and their internal learning goals, when viewing through an objective lens, have their internal motivation and values aligned with the mission of transitioning to a circular economy. Scouring through the vision documents and team composition documents of these consortia, the discussion of values that would illuminate inherent motivation for innovating and building these circular social houses was coded in the value maps. Some consortia have made more

effort to stress their value statements, for instance Dit's document was stressing a lot on why they want to achieve the goals that they have stated and in an interview with the member of the focal firm the motivation of their company was conveyed emphatically as well which is essentially innovating for sustainability (Dit is Thoes, 2019b). They even intimated about their work with other companies and the development of their expertise in sustainable design (Dit is Thoes, 2019a). Plan C has illuminated what their value statements are through discussing the focus inhabitant's wellbeing, "The Good Life" philosophy in addition to innovating for circularity (Plan C, 2019). The value map above has coded the information which would indicate the core value of the companies.

As is evident from the scores in Table 6 above, all consortia have been given a score of 2 for this particular value concept. The aim in doing so is to reflect objectivity in scoring this abstract value concept that represents organizational values and that of their employees. The organizational level, when talking about stakeholders, consists of the housing associations and focal firms within the respective consortiums. A uniform score is allotted based on the scoring scheme, because evidently motivational values have been revealed and are quite important to drive innovation, and to differentially score them would mean ascribing a subjective ranking to their inherent motivation. This will induce fallacy as I cannot determine the adeptness of 'core values' based on the discussion in documents and interviews. The relevance of scoring them a uniform '2' is because that is the score according to the rubric which denotes that the value concept is important, but this will be further touched upon in the concluding remarks for our analysis.

4.2.9 Psychological Perspective | Ecosystem: Shared Values

Innovations for transformations are successful when the members of the ecosystem share the mission of the ecosystem as a whole. Ecosystems are said to evolve with internal and external factors, and that dynamic capability should be kept in mind when shared values for an ecosystem are in question (dDen Ouden, 2012). It is hence important that members within the ecosystem agree on drivers that will determine their functioning and evolution.

Value statements and proposed methods that support the essence of this concept have been coded for all consortia. This value element is of importance for DWC's effort because the goal of long-term transition and learning by doing, is in my opinion, very closely linked to this value concept (also reciprocity which will be discussed in the sociological perspective below). DiT have discussed the importance of maintaining collaborative efforts and keep check of the goals throughout their document, with the CLEAR framework that they have presented. They have even conceptually discussed the revision of the immediate goals and visions for designing, as they go about implementing them. Notion to "invite municipality, tenants, tenant's association, and provincial stakeholders to the table" (Dit is Thoes, 2019b). Once again emphatic conceptualization, with statements of a few actionable plans, so a score of 3 is allotted. CTC has laid out the importance of communication and open flow of knowledge between partners within DWC and their own consortia. This also relates with the concept of reciprocity but is relevant in establishing shared drivers as well. They propose platformization using smart technologies as a way to keep every member of the ecosystem connected and on track (Circulair Toekomst Consortium, 2019b)(Circulair Toekomst Consortium, 2019a). Platformization has been deemed to be a functional tool to develop circular ecosystems in literature as well, specifically in the building sector (Leising et al., 2018).

Plan C has made statements that indicate that the concept is of importance and so has DWNC, as made evident in the map (Drenthe Woont Natuurlijk Circulair (DWNC), 2019b; Plan C, 2019). The remaining consortiums do not address the concept with emphasis based on the discernible material found in the vision documents.

4.2.10 Psychological Perspective | Society: Wellbeing

The overall value for society is well-being. Well-being is a concept that strongly relates with the user level, i.e. happiness for the individual, but here it is stretched out to an overarching view, to determine how an innovation can provide well-being to the society. Individuals refer to the society around them to judge their own personal situation, and that affects their psychological wellbeing. In this conception, the ideas relating to going beyond the individual level and creating value for broader society were scored for.

As stated above, there is strong correlation with the user level, and we previously discussed that Plan C has made wellbeing of people and society central to their approach. They connect their design elements with wellbeing of people and their surroundings, putting emphasis on causation between natural, livable, and breathable bioinspired environments with people's wellbeing. Their philosophy of design is ingrained in psychological wellbeing of people (Plan C, 2019). Corresponding to that central focus a score of 4 is allotted for the value proposition on this concept.

CTC mentions the wellbeing of their collaborating partners and organization members, so that was an added interpretation of societal well-being, hence widening their value proposition. They have mentioned societal wellbeing as a consideration (Circular Toekomst Consortium, 2019b). In subsequent interviews after performing this mapping exercise the idea of expanding the project to a neighborhood level was proposed, providing room for the value discussed through ideas to be effectively created. Individual home construction was creating a barrier for expanding the value proposition.

DiT view people to be central. Their team is said to include a sociologist, philosopher and an anthropologist, and mention ideation of designs in a co-creative way with these and other experts. In their framework they mention the scale of society, labelled as 'macro' scale, and go beyond that representation to define a 'meta' lens relating to humanity. In concepts, it can be extrapolated that they will focus on societal wellbeing. DWNC and Trias-A also make several statements of their design's impact on society, benefits of the natural environment to health and wellbeing of the people etc. The value of societal wellbeing is addressed in ideas. Het consortium's content of their vision document was not addressing this concept sufficiently.

The scores for the value elements for the psychological perspective are represented graphically below in Figure 11.

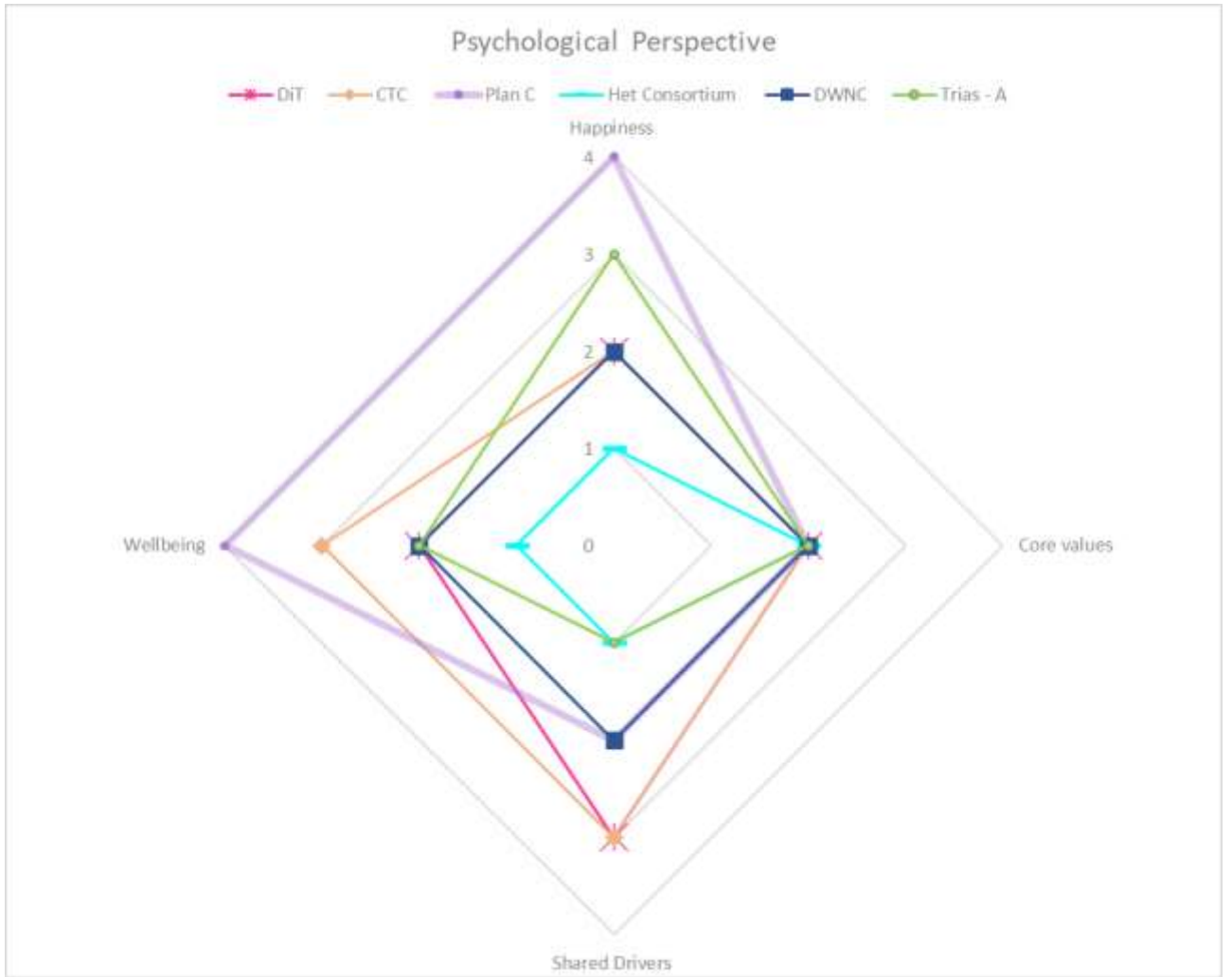


Figure 11: Value analysis scores for Psychological perspective value concepts

On the page below, the value mapping from a sociological perspective is presented, and the discussion follows thereafter.

Sociological Perspective

Table 7: Value mapping and corresponding scores for the Sociological Perspective

	User	Organization	Ecosystem	Society
	Belonging - 3	Social Responsibility - 2	Reciprocity - 3	Meaningful Life - 2
Dit is Thoes	Not just a house but about providing sense of community; “Invitation to tenants and tenant associations to be involved in the design process” Building a self-sustaining community which is more resilient to the economic crisis: Community OS and App - Social relationships will be pursued (concept for app presented)	Creating awareness and pathways for new businesses; Ecological and social sustainability (Brand image as well) Providing sense of community; Resilience to future economic crises	Open exchange of information; like suppliers, new business models, financial information; Necessary for circular economy and society; Ecological system innovation across different levels of scale; Network of different projects creating new relationships; “CLEAR” Framework – beyond the boundaries of their own field and reveal possible new connections; Sustainability expert – enables co creation; systems approach	Contribution to a more sustainable world by way of being in a community; Belonging to a group of like-minded conscious individuals; reduced stress in life; Communities connected;
	Belonging - 3	Social Responsibility - 2	Reciprocity - 4	Meaningful Life – 2
CTC - Cut the crap / Circular future consortium	Residents can be open about their needs and participate within Drenthe Woont Circulair; Designs made for a Community Garden where residents and neighbors can interact; Growing food together in the community garden	Not building more than necessary; Closing the loop and becoming less and less wasteful; Making sustainability visible; Create added social value; Discover new forms of value	Involving actors from quite diverse streams; Trust and integrity Align expectations and visions; Open communication; Involving actors from ecosystem: Universities, municipalities, and other system level organizations; Sharing Knowledge in practice; Agency by focal firm member to initiate that	Diversity in society and culture; Development of the area; Intellectual development of the team members so that they can contribute with greater drive and capabilities
	Belonging - 3	Social Responsibility - 2	Reciprocity - 2	Meaningful Life - 3
Plan C	Involve the residents in the design and adopt their perspectives (People Centric view mentioned); Resident consultant Relationship with their surroundings - "In a healthy environment there is plenty of opportunity to meet each other: it invites exercise, walking and cycling, also to reach sights at a short distance"; Building a services platform for the community to interact and also be of help to each other;	Establishing their image as frontrunners in circular building; ‘People central approach’ Peoples wishes, and the effect of the products on their behavior considered; Communication and behavior change within the project as well as for future projects; ‘The Good Life’ branding Security and sense of safety for the tenants	Mapping the flow of values in the form of material, service, product, customer relationship, data, image etc. relative to waste; Involvement of diverse group of partners in the consortia that openly share insights and data; Continuous process of value creation throughout lifetime of the houses; The 3 circles approach to teamwork – ‘man, ecology, and technology’; Process supervisor to maintain communication and cooperation	Changing the way people behave and interact within the consortia - leading to change in work environment on a broader level; Behavioral change within and outside the consortia and developing healthy communication and collaborative skills; Social safety (ambition); Balance and recovery from work stress mentioned as goals; Vision and philosophy contribute towards thinking and doing on a societal level

	User	Organization	Ecosystem	Society
	Belonging - 2	Social Responsibility - 2	Reciprocity - 1	Meaningful Life - 1
Het Consortium	Place where people can belong, love, relax and be a part of a community with the common goal of fighting against climate change and threat to our future generations; Involving people in the process of exploring what is to live circularly; The house is addressed as "More than a number of walls built and a roof over the resident's head. It is a place where they can "BE" where they love, retreat, relax, and be alone to reenergize	Promoting the reuse and recycling of raw materials in the supply chain; Good, affordable living	Collaborating in innovative ways is mentioned;	Unity in people on the criticality of the state of our environment and coming together to solve these problems;
	Belonging - 1	Social Responsibility - 2	Reciprocity - 3	Meaningful Life - 1
DWNC	Individual and communal space, greenery, and connection on the streets;	Reducing the negative impact of developing, constructing, and using a building; Statement: "As a green builder we keep ourselves busy with Socially Responsible Building" Mention that they account social effect of all their construction activities; Calculation for purchasing, production, realization, sales, and maintenance as well as HR and communications/marketing team reflect that social responsibility;	New forms of Collaboration and cooperation; Being open is sharing and transparent in conveying the developments research and operations by all partners; Well documented, transparent working process in all phases of development and discussion with relevant parties; iteratively making adjustments; The collaborating partners are from diverse backgrounds and the process has been well thought about; Consortium will take on a moderator role with allowing space for everyone to come forth and present ideas; Requires a basic intrinsic motivation from everyone as the process of construction deviates from the 'Normal'	(Mentions several times social sustainability) Circular housing contributing to healthy living environment; Everybody involved will be heard - hence creating more enthusiasm within the teams and generating trust
	Belonging - 1	Social Responsibility - 2	Reciprocity - 2	Meaningful Life - 1
Trias – A	"Resident must feel safe, Pleasant and welcome there"; Social space	Creating demand for new/sustainable materials and drive the supply; "Building in a way that is economically responsible and contributes to the welfare of humans and animals. Here and there, now and later"	Mention of a knowledge bank; Being open and transparent; Developing new strategic relationships; Sharing of the knowledge gained during the entire process is mentioned;	The vision differentiates the region based on heritage and cultural significance as well as the technological history of the region Drenthe. Also specify the larger economic centres of the region, and based on this analysis the housing needs to be adapted as the criterion and plans for development differ for the social needs of people in the distinct areas;

4.2.11 Sociological Perspective | User: Belonging

Sociological concepts of value focus on groups of people and their social relationships, and in addition to that, for meaningful innovation, their relationship with products and values (den Ouden, 2012). Our theoretical discussion in chapter 2 points out that it's in what people relate with, be it things or other living organisms, that they take on *value*. For the user level the concept is of belonging, which is an important parameter in any human's wellbeing and happiness. According to the author people use products and services to express which group they belong to or aspire to be part of. Community is what they seek for, and value creating mechanisms facilitating that can influence adoption and scaling up of innovations.

Referring to the value map above will elucidate that there is evidently focus on this value concept implied through the visions of the consortia. Dit put forward the following statement in their vision document: "They must be places that have been devised from the outset by the resident, with goals that he or she has in the area of living, working, and playing. Because at the core it is not about a house but about a community; communities that provide a sense of security, connection, a place of trust" (Dit is Thoes, 2019b). In what follows this, DiT has come up with an innovative idea of forming small communities of people living in a circular fashion, innovating services such that they are capable of being self-sustaining. Within this community of people, social and financial relationships can be pursued through an app which is backed by an operating system based on blockchain. Making people part of the design process also caters to adding a sense of belonging and being represented. This value concept is revealed through a potential product and service and hence it is allotted a score of 3 for DiT. Similarly, CTC emphasized that people should feel connected to the design of the house and that their needs will be represented. Interviewing led to clarification that they hired a consultant who focuses on and represents people's needs. A community garden is included as part of their designs and a schematic with the marked area for creating the same was shared by the interviewee. People coming together in a garden, interacting, making effort to grow their own food builds a sense of belonging.

Plan C's vision has been people-central throughout and here too their vision specifically denotes, many a times, that they want to create an environment which is catering to the overall wellbeing of the people. With their people centric view, they take 4 major points to focus on, "surroundings, building, service and behavior", and make propositions that contribute to a sense of community and social safety. They make special mention of providing a healthy environment that provides enough space for people to meet, giving it a village mentality with modern design. Under the banner of services, they want to facilitate social interaction, nutrition, and relaxation. These can be places in physical form and/or an app/platform where people can interact and perhaps even inspire each other. Presence of valuable ideas was observed, so a score of 3 is allotted.

Het Consortium says that they want to give people the sense of community through a shared purpose of fighting against climate change and wherein these people come together to explore what is it to live circularly. There is a potential opportunity present as climate change awareness is on the rise and also such propositions will enable in raising it even more. DWNC and Trias-A sparsely mention that resident must feel safe and idea of a communal space, but the underlying value is not in view in what came across through their documents.

4.2.12 Sociological Perspective | Organization: Social Responsibility

This concept, quite probably clear from the name itself, relates to the value of conducting business operations in accordance with the broader welfare of society i.e. people and planet. The author has

given importance of taking into the account the socially and culturally prevalent norms in a geographical context which determines the most important social responsibilities (den Ouden, 2012).

For Drenthe Woont Circulair the value concept of social responsibility can be viewed as a starting point for innovation as the ultimate aim of this experimental setting is to contribute towards transitioning to a circular built environment, a societal transition for a socially and environmentally sustainable society. In essence the housing associations and the partnering focal firms together form the consortia involved in this project that are innovating for social change. Hence, this value concept is inherently a part of their organizational values and clearly a motivation for innovating. The organizational value concepts are of course all linked with each other, but this value concept complements core values, as being socially responsible and transforming their sector towards being less harmful and more fulfilling to our planet as well as to people is a core value, and hence a starting point for the holistic value proposition we have been discussing. The concept is tied to eco-effectiveness and sustainability value concepts too for our case, as I believe these value concepts provide pathways for these organizations to fulfil their social responsibility value.

Representatives from the housing associations could not be interviewed in the course of the project, but through their initiation of this project for circular social housing and pushing the transition to a circular construction sector it can be assumed that there is a sense of 'responsibility' present for embedding sustainability and betterment of society in general.

Statements, quotes, and implied ideas that represent the value of social responsibility in the vision documents of the consortia were coded in the value map. All consortia start with importance for changing the linear society and specifying further for the material intensive construction sector (Circulair Toekomst Consortium, 2019b; Drenthe Woont Natuurlijk Circulair (DWNC), 2019b; Het Consortium, 2019; Plan C, 2019; Trias Argentariae, 2019a), whereas DiT illuminates the fact that there is not even a need to state these things and that they are thankful they don't have to by appreciating the way the call for the tenders were made (Dit is Thoes, 2019b). Some underlying elements that implied the responsibility of doing good have been reflected in table 10 additionally to what has been previously stated above.

CTC and Plan C both have stressed on focusing on new types of value perspectives/streams, where CTC wants to have "another view on value" circular houses reflecting the 'true cost' of land and materials which are inclusive of the socially and environmentally added value (Circulair Toekomst Consortium, 2019b) and Plan C actually mention other forms of value discovery by mapping "actors, moments of value transfer, in the form of material, service, product, customer relationship, data, image etc., compared to waste" (Plan C, 2019). Plan C's inclusion of "The Good Life" philosophy in their business operations is being 'socially responsible' (Plan C, 2019). In my opinion these perspectives, beyond the ambition of circular building, are catering to the value concept of social responsibility.

Akin to the discussion for the concept of core values in section 4.2.8, social responsibility is an abstract value and for the level of organizations in our case it has been a scored a uniform 2 for all projects. How an organization embeds the value of social responsibility amongst its employees and partners is a relevant question because the central ambition of their innovation system is societal change. Being objective, it was imperative in my opinion to not differentiate between the different organizations to define how are they being more socially responsible than the other. Evidently from the discussion above and the value map, it can be said that DWNC and organizations that are involved in forming it have values being socially responsible.

4.2.13 Sociological Perspective | Ecosystem: Reciprocity

Reciprocity deals with the relationships amongst organizations and actors that facilitate the formation of the ecosystem around the innovation. Members of that ecosystem are mutually interdependent, where they contribute from their own strengths and competencies, and in return for that contribution they get remunerated in a form of value that is of importance to them (den Ouden et al., 2013). The author elaborates in defining this value for the ecosystem level that reciprocity means accepting that different parties have values of different nature and that in an ecosystem through reciprocal relationships, such distinct forms of value can be exchanged together to form the whole.

Value statements for this concept were presented by all consortia. In our case, for DWC and CE in general, an important concept is systems thinking, which dictates the importance of collaboration facilitated through a diverse network of relationships and a co-creative process. Collaboration is one of the 5 points, 'Together/networking' in the SNM framework developed and applied for DWC lab and prior to finalizing the 6 consortia involved in this project, it was one of the selection criteria. Reciprocity takes importance for the actors involved in DWC lab, amongst their own teams, but also with other stakeholders beyond their individual project.

DiT have stressed on open exchange of information through their vision document and the team composition document. Their vision embraces that circularity is a systems property and relationships are the central piece to it. "Transparency, interoperability, and interconnectedness" important for moving away from linearity to them, and theories and schematics to reveal that have been discussed. They state that they want to "select suppliers based on their openness, collaboration capabilities, and efficiency, resulting in a network that can achieve an increasingly higher degree of circularity together" (Dit is Thoes, 2019b). Their team consists of a sustainability expert and a facilitator/project manager, and both these roles have responsibilities of ensuring a co-creative process and maintaining that throughout design and construction (Dit is Thoes, 2019a). Clearly, the value concept has been given priority throughout along with some procedural steps for how they embed this in their operations, and correspondingly a score of 3 is allotted.

CTC presented their vision on cooperation, and stress on trustworthy relationships. They state: "Mind you, before we are willing to open up and share knowledge, we need to get to know each other. It takes time to find out what the other person is good at and to appreciate it" (Circular Toekomst Consortium, 2019b). Openness and transparency in knowledge sharing are dependent on integrity in relationships according to them. They propose a "flexible expertise dispute" team where experts consisting of likeminded ideas and their counterparts are present, and discussions around specific issues are organized, so that expectations and visions are aligned, and the team is enriched, inspired and sharpened through such dialogue and discourse (Circular Toekomst Consortium, 2019b). They reveal underlying values that can contribute to reciprocity. Platformization is suggested in their vision and team document, and it enables knowledge and data sharing, and contributes towards embedding this value concept as well (Circular Toekomst Consortium, 2019a) (Circular Toekomst Consortium, 2019b). Through the value workgroup, I witnessed that there is indeed willingness to share information with transparency, and agency to collaboratively solve problems, since one stakeholder from the focal firm within CTC was leading the way for co-creative effort and ask others to contribute as well. From these observations I allotted them a score of 3.

Plan C has stated finding out new value streams "values in the form of material, service, product, customer relationship, data, image etc. relative to waste" (Plan C, 2019). This value statement reveals that they value reciprocity. They emphasize that their vision of closing the 3 circles 'people, ecology and technology, depends on "seamless cooperation", where construction team, residents, and

housing association/client are all connected. A process supervisor is part of their consortium that will work on “developing skills and providing insights for communication and behavior change” (Plan C, 2019). Evidently this value concept is important of their proposition, and a score of 2 is allotted, as I found the discussion of mechanisms to support their vision for this concept remain abstract, given the emphasis that has been portrayed through the documents. Similarly, Trias-A has presented “Knowledge base” among one of their 3 bases where they want to develop more knowledge and learn from mistakes, where the information is made available to other parties and vice versa (Trias Argentariae, 2019b).

DWNC has stressed on “new forms of collaboration and cooperation” also laying out a procedural discussion towards that goal. They mention 3 pillars on which their vision for circularity is based on, and I believe 2 of which unveil this value concept’s essence are “new forms of collaboration” beyond the usual and outside the construction industry and a “healthy business case with new forms of shared values” (Drenthe Woont Natuurlijk Circulair (DWNC), 2019b). It is clear through their vision that for them circularity means intensive interaction between client, builder, architect and other experts and mention that “the ideal interaction system for a circular project does not exist, but is developed in close cooperation with the client during the process”. Maintaining a workbook with thorough documentation at every step of the design and building phase and later reflecting on the results with “all interesting parties” is stated, and furthermore stating that “this iterative process is carried out on the basis of fairness, resilience and transparency and is appropriate for involving all parties and experiments” (Drenthe Woont Natuurlijk Circulair (DWNC), 2019b) (Drenthe Woont Natuurlijk Circulair (DWNC), 2019a). More value statements have been mentioned in the value map. A score of 3 is allotted as there is an outline and an approach, along with the emphasis on the value concept.

4.2.14 Sociological Perspective | Society: Meaningful Life

The value from a sociological perspective for society at large translates to living a meaningful life. The innovation should strive to maximize the wellbeing and happiness of as many people as possible so that they are able to contribute to society in a meaningful way from their own strengths and capabilities, while having an opportunity to develop them too (den Ouden, 2012). As mentioned in the psychological perspective, society provides the bigger picture, and hence makes the reference to which the individual can contribute (Den Ouden et al., 2013).

The levels of society and individual are connected for this value concept. The value statements that have a deliberate focus to reflect on a societal level become imperative here and the value mapping was targeted towards that goal. For DiT, the idea of first making communities of a small scale where their lifestyle is embedded in living circularly and then connecting these smaller communities in a network contributes to this value on a societal level (Dit is Thoes, 2019b). Although their focus of achieving this was more from an economical perspective, (Dit is Thoes, 2019a) proposing these networked communities is also a value proposition for instilling a sense of meaningful living in people’s lives. These conceptual elements are robust in their ambition, and they do aim at contributing to society implicitly. A score of 2 is appropriate to address the same.

CTC’s vision document did not mention wellbeing on a societal level, but later on interviewing a focal stakeholder revealed that there is a need for scaling their plans up to, for a start, at a neighborhood level, and a part of the reasoning was to create value of health and happiness for greater number of people by inclusion of design elements, such as a community garden. Through the work of the value workgroup, a connection was made between healthy working and living environment to reduced stress and improved wellbeing of the employees. Through an implied sense, mentioning the

development of intellectual capabilities of actors involved in open, collaborative discourse also suggests creating a meaningful life for them, and therefore it was mapped at this level of value.

Plan C’s score of 3 is to reflect their philosophy of ‘The good Life’ where “people and not technology are central”. Summarizing it with this quote: "A new perspective on housing and living, with which we build on happiness and health sector-wide” (Plan C, 2019). Numerous value statements that reflect on the level of society were also mapped for this value concept, as there is also a strong link to the individual level. Addressing social issues within the sociological and psychological fields on a societal level and solving these problems is a central theme, whether it is renovation or new construction of neighborhoods (Plan C, 2019). Societal wellbeing and providing a sense of comfort to people is central to their vision.

DWNC and Het Consortium did not present any discernible discussion or statements that emphasize this value concept. Trias-A has divided Drenthe into different regions and state that these regions have their own characteristics regarding social housing, differing goals on the basis of the prospective tenants and want to concentrate on these differences when they build houses. This might create some quality of a meaningful living for people but analyzing objectively I concluded that there were no value statements there that contribute effectively to this concept.

A graphical representation of scores for the value analysis and discussion presented for the sociological perspective is given below.

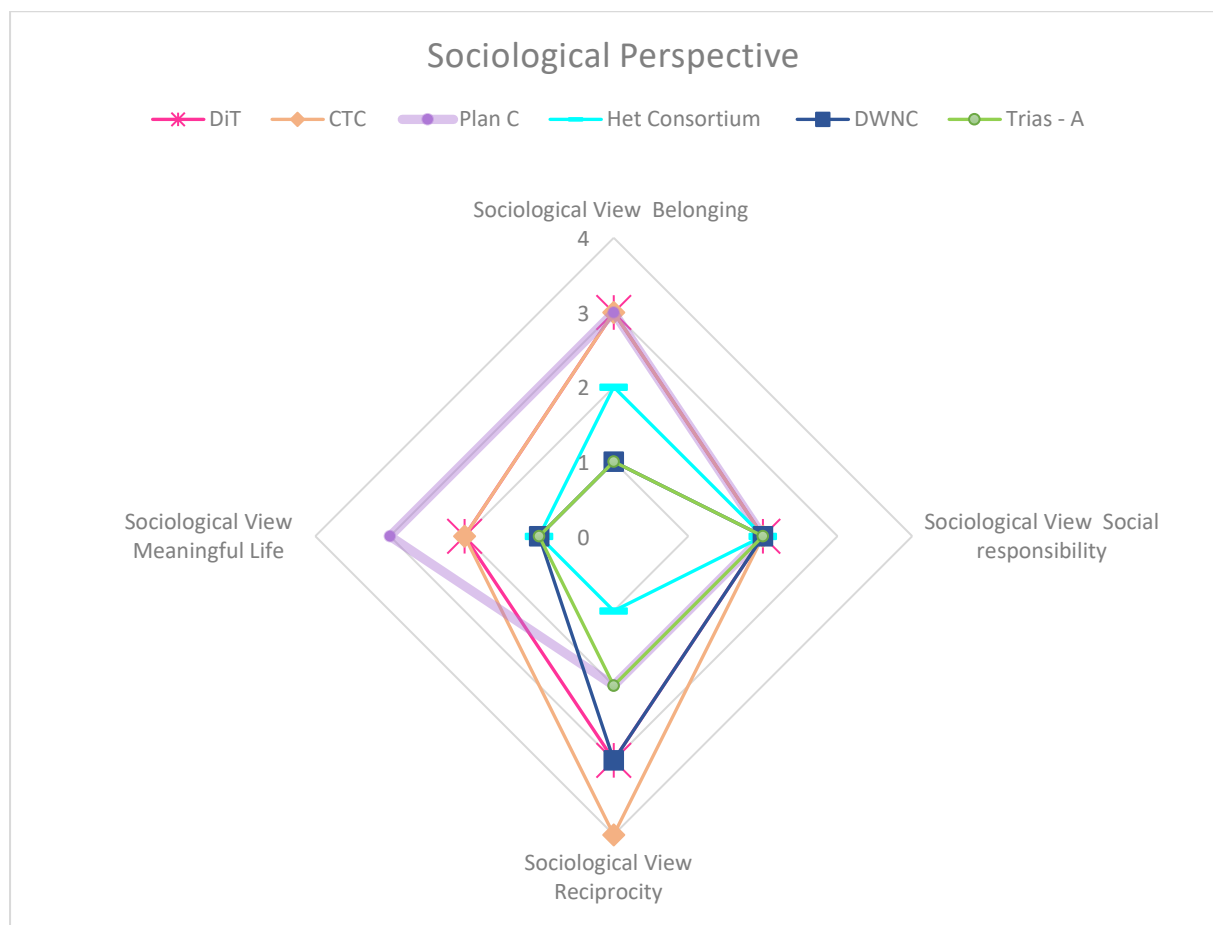


Figure 12: Scores of value analysis for the sociological perspective value concepts

On the next page, the value mapping for the ‘Economic perspective’ is presented and the discussion for the same follows thereafter.

Economic Perspective

Table 8: Value mapping and corresponding scores for the Economic Perspective

	User	Organization	Ecosystem	Society
	Value for money - 2	Profit – 1	Stability – 2	Wealth - 3
Dit is Thoes	Sharing Economy - community based sharing of Products and services among residents; Blockchain based marketplace-turning social relationships within a community to financial as well; Resilience in economic crises	New market development; Developing New business models; Financial Frameworks – International Subsidies	Developing new strategic relations and developing new business models; Creating space for new businesses and entrepreneurs to join; Creative commons license - releasing of intellectual knowledge for use by other actors	Economically resilient society; Energy cost savings as self-sufficiency driven communities; Concept of decentralization and creating sustainable market; Repeatability due to transparency and knowledge sharing
	Value for money - 0	Profit – 2	Stability - 3	Wealth – 2
CTC - Cut the crap / Circular future consortium	“Affordable - Repeatable - Scalable”	True value of the product where externalities have been internalized; “Another view on value” Experimenting with new revenue models and value systems – value workgroup	Degree of circularity determining the financial value; Valuing at Real Value along with new regulations and taxation; New revenue and value models to be explored like sharing economy; New regulation and push for subsidies for CE Platformization in construction	Strengthening economy through developing the Green Hydrogen Economy
	Value for money - 1	Profit - 2	Stability - 2	Wealth - 1
Plan C	Mentioning value for money for the residents and easy maintenance and servicing	Finding new opportunities based on a value map; New forms of value transfers; Discussing new business models along with the partner housing association;	Discovering Value streams in the experimental garden; Creating new business opportunities for the entire supply chain and changing the normative way of doing things;	(Nothing specific is mentioned) Ideas about a circular community and society, the idea of people centric design can contribute to creation of sustainable wealth for people

	User	Organization	Ecosystem	Society
	Value for money - 3	Profit - 2	Stability - 3	Wealth - 0
Het Consortium	Saving on energy costs makes the house even more affordable; Pay per use for all devices; Savings in maintenance and	Less of an investment in procuring new materials; Adaptable living which can reduce maintenance and construction costs (for the organization); Housing as a service business model; New form of contracts; DBFMCR contracts: Design, Build, Finance, Maintain, Collect and Re-use;	Demolition is not looked as an extra cost activity, but it generates capital as materials are being "harvested" and collected for reuse; Housing as a service; The partners in the consortium enter in the long-term partnership of at least 50 years for these domains; Manufacturers of products will have to change their process and business model as well for PSS	
	Value for money - 0	Profit - 2	Stability - 2	Wealth - 1
DWNC		Housing will be a material bank or a temporary material depot - hence reducing the costs of investment in future construction and renovations; A healthy business case with new shared values; Economic innovations – Interest in finding new business models and shared values discovery	Organizational innovations: Network of local suppliers and other actors; Network being circular Creating of these forms of value goes beyond just financial gains;	Socio spatial added value that goes further than the land price
	Value for money - 0	Profit - 1	Stability - 1	Wealth - 1
Trias – A		New contract forms;	New contract forms (within the supply chain); Testing ground as an opportunity to experiment with new regulations and push the conventional boundaries; Adaptive and flexible housing structures can create economic opportunities throughout the life cycle of the building/structure	Scalable circular economy

4.2.15 Economic Perspective | User: Value for money

Users want to attain the highest exchange value for their money and making sure that users are delivered products/services with that in affect is the explanation of this value concept i.e. value for money (den Ouden et al., 2013). Decisions for spending money made by people are not exclusively made based on economic rationality. Users perceive the worth of any product/service based on the intangible values, because the values they are maximizing are not material (den Ouden, 2012). The discussion in the psychological and sociological perspectives of the values on the user level is about that 'intangible value'.

For Drenthe Woont Circulair, social housing can imply that the prospective residents of the circular houses that are to be built will have affordable housing as that is in their motto, providing good quality affordable homes. From the propositions put forward by the consortia though, value statements divulging the 'value for money' for the residents were being searched for. Het Consortium is one of the consortia that connect their design elements with this value concept for the user i.e. the resident, stating that "We make 'living' so high-quality that energy consumption is kept to a minimum. The 'living' will be energy neutral. In this way, we not only save the environment, but 'living' also becomes even more affordable" (Het Consortium, 2019). With their proposal of housing as a service, residents pay for the service per use, and this way the "ballast of ownership" of the devices like refrigerator, dishwasher, washing machine etc. and their maintenance is removed for the user (Het Consortium, 2019). They have complemented this value concept with considerations that are clear in their purpose of creating this value. A score of 3 is given to reflect that.

DiT has included economic resiliency for the users, through being a part of circular communities. They state that they "want to create communities that are autonomous where possible, through our own food production, energy production or water cycle" (Dit is Thoes, 2019b). Within these communities they want to enable a sharing economy, and other capabilities where people can offer services or sell products as well through the community app (Dit is Thoes, 2019b). These ideas point to economic effectiveness for the user actively reducing their expenditures relatively.

CTC's vision document did not reveal this value concept, apart from one mention of the word "Affordable" and similarly Plan C has just mentioned "value for money", and "easy maintenance and servicing" in their document (Circulair Toekomst Consortium, 2019b; Plan C, 2019). For the remaining consortia I did not find attributions for this concept.

4.2.16 Economic Perspective | Organization: Profit

Difference between the cost incurred in developing, producing, and delivering the product or service and the revenue or income an organization can generate from that offering. A positive figure is required for the long-term survival for any organization (den Ouden, 2012). Sustainable innovation systems or products and services have to be economically sustainable as well, as discussed in the theoretical analysis before.

Studying the documents it was made abundantly clear, and has been reflected through the value map as well, that there is a need for new forms of revenue modelling/financial frameworks and value streams to generate profitable business operations that encapsulate the value being created by circular economic construction. Trias-A have not discussed this value concept in detail, just mentioning as part of their Knowledge base, "Develop more knowledge: new materials, new working methods, new contract forms" (Trias Argentariae, 2019b). DiT have similarly mentioned that they want to develop new business models, and they will be searching for financial frameworks including national and international subsidies (Dit is Thoes, 2019b). Both these consortia have plainly stated that they

aim to look into it, but not revealing any details about ‘what’ and ‘how’ for their objective and that is why they have been allotted a score of 1 for this value concept.

DWNC had an outlook of having a healthy business case with new shared values, and mention it under “Economic innovation” where they research “innovation towards circular input of materials, product service systems for life extension, sharing platforms and value recovery” (Drenthe Woont Natuurlijk Circulair (DWNC), 2019b). Attributing value to building materials has their interest and they also want to promote provincial subsidies, thereby stimulating growth of a circular economy in Drenthe (Drenthe Woont Natuurlijk Circulair (DWNC), 2019b). They emphasize on their quest for financing the circular way of construction. Similarly, Het Consortium has put forward clear plans of implementing their new contract forms between the consortium and the corporation, that support their business model of product service system (PSS) i.e. housing as a service. They name it “DBFMCR contracts: Design, Build, Finance, Maintain, Collect and Re-use”. They link their circularity initiatives to the reduction in costs through purchasing less of new raw materials and adaptable modular construction which can reduce maintenance and construction costs. Value concept has been revealed in sufficient detail.

Plan C, as discussed in the previous sections, and quite in sync to our analysis looking reflectively, have given importance to the ‘immaterial’ or intangible value, and connect it to value creation. “The connection with a product; the meaning, the immaterial element is also important to maintain the value to hold. It is about recognizing the circle of continuous value creation” (Plan C, 2019). Business modelling for an integrated approach where the involvement of the corporation in discovering a “hybrid model” of less ownership and more of sharing economy concepts and living as a service (Plan C, 2019). In an interviewee with a lead actor from Plan C, it was found that they have been holding intensive discussion sessions with the housing corporation on theme of business modelling.

“Money should not be the motive for societal wellbeing, but to which we succeed in balancing Earth’s ecosystems should be rewarded”. CTC, elaborating upon this theme suggest “another view on value” (Circulair Toekomst Consortium, 2019b). Stress on including the added value of circularity and socially added value is laid out, along with inclusion of “environmental impact of raw material usage in the value of the product and materials (shadow pricing)” to reflect ‘true’ value (Circulair Toekomst Consortium, 2019b). Plan C as well as CTC dictate a clear importance of new value forms, where CTC has more stress on different forms of ‘Valuation’. Both have been scored a 2 because the concept is clearly essential to complete their proposition, as in attaching value to their ideas. The score reflects that this is still being investigated.

The work of the ‘value workgroup’ is closely related to this value concept and specially the question of inclusive valuation, as suggested by CTC. The explorer groups work, for the time period of the research study, was led by a focal firm executive from CTC. It will be discussed later.

4.2.17 Economic Perspective | Ecosystem: Stability

The economic value for an ecosystem is to provide financial stability for its stakeholders, where the actors can adapt to changing external conditions in the market. Ecosystems can only thrive when they become resilient to externalities, and thereby provide sustainable value delivery for the stakeholders (den Ouden, 2012).

For our case consideration, i.e. DWC, the financial stability on an ecosystem level is quite important and linked, in my view, to the other concepts integrally on the ecosystem level. An ecosystem working on ‘shared drivers’ and ‘reciprocity’ for creating a circular ecosystem a priori needs financial stability and resilience to challenge the dominant linear economic system. DiT express that there is uncertainty in building a circular (economic) community as there are no “ready-made solutions” but they see DWC

as “a way to find new connections and discover new business models” (Dit is Thoes, 2019b). Their vision recognizes that there is a higher order of complexity in actualizing a circular economy, and that open access to knowledge including financial which can lead to finding new business models (Dit is Thoes, 2019a). The stress on collaboration linked with finding business models that can be developed through those collaborations, proposes stability for the ecosystem. They propose this value through ideation and express interest in exploring how it can be created, so a score of 2 was ascribed.

DWNC view finding new/shared value streams in the construction sector “such as value attribution to building materials” as their primary interest (Drenthe Woont Natuurlijk Circulair (DWNC), 2019b). Setting up a network of local suppliers for raw materials, both new and reused, as well as products and other elements such as prefabricated construction parts is their aim. They add on to state that they want “a network of local suppliers and subcontractors who work with biobased materials and in a circular way”. Subsidies to aid their objectives and stimulate CE in Drenthe is also their agenda (Drenthe Woont Natuurlijk Circulair (DWNC), 2019b). There is an emphasis on setting up a local community of suppliers and strengthen the local circular economy. Plan C also mention finding new opportunities for business within the supply chain and finding new value streams. Their plan of forming a hybrid business model will need ample collaborations and connections within the ecosystem (stakeholders). Both have been attributed a score of 2. For, CTC we previously discuss their ideation on finding new value models and their view on collaboration, and their offer of platformization, where an online platform is already present within the consortium, which they mention as “the potential to become an Amazon for circular construction beyond DWC, where supply and demand, information and products, professionals and individuals, can find each other flawlessly” (Circulair Toekomst Consortium, 2019b). Surely this corresponds to a service attached to the value of inducing stability for the ecosystem. Hence a score of 3 is allotted.

Trias-A have mentioned “new contract forms” and “pushing regulations in the right direction” for building circularly, but there was no discernible focus on an ecosystem or network approach. So, a score of 1 is attributed as there could still be an implied effect from their regulation push.

Het Consortium has been allotted a score of 3 because they put forward elements that portray creation mechanisms for this value concept. Het Consortium’s housing as a service ideation is supported by their DBFMCR contract formation they tend to introduce, which stands for Design, Build, Finance, Maintain, Collect and Re-use. They mention that this contract form is between the consortium and corporation where the ownership of the ‘housing’ remains with the consortium. Mentioning that manufacturers have to deal with the production of equipment in a different way due to the PSS model hints at ecosystem stability as well (Het Consortium, 2019).

4.2.18 Economic Perspective | Society: Wealth

The value for society is wealth, which, according to the author, signifies a flourishing society, that is built on economic activities that will result in a high GDP (den Ouden et al., 2013). A wealthy society is able to provide people with good healthcare, education, and infrastructure which not only contributes to welfare but also to the well-being of the people.

Since DWC’s ultimate ambition is to aid a transition to a circular economy, albeit within the construction sector, the interpretation of this value concept should aim to develop a resilient economy which is inclusive and contributes to an equitable division of wealth. From studying the vision documents, DiT was the one consortium that has given importance to this value concept. Their previously discussed ‘CLEAR’ framework has the macro level corresponding to society and they mention that solutions to complex problems need perceiving it from every level. What contributes to this value concept, abstracted from their vision document, is their ambition to have connected circular

communities with a market component. They state that “Ultimately, we want to create a network of connected communities, which together form a decentralized market. Because of this redundancy, they are individually resilient and have the 'economy of scale' to make an impact” (Dit is Thoes, 2019b). This ideation is on the societal level and in my opinion contributes to a ‘wealthy’ society, and since they have attached a plan, although abstract as it is a ‘vision’, the score of 3 is allotted. CTC have presented the idea of the green hydrogen economy and mention that it will “strengthen the economy” (Circular Toekomst Consortium, 2019b).

For the other consortia, no specific statements that imbibe or contribute to this value element with emphasis were found.

Figure 13 below reflects this discussion graphically.

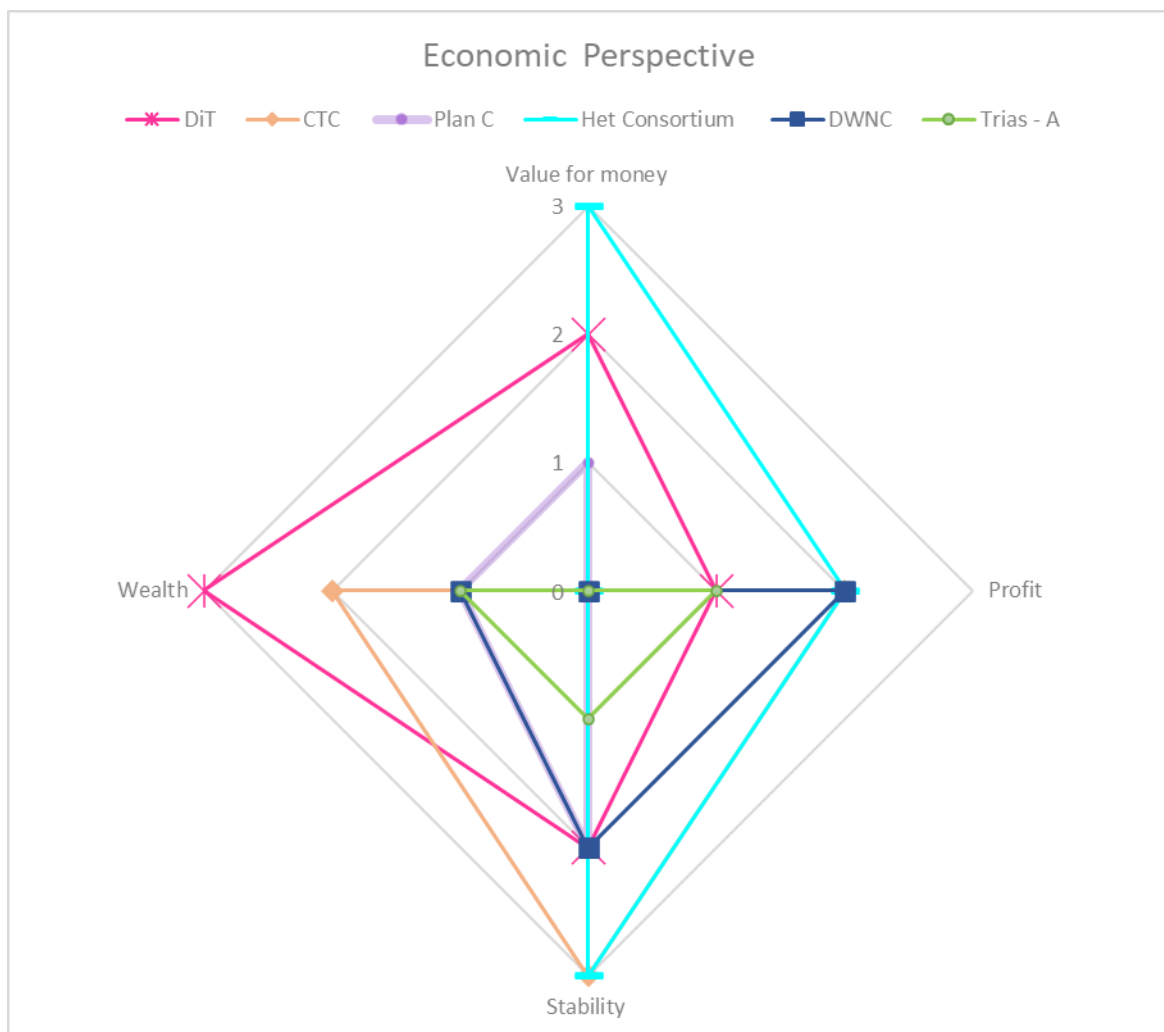


Figure 13: Scores of value analysis for the economic perspective value concepts

With this we have finished discussing the value embeddedness in the innovation system design for the 6 pilot projects that form DWC, through the lens of the “Value Framework”, and the scoring rubric which was set up as a tool to see the completeness of the value proposition. In Figure 14 the scores set for the 16 value elements for all consortia have been depicted in a spider diagram, which gives a pictorial view of the value propositions for all the projects discussed above. The next section will conclude this analysis by discussing the main findings through the empirical study conducted for DWC.

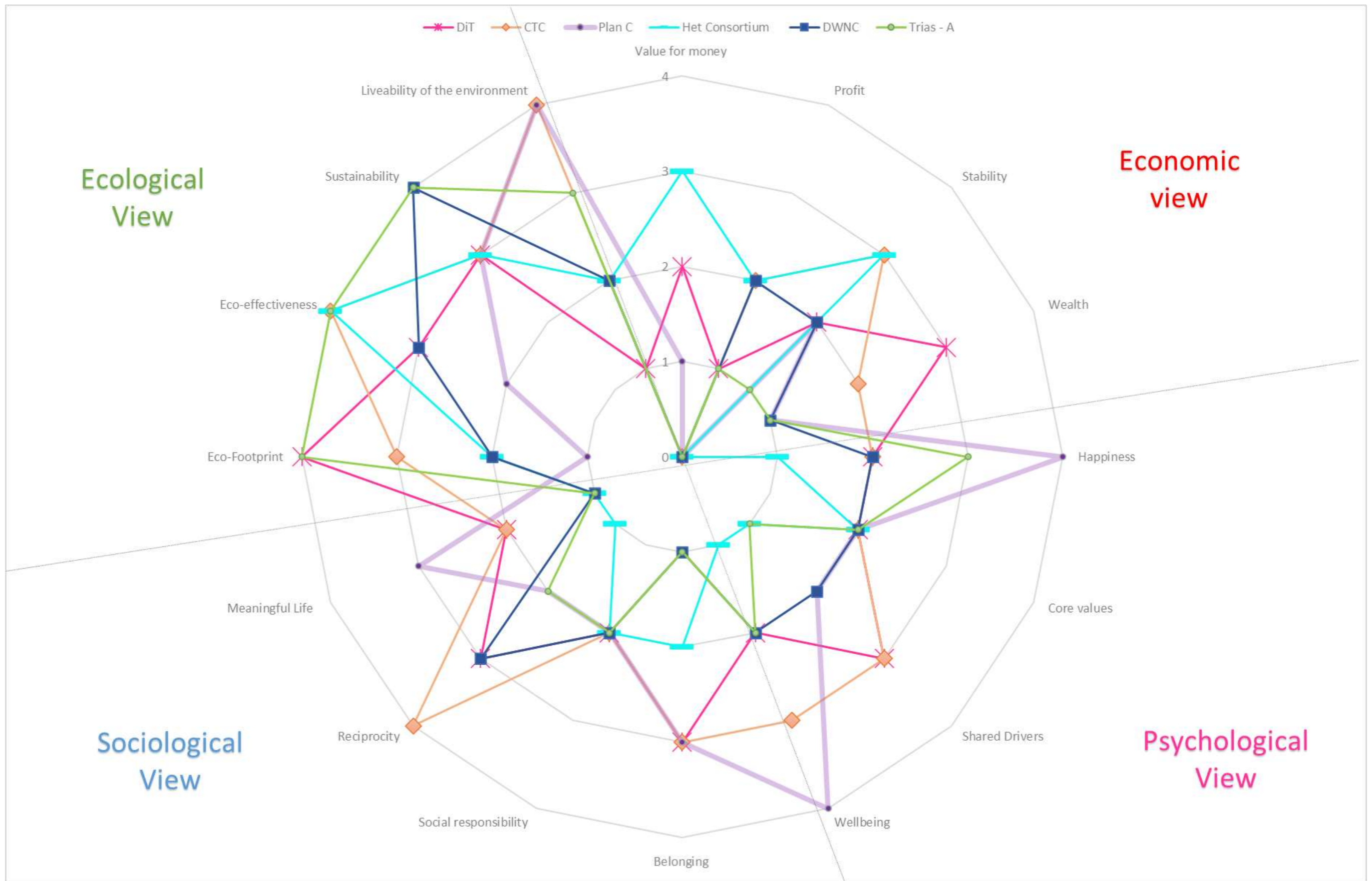


Figure 14: Spider diagram: Value analysis for DWNC

5 Discussions and Conclusion | Empirical Analysis

5.1 Main Results & Conclusion

The empirical analysis conducted for DWC began with defining stakeholders for every level of value, and thence elucidated the value mapping exercise, delving into why the values were coded for specific value concepts along with justifying the score for each project. The stakeholder mapping explicated the presence of a broad, diverse network of actors involved in DWC. Through the value proposition analysis performed, as is evident from the spider diagram in Figure 14, it can be concluded that DWC as a whole has imbibed multiple values in its innovation system and there is ‘potential’ for these circular social houses to become meaningful innovations. The term potential is being deliberately highlighted as these projects have yet to be implemented and these initial propositions for creating value have revealed the desired outcomes that the different projects want to achieve. The projects are still in their design phase, preceding implementation and construction of the circular houses by the construction teams. Values proposed from multiple perspectives can *potentially* create those values if the visions reach implementation as desired. Hence, *there is multiple value creation potential for DWC cases.*

The notion that this VF presents a valuable opportunity for application in our case or multiple cases within DWC was apt as value coding revealed presence of value statements and discussion of values implicitly from all four perspectives of value. The scoring mechanism developed was instrumental in addressing the depth of discussion for the coded propositions, which created the opportunity to discuss propositions on those levels of detail, where some elements have not been addressed at all, and on the other end of the spectrum, fully formed propositions have been defined for quite a few value elements. Referring to Figure 14 above, it is illustrated that values have indeed been addressed in most value elements. So concludingly, *projects for circular social housing, in our case within DWC, can essentially be described as combination of many innovative products and services which present the potential for creating multiple values, from the four different perspectives and at every level of the value framework.*

These values can achieve realization if they are indeed implemented as the projects move ahead and start execution (reflected on later as part of recommendations), and that’s why the values mapped are propositions at this stage, representing the *potential* for creating sustainable value. Let us move on to summarize and conclude this value analysis. The relevance of scoring the value elements has been justified in extensive detail, to reveal the completeness of value propositions. It needs to be emphasized here that the scores are not to be used for the purpose of critique of the projects on a comparative scale, they just reveal if the value proposed by the project’s consortia has the corresponding creation mechanism defined, or whether that is lacking and the value is proposed just through statements or not comprehensively at all.

5.1.1 Discussion: Ecology, Sociology, Psychology and Economy

The operationalization of the framework was not conducted under the assumption that all 16 elements must have positive contributions to the effect of fully formed value propositions. No presumptions were made as to which perspective of value would be most comprehensively addressed. So, the analysis was conducted objectively to reveal what values are included in the visions for design of the innovative houses.

The value analysis revealed that the maximum emphasis or the ‘core’ of the overall value proposition for DWC projects lies in the ecological perspective, as can also be inferred from the spider diagram in Figure 14. DWC proposes circularity as the central value proposition, for embedding circular economic

principles in their construction and design, but also focusing on influencing their prospective tenant's ecological impact, pushing them to make ecofriendly choices, enabling sustainable consumer behavior. The propositions for organizational and ecosystem level are quite well formed as they elucidate their design elements of the circular houses to be built. Livability of the environment, the societal level value, is also paid attention to. Hence, the ecological perspective is the most comprehensive in its containment of complete propositions. If these visions are followed through in the implementation phase, then the elements with scores of 3 and 4 will be leading to generating sustainable outcomes.

The psychological and sociological perspectives are strongly connected with each other, and for these two perspectives the society and user level have deep ties, as society provides the reference for the individual to determine their well-being and what entails living a meaningful life. The user's sense of belonging to a community and being represented has been represented in the visions by most consortia, and happiness, the value from the psychological perspective, has importance too, especially a couple of consortia making it central to their philosophy. The user experience is being emphasized, as discussed in the previous sections. Societal level values were coded if they were indeed directed towards broader wellbeing of society.

Psychological and sociological value concepts for the organizational level and the ecosystem level are quite deeply entrenched as well. For organizations at the center of the innovation systems, the core value can be deemed to be social responsibility, as societal transformation is the ultimate goal. While discussing the propositions for these concepts the score of '2' was uniformly allotted to all consortiums, as there is no way to judge through the visions and interviews as to how these abstract value concepts translate within the organizational structure of separate institutions. For innovation systems to be successful for sustainable business transition, these two value elements are pivotal, albeit their abstractness. An in-depth inquiry into the permeation of these values needs to be conducted within any organization aiming to contribute towards sustainability. There needs to be a framework for acquiring 'metadata' for these value concepts. Shared drivers and reciprocity are linked closely as well, and only a few consortia have a clear vision for actualizing these values, but importance is given by all.

The economic perspective is still not well developed, which reflects on the ambiguity and the challenge that lies in financing sustainable projects, or circular projects, as all consortia do mention finding new perspectives on value, finding financial frameworks and/or new business models. It is important to have a revenue model that is sustainable for continuity of any business. The stakeholders face a dilemma in having an apt revenue model for such projects because the traditional models used previously are not relevant for circular economy or sustainable projects. In connection to this facet, an observation is that organizations should connect elements from the ecological perspective, as circular houses along with other circular offerings should retain a high value, and at the end of their use life they are recirculated in the market. They might need refurbishing or remanufacturing, or if not viable to return to their original functionality then they are repurposed for some other application. In section 5.2 below we shall delve into the financial aspect of innovating circular social houses with value creation from these 4 perspectives in more detail.

The spider diagram in Figure 14 reflects the value embeddedness from the four perspectives of value that are defined in the framework. Let us see what happens when the scores are made to reflect the emphasis on the four levels of value that are defined within the framework. The graphical representation of the same is given below in Figure 15.

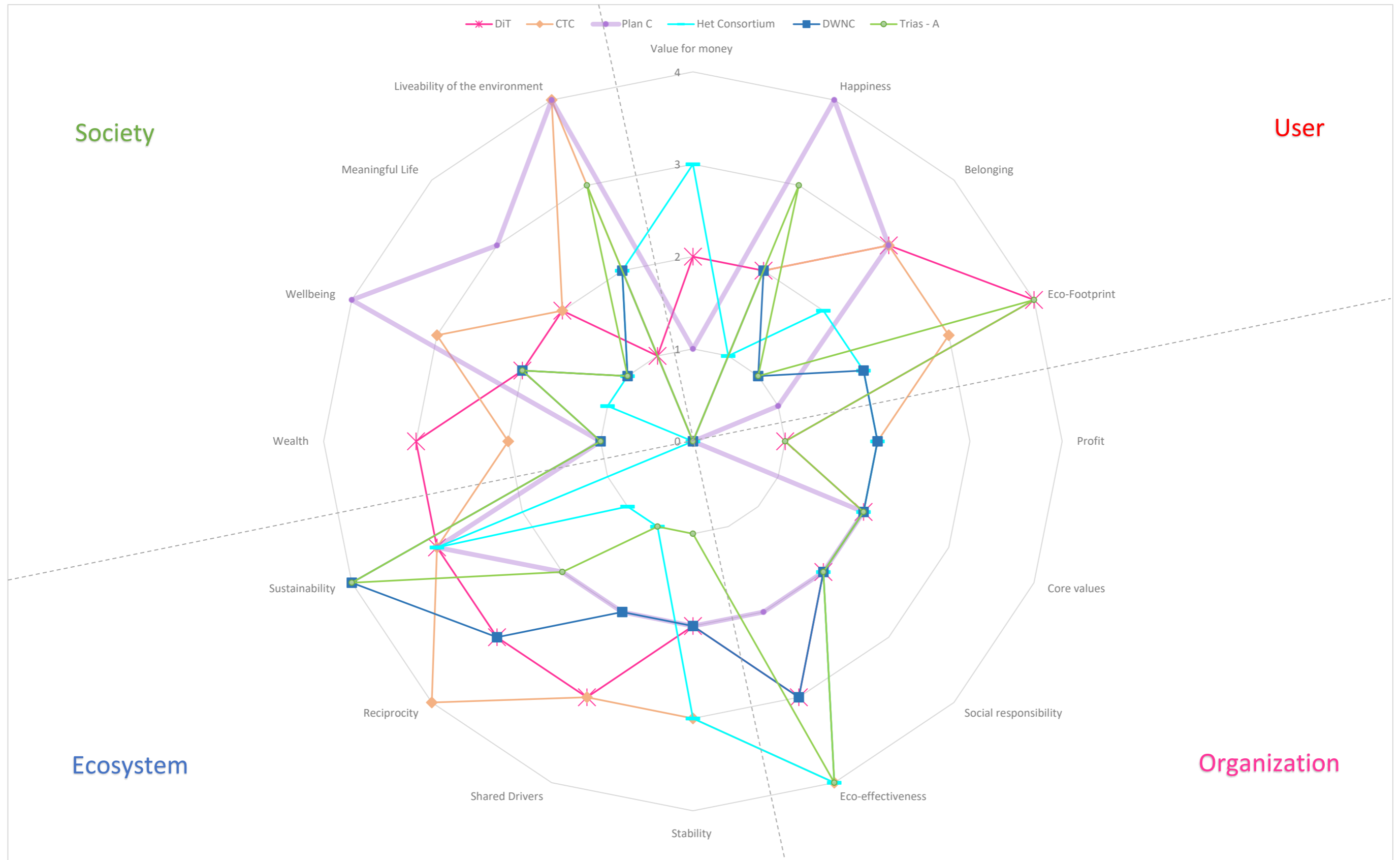


Figure 15: Spider Diagram reflecting value analysis from a levels of value view

5.1.2 Discussion: User, Organization Ecosystem, Society

The spider graph above was made to discern where does the emphasis of proposing value lie based on the levels of value. Observing the graph reveals that there is no one level where the emphasis can be found in a distinctive manner. The value propositions are distributed quite evenly in all the levels of value. On the organizational level, the value concepts of 'core values' and 'social responsibility' reflect the uniformity in scoring for all consortia, an even score of 2. That is why variability was not quite visible in the organizational level. Also, the value concept of profit does not have detailed representation at least in the vision documents, and furthermore the discussion for the economic perspective illustrated the ambiguity of modelling revenues for such a sustainable project.

The ecosystem level values have been proposed in more depth than the organizational level indicating that consortia understand collaborative effort in required for creating sustainable value, and a shared responsibility for bringing about change is needed. The concepts of shared drivers and reciprocity have been given importance by most consortia and discussed by all. The realization of economic stability for the innovation ecosystem is present as well as five of the six consortia have a score of 2 and above for that value concept.

It is clearly discernable from Figure 15 that the value concepts of ecological perspective have the most emphasis on every level of value. Eco-footprint (User), eco-effectiveness (Organization), sustainability (ecosystem), and livability of the environment (society) have scored well to the other value concepts of the same level of value. The connect between the individual and the societal level of value for sociologic and psychological value concepts is observed, where belonging and meaningful life and happiness and wellbeing have nearly identical scores. It can also be observed that the only value elements that have a score of '0' are economic perspective concepts.

5.1.3 Reflection | Operationalizing the framework

Mapping the stakeholders for DWC cases was not straightforward as in such a multiple project, diverse environment the boundaries for assigning the levels of value to the actors were blurred. We reflected on the dilemma of the user, as the individual/institution owning the product-service system is not always the user which was true for the housing projects within DWC. The needs of the tenant are not directly represented by the tenant's but other actors that will be doing the thinking about providing the bets experience to the tenant, and these actors are part of the wider ecosystem, not the user level. The organizational layer was also a bit ambiguous for deciding the stakeholders. The ecosystem layer has a multitude of actor but the specificities about the name of the companies and individuals that represent the roles defined for the was information that either was not privy to us or yet to be defined.

The mapping exercise was done in an iterative way where initially the documents were coded, then information from interviews and group discussions were further coded in the matrices. It was imperative that value concepts are coded correctly, and objectivity is maintained. The scoring was an added layer that helped reducing that subjectivity and moreover enhancing the viability of the framework by providing conceptual depth in recognizing the completeness of the value proposition. It enabled the discussion for determining where the emphasis for creating value lies for different projects on a case level and for DWC umbrella project.

The score allotment of '2' is the benchmark that the value element is important to the project's vision, but it is not elicited how the consortia want to create that value. In section 5.3 reflecting on the value analysis performed some key lessons learned have been discussed and we shall discuss how this scoring set up can turn into a useful tool for enhancing value potential and using it as a learning tool. In the next section we discuss and reflect on the work done within the 'Value Explorer Group'.

5.2 Value Workgroup | Shift from 'Business Case' to 'Value Case'

In the duration of conducting this thesis research there were some other interesting challenges that came to light, one such problem was the exploration that took place in the value workgroup. This chapter will discuss and address these elements, where we reflect on how they contribute to DWC and the research agenda for *creating sustainable value*.

In section 3.3.2 of this report a detailed explanation was provided of the research being introduced within the value workgroup and its functionality in data collection. With the value framework explanation being presented as part of the information package provided to the stakeholders that formed the group, member from CTC delved into the framework's explanation and was inspired to explore how the different value perspectives can be included in their valuation method i.e. the existing revenue model, calling it a shift from 'business case' to a 'value case'. In the value maps for CTC it is evident that new, inclusive forms of valuation for a circular economy but also hedonic pricing for land, and the interest of finding new perspectives on value was high on their agenda, as part of their learning goals as well.

The business case approach considered only financial value, where essentially the model was a clear cash flow statement, calculating return on investment at the end of the proposed lifetime of the houses, and the concept was to shift to a value case where the model includes the other perspectives of the value framework, 'ecology, psychology and sociology'. The traditional calculations are made on operating costs, organizational costs, landlord levy, investment rent and residual value etc. The problem as stated by the stakeholder was that "building circular social houses was not a profitable activity in the end for the organization, and we need a new value model where all these different perspectives of values are quantified". Essentially the focal point of inquiry was to convert the forms of values into monetary terms, where they wanted to connect these value perspectives, to savings in costs. An example was given of the same as a starting point for discussing monetization of intangible values; housing associations must pay an agricultural tax of 365 euros, which the insurance company pays on their behalf. Now, instead if care is taken for the surroundings where the houses must be built, and here the idea to increase scale to a neighborhood level also came in, they could be exempted from paying that tax. Needless to say, the qualitative value of Livability of the environment from the ecological perspective has relevance here.

Discussing with the lead stakeholder, I intimated that the starting point should be to qualitatively embedding these 'values' in the design first, so that positive outcomes can be generated. Starting from the identification of financial proxies to be added into the model is a 'top down' approach, and to create meaningful, sustainable value, we must have a 'bottom up' approach, starting from designing those sustainable outcomes as discussed earlier. At this point in time the value mapping was not complete, but reflecting on it now, the value proposition has the potential to create those values. Now, a more important facet to this monetization question is, to have qualitative and quantitative data based on which there can be an assessment into the impact of innovating. I discussed this with the stakeholders, and in the first meeting of the value workgroup this was raised as an issue. Attaching monetary gains to any value creation activity contradicts with the argument in our theoretical section about *valuing nature and societal well-being, not putting a value on them*. But if it inevitably must be done, we need data for creating metrics such as KPI's which can provide a measurement or a benchmark for these intangible values. We need to map the outcomes first and then think about return on the values, and presently in the case of buildings, most metrics are for building performance and sustainability metrics, which can be used for substituting ecological proxies, but to measure the impact of the design on people's experience is not that prevalent and needs to be done for measuring social impact (Watson & Whitley, 2017).

Social impact assessment is high on the research agenda, and one such method was researched, the 'Social Return On Investment' (SROI) method (Keane et al., 2019). The paper studied discussed the application of this method in three non-clinical healthcare buildings. They argue that in order to distinguish best practices and influence positive decision making we need to move away from criteria based on economic valuation or other predetermined criteria, "for example, the outputs of design like building quality or function, specific physical aspects like indoor air quality or acoustics, or fixed user outcomes like satisfaction and productivity, which are typically measured" (Watson & Whitley, 2017). So, a shift in evaluative focus is needed, where the subject of analysis should be the outcomes experienced by people based on their interactions with the buildings and their social context (Watson & Whitley, 2017). The point being to assign value to something, we need to map outcomes first, which was evident by the steps of this method as well. While not discussing them in detail, the steps defined are: (1) establishing scope and identifying key stakeholders (2) mapping outcomes (3) evidencing outcomes and giving them a value (4) establishing impact (5) calculating the SROI (6) reporting, using and embedding. In brief they mapped outcomes through focus groups in buildings and interviews, and step 3 is evidencing outcomes, which they did by surveys, and then assigning value through identifying and applying financial proxies to evidenced value outcomes (Watson & Whitley, 2017).

In our case, for instance, we discussed that the traditional revenue modelling which the stakeholder taking lead was using in their organization was presenting a residual value of '0' at the end of lifetime. It did not adapt to circular construction. Conceptually I inferred that circular economic construction of houses or in general circular designing is based on underlying principle of keeping products and services at their highest value throughout the lifetime. Value preservation is the essence of circular economic activities, and the traditional model fails to include that value. The standardization of KPI's with more research and development can aid in this ambition, as to evaluate monetary worth you need to have quantifiable information through metrics. Finding circular KPI's for the construction sector is one of the objectives within DWC.

In the subsequent meeting of the workgroup a mind map of 'value' flows was introduced by the stakeholders, where they find connections through value exchanges between the resident, owner/ proprietor, municipality, and society where central theme is connecting elements within these domains. It is not being shown here as it was not intellectually developed by me, but I will reflect on my contribution to establishing qualitative flows in that mind map. The task was to make monetary connections, and assign financial proxy to that value, but based on the argument above, outcomes need to be mapped first before valuing them. So, the connections I made were all potentially economically beneficial. For example, within society a potential benefit was mentioned as employment opportunities, and I made a connection to residents living environment, where circular economic principles of remanufacturing, repurposing, reusing, refurbishing can potentially generate business and employment opportunities.

Reflecting on that mind map of value flows, some connections are definitely monetary value flows, but others can remain in the form of intangible values. Performing that exercise with the ecosystem in mind and mapping money, knowledge, material and other (intangible) value flows will yield an ecosystem map. So, this exercise can turn into a holistic ecosystem mapping, where all DWC projects can map their own ecosystems, and then broaden the scale to DWC level to involve all projects with system level integration as well.

Generating a new model for financial calculations for including multiple values is a complex, time intensive, very specific task, which requires expertise and dedicated research over a long period of time (prospectively a PhD thesis). The initiative of creating such a model is in itself a great start for the

value explorer group, and these developments take place iteratively, with renewing perspectives and collaborative effort.

5.3 Learnings | Reflecting on DWC Empirical Analysis

Collaborative Approach

Reflecting back on the value analysis conducted, the central recommendation for Drenthe Woont Circulair is to use the value framework collectively within the individual projects or cut across boundaries and use it with stakeholders from other projects (we shall return to this later), going back to the drawing board to reflect on their value propositions. We view it to be central due to multiple facets, observed during the analysis. The first one is quite simply not being able to use it in a workshop setting by involving actors representing all levels (Discussed as part of limitations in section 7.2). The focus of that exercise will be to engage all actors, with a basic background about what different value elements mean, in an ideation process, a brainstorm session around the specific aim of making the value proposition as holistic as possible. The exercise in the value workgroup was different from the intent that the framework holds when it is applied in a collective setting. In no way does it diminish the work of creating an alternative financial framework which was aimed at reproducing the positive effects of creating these values monetarily (as discussed in 5.2). Rather, it is an important exercise to create discourse and enable the co-creative abilities that the use of this framework can potentially discover.

Inclusivity of stakeholders

This brings the discussion to the second relevant consideration, the inclusivity of stakeholders from all levels in operationalizing this framework. The value analysis, and as coded for the user level in the psychological and sociological value perspectives, revealed that most consortia want to involve the user in the process and have open communication with them, and residents' overall experience is important to them. With inviting them to use this framework, and especially after this study has been done which has recorded thoroughly the values proposed, the stakeholders in the organization level; housing association and the core companies within the consortia can intimate them of the way the design wants to improve their overall experience. It can be revealing for the focal firms as well to see what the resident's views are, what is important to them, when they discuss their plans and designs with tenants. Companies mention hiring resident consultants or have employed dedicated researchers for gaining insight into their prospective resident's demographic, their consumer behavior etc. and using the framework conjunctively with them has the potential for generating ideas that will add new and/or embellish existing value propositions.

The third, and arguably the most relevant facet of using the framework in a collaborative setting is involvement of actors from the ecosystem level and the societal level. The reason for this is both theoretical and observational. The discussions of the value workgroup brought to light that in the design process, each actor involved to focus on specific areas are performing their separate tasks individually, which of course is the way it is supposed to be done with producing their respective deliverables. Co-creation and collaborative work, which is evidently on everyone's agenda, means ideating, often iteratively, along with the actors as the first and primary step. Working together to ideate on adding products services along the value concepts and discussing about the more intangible values like 'core values' and 'social responsibility' can enhance the value potential of the innovation services and aligns the actors towards the same ambition. For example, DiT mentions that their team consists of an ecologist, philosopher, anthropologist, environmental psychologist and other members, and for this diverse group of actors to involve in discourse using the inclusive value elements can be an ideal opportunity to unleash collaborative designing of the innovation system. Within the two workgroups that are actively exploring solutions to the thematic problems of these set as agendas for

exploration, value workgroup being the first one of them, observation shows that the focal firm employees of the consortia, and representatives from the housing associations are present, but actors from other levels lack representation.

Along with co-creative realization it also involves the definition and recognition of value for the ecosystem actors, from all the different perspectives. The ecosystem approach is very high on research and application agenda for a circular economy (Aminoff et al., 2016; Gjørdvad et al., 2017; Konietzko et al., 2020; Planko & Velzing, 2019). Research shows that ecosystems approach is essential for realizing a circular economy from all perspectives, process, tactical operations, systemic change and financing the circular economy (Metabolic Institute & Circle Economy, 2020).

System level integration

This brings us to another pivotal point, integrating the system level actors, which consists of governmental bodies from the region, and local municipalities at the city level, representatives from policy making and governing bodies/institutions, and financial actors such as investors and banks that will provide funding. Financing the circular economy is a challenge and that was also evident from the discussions in the value workgroup. There is lack of supporting policies and subsidies that support the ambition of becoming circular. Netherlands has set a goal for becoming circular by 2050, and what that incurs is a monumental effort by all members of 'society', where policy makers and governing actors have a major role to play. The ecosystems approach requires collaborative work, starting from discourse and initiating these system level actors into the loop of value creation. Making them aware and aligning their perspectives through the use of this, or a similar framework, is essential. Discussions with actor taking the lead in the value workgroup revealed that they invite representatives from municipalities, and in discussion they express that 'social and environmental added value' should be there, but when it comes to support through financing and subsidies, that's lacking. Involving them in the ecosystem and through that in the process of 'sustainable value creation' will lead to change in the policy frameworks and supportive financing over time (Konietzko et al., 2020; Metabolic Institute & Circle Economy, 2020).

Enhancing Value Proposition

A quick reference to the spider diagram, or value maps in the empirical analysis chapter, will reveal that there are quite a few value elements that have scores of 2 and even 1's and 0's which depicts that value is not under consideration. For this scenario there is an opportunity to brainstorm new value propositions and addressing that element as part of product/service offering. Selecting stakeholders from all levels is the first step and then ideating to embed the value concept in innovation design to enhance potential is next. For the value elements with a score of 2, the idea is that more information in the way of corresponding value creating mechanism or product/service be revealed. Here too, if there is no concrete plan present in design, brainstorming for matching products/services is of relevance.

Learning Tool

Lastly, another valuable recommendation based on the value mapping and analysis conducted is using it as a learning tool, for sharing the ideas for value creation elicited through the visions of all consortia. Open sharing of knowledge and resources is mentioned quite regularly in these documents and agenda of DWC as well, and hence, this value mapping conducted provides new perspectives of creating value that was not included as part of the design of any one consortium. For instance, if a consortium's design is scored a 1 or 0, that means they did not elicit any plans to address that value, and so they can refer to the other consortium's value coding for gaining new insights into addressing that value. Also, it can contribute to learning goals of DWC as a whole, where it can be integrated into

a monitoring tool, to make sure the values proposed are actually realized, and if they are not, then it can be learned what were the barriers that stopped the value from being created.

6 Living Lab: Where does it fit?

During the process of discussion of layers in the framework and situating stakeholders within them, the question of ‘how does the living lab environment of DWC relate with these layers’ was raised by stakeholders. So, to answer that question the living lab literature was delved into and the idea was to correlate it with the VF levels. A move from empirical analysis is being made to develop theory reflecting on the analysis conducted and conceptual knowledge developed for DWC study. This section is additionally contributing to answer RQ 5 and RQ 6 as part of implications for both DWC and future transition experiments set up as Living Labs.

Throughout the literature on living labs, user-oriented design and user participation in the innovation system, and open innovation have been given emphasis (see Section 1.4.1). The Value Framework (VF) being used for this analysis states that users are the bedrock of every innovation, their needs and their internal values must be of primary consideration for designing the product/service and hence, it can be validated again that this framework is an apt tool for urging the stakeholders to create/improve the value proposition, and through the analysis of different projects within DWC, the knowledge will be shared among all consortia making it a tool for learning as well.

The question is how to accommodate the living lab in the layers of the value framework. It is quite evident from definitions of a living lab that levels of ‘User, Organization and Ecosystem’ combined can correspond to a living lab level i.e. living lab will be comprised of the levels mentioned above: A user driven participatory approach, where vast variety of stakeholders are involved for collaborative innovation and learning, to form an innovation ecosystem which can be scaled up and commercialized.

Table 9: Living lab encompasses the 'User', 'Organizational' and the 'Ecosystem' level

Living Lab		
User	Organization	Ecosystem

Within the experimental living lab atmosphere of Drenthe Woont Circulair, an internal framework for monitoring and evaluation (M&E) has been set up to observe and govern learning and subsequently the transition process. For tracking the learning process through M&E three different layers have been defined; Operational level which relates to the design process and activities related to the development of the circular social house, Tactical level which is concerned with making the process repeatable or stable in conjunction with all partners involved in the projects and Strategic Level which is dealing with the systemic change and the sustainability transition or transformation. There is a synergy between these layers and the levels in the Value Framework. It can be deduced that the operational level of M&E will comprise or rather will be in parallel with the user and organizational level. The tactical level is synonymous with the ecosystem level as ecosystem values lead to the stability and replicability of the innovation. The strategic level is the birds eye view and hence, it incorporates all three levels, in synergy with the societal level of the value framework where the overall value proposed is ‘transformation’. Monitoring and evaluating at every level is of importance so strategically learning from all 4 levels of the value framework is quite essential.

Table 10: Parallelism in M&E layers and VF

Value Levels (VF)	Layers within DWC M&E framework
<i>User</i>	<i>Operational</i>
<i>Organization</i>	<i>Operational; Tactical</i>
<i>Ecosystem</i>	<i>Tactical</i>
<i>Society</i>	<i>Strategic</i>

6.1 Defining value concepts for Living Lab

The synergy between the layers in DWC M&E and den Ouden’s value framework has been established in the preceding sub-section. Upon a closer analysis it can be seen that, albeit the value concepts of the three levels of value which can be assumed to contribute collectively to the ‘Living Lab’ align perfectly, singular value concepts for a ‘Living lab’ level can be derived looking from the four different perspectives. To define these concepts, living lab characteristics from literature and how are they arranged within DWC were researched.

Steen and van Buren (2017) focus their research into urban living labs stating that they have become a popular developmental approach for accelerating the adoption of sustainable innovations in the urban system with the hope of achieving the corresponding sustainability transition. Urban living labs are not starkly different from living labs, rather they have all the same characteristics. The term used to denominate a cluster of local experimental projects of a participatory nature, with more emphasis on urban sustainability are “testing ground”, “hatchery”, “field lab” or “incubator”. Drenthe Woont Circulair ‘testing ground’ can be categorized as an urban living lab as it is a clustering of 6 distinct experiments driven by the ambition of transitioning to a circular built environment. Steen and van Buren (2017) define the characteristics of urban living labs as follows:

Aspects	Characteristics
Aims	Aimed at innovation
	Aimed at formal learning for replication
	For urban living labs: Aimed at increasing urban sustainability
Activities	Development (all phases of the product development process)
	Co-creation
	Iteration (feedback, evaluation, and improvement)
Participants	Public actors, private actors, users and knowledge institutes participate in the living lab activities
	All actors involved have decision-making power
Context	The living lab activities take place in the real-life use context of the innovation. In many urban living labs, this is a territory or a space-bound place.

Figure 16: Defining Characteristics of Living Labs (taken from ‘The Defining Characteristics of Urban Living Labs’ (Steen & van Bueren, 2017)

Under the umbrella of aiming for a circular construction economy, the Value Framework's perspectives i.e. 'economic view, psychological view, sociological view, and ecological view' are operationalized for determining or rather translating DWC living lab ambitions and needs to value concepts. It was observed that the living lab when discussed as a level of value corresponds quite closely with ecosystem Level, although it can be viewed to incorporate user and organization as well, which is also true for the ecosystem level according to the author of the VF (den Ouden, 2012).

The essence is the focus on the challenge of transformation and that will be the key consideration in defining the value concepts as well.

6.1.1 Ecological view

We start with the ecological view, as the overarching goal is that of a sustainability transition in the form of circular economy. Circularity is what needs to be achieved, and to achieve that the living lab environment values new and radical ways of constructing, enabling the use of new materials, new ways of incorporating waste into the food stream for construction, designing out waste, reducing the environmental impact during the development, use and demolition phase and many more principles which will contribute to sustainability (circularity) (Zucchella & Previtali, 2019). Viewing it in terms of what is needed in the living lab atmosphere for achieving circularity leads to defining the value concept which will be '**Novel Development/Design Techniques**'. It is being named so because for achieving circularity and incorporating the discussed principles the requirement is to change the way of designing and developing, also technically, the product/service which in the case of DWC is a house constituting many products and services offered as a package.

6.1.2 Economic View

From an economic view through the lens of transition, the value concept should imply that stakeholders are experimenting with different ways of conducting their business, finding new strategic and investment relationships, new forms of valuation in the revenue modelling, novel way of tendering and finding new opportunities for providing their customers with the best value for their money. According to the Ellen McArthur Foundation report 'Achieving Growth Within' the circular economy offers a real opportunity for economic growth while pursuing sustainability and attractive investment opportunities that have remained unrealized until now (Ellen MacArthur Foundation et al., 2017).

The value elements present for 'ecosystem' and 'society' in the VF are stability and wealth respectively, and which will be quite relevant for this new 'living lab' level as well. But, looking from the lens of transformation for DWC, the most important aspect would be that stakeholders involved change their strategic operations in lieu of building circularly. Therefore, the value concept for the economic view will be '**New business models/circular economic business modelling**' as business modelling entails all the aspects mentioned above, with the focal one being value creation of which this project is also a contributor.

6.1.3 Psychological view

The value concepts of 'Happiness, Core values and Shared Drivers' corresponding to 'User, Organization and Ecosystem' level reflect the core beliefs of a living lab as well, where user happiness and experience are central and stakeholders need to be aligned with the vision of the project they are involved in. Even the value concept for the societal level, 'Wellbeing', is quite relevant because the ultimate aim is to provide an innovation that through its pleasant nature gets adopted widely to improve societal wellbeing.

One important element that is quite central to experimentation, living labs and governing a sustainability transition is learning and being reflexive. Now, learning is quite a diverse research field and its connection to governing transitions is being developed and researched too. Van Mierlo and Beers in their article 'Understanding and governing learning in sustainability transitions: A review' detail four learning traditions by connecting them to governance and acceleration of transitions, namely 'Collaborative learning, Organizational learning, Social learning and Interactive learning' (van Mierlo & Beers, 2020). DWC adopts 'transformative learning' as the approach which is essential for sustainability transitions as it has a third order of learning where along with reflecting on the actions, attention is also paid to the 'underlying values and norms' (Mourik & Jeuken, 2020). Now to define the value concept, the actors involved in the transition experiment go through the process of changing their own values and practices, and can thence act as exemplar actors or role models for the actors outside the innovation system situated in the DWC experimental setting. The concept, based on the premise of transformation through learning and being reflexive, is coined as "**Ambassadorship**". It represents the transition from normal to 'new normal', where the actors going through their value transformation are the embodied form of the learning that occurred. They take on leadership roles to facilitate that transition for others.

6.1.4 Sociological View

Sociological view of value fundamentally inculcates values that concern with social and cultural values which are understood as mechanisms of solidarity, belonging and a sense of collective identity. The latter is quite relevant to the living lab concept, because working in unison towards the same vision and belonging to a cause, which is higher than the individuals is essential. The value concept for 'organizational level' in the VF is 'Social Responsibility' which is inherently connected with sustainability and the larger impact of an organization on society. In my view, social responsibility with regards to sustainability relates to conscientious effort within the company for adapting their internal as well external strategic operations and, more importantly, relationships that enhance and drive the innovation system, and renewing it over time.

At the 'ecosystem level' the concept is 'Reciprocity' which is essentially about mutually beneficial relationships that can empower the ecosystem to stabilize in the long term, where all members of the system contribute in accordance to their own competencies. We discuss this before, but just to reiterate, they are 'paid' in return in a value form that is of 'worth to them, or to put it in other terms, what is valued by them. For e.g. a business or a commercial organization, the return of their contribution will be in monetary form, but for other organizations, like an NGO working towards climate change activism and increasing awareness, giving them a platform so that they can be heard and endorsing them, is worth a lot to the concerned organization.

I believe that the value elements of the VF are very much aligned with what would be valued from a living lab perspective, but to name a value concept it must relate to diversity of stakeholders and their strategic relationships that go beyond the traditional value chain view to include as many actors and organizations as possible. With this background knowledge, the concept can then be defined as '**Inclusivity**'.

Table 11: Value concepts defined through reflection for DWC Living Lab

Value Perspective	Corresponding Value concept coined for DWC 'Living Lab'
Economic view	New business models/circular economic business modelling
Psychological view	Ambassadorship (through transformative learning)
Sociological View	Inclusivity
Ecological View	Novel Development/Design Techniques

An essential assertion to be made at this point, which is pivotal to the analysis, is the time frame where these values now defined for the living lab can be observed in real world context. At this moment this discussion is theoretical, but moreover, the concepts here have been defined with the transition in view, and these value elements need to be monitored, evaluated, and governed throughout all phases of the transition process. Time is quite central to transition studies. The seminal work in this field was introduced with a multiphase model of transitioning, where the first phase is of predevelopment of innovation in concern, followed by take-off, acceleration, and stabilization. The field has been developing consistently since then along with the progression of underlying principles and different approaches being added theoretically. The phases within a transition process have also been amended, where the process starts from 'experimentation, followed by acceleration, emergence, institutionalization and stabilization' (Loorbach et al., 2017). Within these phases there is a dynamic, iterative process of build-up and breakdown over a period of decades, without going into a digression about transition theories and their dynamics. Although it might be interesting to connect these value concepts to the phases, it's out of scope for this thesis project. The essential takeaway from this discussion is that, these values will be created in the long-term process of the circular built environment transition, which is in question in our project, Drenthe Woont Circulair.

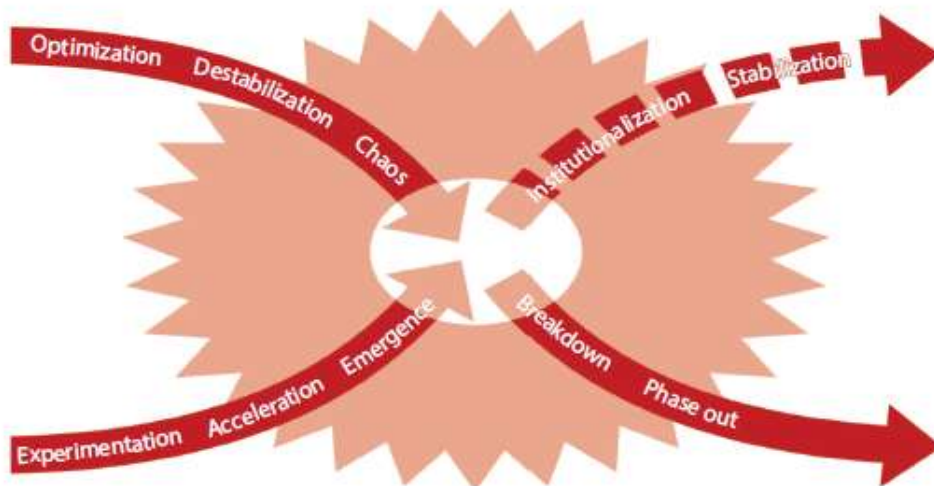


Figure 17: The phases of transition process (Taken form Sustainability Transitions Research: Transforming Science and Practice for Societal Change (Loorbach et al., 2017))

7 Conclusions, Reflections and Recommendations

7.1 Conclusions

Within the experimental setting of the Drenthe Woont Circulair, this thesis project aimed to explore new perspectives on value creation in a sustainability transition context. To that goal the following overarching research question was developed:

How does value creation change in sustainability transition experiments?

To develop an answer to this question building up a conceptual understanding in a theoretical analysis and empirically studying multiple projects that together form Drenthe Woont circulair were both consequential. The first step to answer this question was understanding the underlying concepts and mechanisms of value creation, thereafter, discussing those elements in the context of sustainability transitions and from there proceed to study the projects.

Value and Values | As a *first step* to studying the theory, it was deemed necessary to conduct a brief semantic inquiry into the word *value and value creation* as these terms are widely used in literature but seldom defined as to what is exactly meant by them. The principles pertaining to ethics, morals and culture of individuals or people collectively represent *values* that are held by them and these values lead one to have preferences and assign importance to tangible and intangible things. These subjective values determine the worthiness or *value* of products and services and they must be considered when innovating for transformative change. The discussion of *values* became central to this thesis research study.

Traditional Business Values | Before realizing the changes that can contribute towards sustainable value creation, it was necessary to research what had been the approach to value creation traditionally and how its perception is enabling the unsustainable model of growth currently. Viewing through the lens of values, our modern capitalist society was argued to singularly value the endless accumulation of wealth and resources at the expense of broader society and environment. This deification of economic progress is exemplified by assessing growth and development through GDP. Capitalism current conceptualization *values* or rather *devalues* the environmental and social dimensions, the contribution of nature to societal wellbeing and human sustenance, and the complex aspirational, cultural and psychological values of human beings. This devaluation has resulted in the gross unsustainability in our current economic system, where the damage to our environment and social structures are considered as an externality, decoupled from all economic activity.

These capitalistic values representing the imaginary of progress based on endless accumulation permeates the cultural, social, economic and political architecture affecting the values of individuals and institutions. In the business sphere, the ideation and motivation for conducting business is derived from this commodified view of environment and even human beings, and the role of business in society was argued to be to solely maximize their profits. *Creating value entirely relates to generating monetary gains in traditional business logic.*

Values and Business Models | How this monism translates in operations of an organization *was the next step to research*, which led us to the concept of business models, simply described as the way business is done. The entire logic of a business model revolves around value and value creation or contrarily stated *business models are a way to conceptualize value creating processes and their configuration*. Within that representation the *rudimental block of value creation is the value proposition* which describes the tangible and intangible benefits of a proposed solution. The value that needs to be created and for whom, first needs to be proposed.

Value Creation-Traditional Lens | *The major barrier in traditional business thinking is narrow conceptualization of value and 'egocentric' view of organizations as value creating processes are ultimately aimed towards organizational value appropriation in form of financial profitability and creating a competitive advantage for themselves. They themselves are the focus of proposed value and these value propositions are entrenched in the 'for-profit' logic. More importantly the environment and broader society are not even part of this inadequate proposition. CSR activities are argued to be 'patch work' to cover the damages done while continuing the exploitative practices, thereby not addressing the root causes of the problems and keeping the narrow view of value creation intact.*

Sustainable Value and Business Models | After establishing what is being done traditionally, we advanced the study towards determining what underlies sustainable value creation in innovating for transformational change. The argument of BMs being logical representations of value creation processes takes even more precedence when sustainable business models are concerned, because value creation is the center piece for practice to transform and embed sustainability. *Sustainable outcomes will only be generated when the value creating processes of businesses are themselves sustainable.* To understand how that is, we first defined what is meant by *Sustainable Value*: It pertains to a deliberate inclusion of ethical and moral considerations of environmental preservation and socially equitable development considering human needs and values on an individual and societal level.

Sustainable Value Proposition | To create sustainable value in practice, the first and fundamental step was to be *designing the desired benefits for the social and environmental dimensions as value forms*. This facet connected to our argumentation before that the rudimentary block for creating value is the value proposition, and in order to *create sustainable value* we must first *propose sustainable value*. The mechanisms that will lead to creation of sustainable value will revolve around and follow from the *sustainable value proposition*. Innovating in context of societal transitions towards sustainability was deemed as transformational innovation. In context of transformational change, central to the business model transition is *rethinking the value proposition* of the innovative product/service where the desired sustainable outcomes *are embedded within the design of the innovation itself*. **Value proposition reform** is central for sustainable value creation towards transformational change.

Determining Elements: Sustainable Value Creation | Creating value sustainably is the antithesis of its traditional antecedent. We identify three determining elements centrally connected to the value proposition for creating value towards transformational change:

1. It first entails the move away from egocentric view of organizational value capture, to value network thinking which reflects proposing sustainable value for a broad range of actors, organizations and other institutions which directly and indirectly influence the innovation and offering of products/services. An important consideration here is that society and environment need to be central from since we were discussing from a stakeholder perspective. Inclusion of actors from diverse backgrounds and roles in society is important to generate shift in markets towards sustainable development.
2. This multi-actor value architecture must embrace co-creative, collaborative manner to create and deliver the proposed value, capturing synergies that remained external in the egocentric approach, hence making the business sphere more inclusive.

3. To that point, the economic value capture modelling should distribute costs and benefits equitably among actors while regenerating social and natural systems beyond the organizational boundaries of the firm.

But What are the Values that must be Embedded? | The most essential logic and a question that remained henceforth unanswered was *how* the sustainable value proposition central to value creation in transformative context can be designed; *What are the values that need creation* for embedding sustainability at a company and system level, and *how can they be translated into practice* so that value co-creation can occur. **The Value Framework** identified in literature provided the most holistic approach to answer both those questions where the aim is to create meaningful value propositions for innovative products and services aimed towards societal transformation. The framework addresses the pivotal determinants found for creating sustainable value where, as a first layer, value is defined for four societal levels: *User, Organization, Ecosystem and Society*. For these four levels, the framework discusses value concepts for proposing value from *four perspectives of value: Economy, Psychology, Sociology and Ecology*. The framework defines a value concept for each level from these four views, giving us sixteen value concepts on which values could be proposed. We discussed the viability of this framework matching the conceptual grounding with the strategic shifts necessary for sustainable value creation found in literature, bringing forward its novel approach (Table 2).

Value co-creation in multiple forms is indeed a novel research topic as not many cases/examples are found yet. Analyzing and presenting theoretical concepts in detail was important to understand value creation change for sustainability transitions.

Shift: From Theory to Practice | Moving from theory to empirical case analysis, this framework provided the bridge to connect theory and practice and was operationalized as a tool to explore the sustainable value embeddedness in visions and designs of consortia developing the circular social houses. The value concept definitions were studied thoroughly to understand, first in an objective way to correlate with the author's view, and then apply that knowledge in the context of DWC cases, translating the meaning of those concepts for DWC value statements. We reflected that approach to the study was chosen to be analytical as actively participating and using it in a workshop setting was not possible. This reflects on the dynamic capability of this framework, where it can be used in many scenarios.

Framework Operationalization | *The first step* in operationalizing the VF for DWC cases was mapping the actors involved to the different levels of value. Reflecting at the results from the literature study, the mapping of stakeholders evidently illustrates that the focal firms within the consortia and housing associations understand the need for diversity in actors involved in such transformative innovations, letting go of the individual view. Almost all consortia have mentioned that ecosystem or systems thinking to be relevant part of their design vision, and the team compositions have diverse actors, also mentioning collaborative partnerships that they have fostered over time, indicating trust and reciprocity. DWC living lab environment has a presence of multitude of actors, from diverse expertise fields, e.g. one of the consortia mention that they will include a philosopher, environmental psychologist, health scientist among many other actors in their design process, and other projects also have wide ranging members. Their expertise will bring new perspectives and insights and change the normative thinking. DWC value architecture has the potential to engage in sustainable value co-creation. Reflecting back on the way the framework was operationalized, engaging such diverse group of stakeholders in a brainstorming session for proposing values from the four perspectives, at sixteen value elements would be an intriguing and revelatory experience on how different perspectives align and where do the possible value clashes in lie amongst different actors. This is part of our recommendations for DWC and future transition experiment projects.

An interesting discussion point came to light when the User level was assigned to the residents that will be inhabiting the constructed circular social houses. The value is provided to the user, i.e. happiness, belonging, value for money and eco-effectiveness, but the ideation of creating propositions is done by the consortia members that can understand the needs and aspirations of the user, in our case that role was filled in by the resident consultant collaborating with the focal design firm. In a collaborative setting the User's direct perspective can be gained, also revealing the values that will be created for them.

Analysis: Value Embeddedness | *The next step* was the value proposition analysis. As an additional layer to check the completeness of the value proposition and a check on emphasis of values, a scoring rubric was developed while the values were being coded, reflecting on the variation in the depth of discussion of the coded data. The scoring system enabled us to see where is the value proposition fully developed, matched with products services and central to the vision of designing the project and on the other end of the spectrum show us the gaps where value elements have not been addressed at all or in a comprehensive way. The scoring rubric goes from '0' to '4'. The score allotment of '2' is the benchmark that the value element is important to the project's vision, but it is not elicited how the consortia want to create that value.

The Research showed that the designs, visions and philosophy for innovating circular social houses presented by the consortia had conceptualized and embedded multiple value forms. Innovating for circular social housing is a system activity and there is possibility of offering a bundle of products and services that can contribute to creating value sustainably and more importantly circular housing is at the intersection of sociological, psychological and ecological value perspectives and this framework could be maximized its capability for assessing holistic value propositions for meaningful innovations.

Outcomes | Analyzing and presenting the value analysis in the spider diagrams illustrated the most emphasis within the values proposed in on the ecological value perspective. We recognize it to be the core value proposition, as circularity, which is a part of the ecological perspective, is the main ambition of DWC projects and hence it is central to their proposed value. Almost all consortia scored well for all four ecological value concepts for the levels of value: Eco-footprint, Eco-effectiveness, Sustainability and Livability of the environment. All projects had innovative ideas and designs imbuing circular economic principles. The societal level of value, livability of the environment was specifically addressed emphatically by a couple of projects.

Varying level of scores for different projects were present in the psychological and sociological perspective, with one of the consortia presenting a philosophy for developing their projects "The good life philosophy" which makes the wellbeing and happiness of the user central to their entire design, stretched out to wellbeing of broader society as well. It was concluded that the societal level of value and the user level are particularly closely linked for the psychological and sociological value perspectives. The organizational value concepts of 'core values' and 'social responsibility' were allotted a score of 2 for all the consortia, as it was not conceivable from data gathered as to which if the organizations have a better sense of social responsibility or better core values. These judgments could not be made.

The economic value concept was the least emphasized with concrete propositions, but an expression of finding new business models and, new forms of value streams which can be incorporated in their revenue modelling is present by almost all the consortia. One consortium has presented and explained the new form of contract and business model they will be incorporating in the development of their project and it was a new form of collaborative offering through a product-service system business model. It can be concluded that revenue generation for sustainability oriented projects is not equally

matched with other and also represents a need for new financial frameworks reflecting the sustainable outcomes, because this brings us to the work done in the value explorer scouting group in DWC living lab environment.

Reflection: DWC Value Workgroup | The exercise and point of discussion within that workgroup became to attach monetary gains to the perspectives of value other than economic value. The idea was to add it to the cost benefit analysis, to have better profitability from the circular housing development projects. In the discussion with the stakeholder taking the lead it was expressed that monetizing these values is counterproductive to the argument of qualitatively embedding these values in the innovation design, but his argument was that in the current capitalist system they need to report these values in some form to gain more investment and financing opportunities for such projects because the actors involved in financing and providing subsidies will only relate with 'benefits' expressed in term of monetary value. This points out that the narrow conceptualization of capitalism is hindering business transition to sustainability and needs to be addressed on a company as well as system level.

Concludingly, the DWC living lab environment has potential to create value from all four perspectives and at all four levels of value. The scores allotted to value concepts of 3 and 4 depict that implementation of the designs, when the construction and implementation phase starts, will lead to the creation of that value concept for the stakeholder value is proposed for. Since projects are in the design phase the value creating potential of designs is portrayed. The potential for value creation towards transformative change is present for DWC projects. There is although a lack of discernible co-creative quality of value creation as the value architecture partners are not part of joint sessions on design as per data gathered. Within the scouting groups too, only members from focal firms of consortia and representative form housing assassinations are present. Moving away from viewing values monetarily and involving actors in co-creative sessions for conceptualizing multiple value forms are essential takeaways for DWC and future transition projects.

Completing the research cycle, lastly, we have contributed to theory based on the premise of the value framework and knowledge gained for DWC living lab environment. A synergy is shown to be present in the value framework and M&E layers within DWC. Living lab can be viewed to incorporate the three levels of 'user, organization and ecosystem'. Learning from living lab literature and DWC empirical analysis, value concepts have been defined for a living lab level from the four perspectives of value and the concepts are: New business models/circular economic business modelling for the economic view, Ambassadorship for the psychological view, inclusivity for the sociological view and novel design techniques for the ecological view.

7.2 Limitations of the study

A primary consideration, after the exploration of the problem posed by the DWC stakeholders and subsequent theoretical study, was to operationalize the framework in a collaborative manner within the DWC project environment. So, initially the idea was to use the framework collectively with multiple stakeholders involved in DWC, consortia members (diverse group of actors), housing corporation representatives, municipal officers, residents, or resident consultants and if possible, representatives from the NGO's involved. Then lead them to brainstorm, with the provisional explanation of the framework, value propositions for the development of the innovation system for circular houses and potential products/services based upon the 16 different value domains present in the framework. This was to be done in a workshop setting, so that the co-creative process, which is a central theme and ambition within the DWC project environment as well, can be actualized.

The workshop setting could not be created as right at the beginning of this project, the corona crisis began. There was total uncertainty and constant shifting dilemmas regarding the possibility of actors getting together, as everyone was hoping the cases to subside after the initial lockdown measures. We do not need to go into detail about the changing conditions for work everywhere due to this pandemic. Following that, the research and the framework was presented to the value workgroup members as detailed in section 3.3.2, and from there the intervention for DWC took a different course which we have delved into in section This will be discussed more in the recommendations section below.

The vision documents and other literature, which was used for the value analysis, albeit being rich sources of data for value proposition assessment, were not providing real time data for all the projects. Interviewing stakeholders revealed more information, and also corroborated the values mapped, but it was also functional in providing other insights about the stakeholders views, the challenges they face, and also changes they had to make in designs due to push back from other stakeholders. In one instance, it was revealed through interviewing that one of the products attached to the value element of 'eco-footprint', the product being the 'composting toilet', had to be removed from the value proposition as the housing association thought it would be unhygienic to include it as part of their social houses. Access to representatives from 3 of the consortia was gained, but the rest of consortia and representatives from the housing associations could not be reached for discussion/interviewing, due to a shortage of time but also some representatives were not lenient with their time and wanted to avoid interviews and discussions with student researchers as communicated to me by my project supervisors. This lack of current data, which would have acted as an added layer of reliability through discussion of values mapped, is a limitation, in terms of being completely accurate with the empirical analysis conducted.

Another limitation, which might seem superfluous, was the language barrier due to my unfamiliarity with the Dutch language. The prowess of collecting data, to be an active participant in the discussions within DWC, more importantly within the value workgroup, and also from the perspective of the internship with N.I.C.E. was made challenging as the internal environment of the company, documents, reports and all communication was in Dutch, and with corona crisis happening right at the start of this project, the work was shifted entirely online, which made it harder to be part of the community of interns that participate in DWC project. But more importantly, my primary sources of data, the vision documents, team documents and other internal reports which became essential for the analysis in the corona situation were translated, but no matter how good the prowess of google translate is, there is always loss of data in translation of such documents with heavy graphics and text embedded within those graphics, which gets lost in translation. All effort was made to have zero loss of data though.

With help from fellow interns in the later part of the project, the discussions within the value workgroup were monitored and they became actively involved in discussing and aiding the agenda of the Value Workgroup, where they helped me understand many of the statements that did not make sense after translation. I had weekly discussion sessions with them which was quite helpful to discuss what's happening in DWC. These interns were a huge help in providing continuity to the research and I have expressed my sincere gratitude in the preface of this report to their collaborative effort and having discussions with me. All in all, I traversed through this limitation, but in my belief my contribution with being a more active participant would have been greater both for DWC project, and my thesis research.

7.3 Recommendations and Further Research Work

Drawing from the lessons learnt through DWC value analysis (section 5.3) and reflecting on the main results and conclusions, these recommendations for following this research study are made for DWC and future transition projects:

- **Learning Tool:** The scoring system set up for value proposition analysis along with the explanation for the relevance of the score can act as a learning tool for consortia members to reflect and learn from the values proposed, and the concrete creation mechanisms attached to the complete ones.
- **Collaborative Approach:** One of the pivotal facets of value creation towards a transformative change is the co-creative, collaborative design and implementation. This framework can be used as the tool that enables co-creative design. This is the most important recommendation for DWC's consideration as it is connected to the all the other ones too.
- **Inclusivity of stakeholders:** The diverse, multifaceted network of actors brought together under the umbrella of DWC are not being involved in the scouting groups. This connects to the collaborative use of the framework but actors from all levels, and specially from the ecosystem level, should be more involved in discussions of value creation and ideation of propositions. The project manager in DWC initiative should facilitate that.
- **System Level integration:** Answer to the financing dilemmas, is involving actors with influence over policy, investments and governing power to make system changes. Through their involvement in discussions of value beyond monetary value, the discourse can change, and favorable policies, subsidies and investment opportunities could be attained through revealing multiple value creation potential of such projects in the future.
- **Enhancing Value Propositions:** In performing this value analysis of DWC projects, the value gaps, where value propositions remain amorphous or not at all present have been revealed. This presents an opportunity to-Identify Gap; Select Relevant Stakeholders; Ideate value propositions to enhance the value potential.
- **From Single to Multiple Value Conceptualization:** For DWC stakeholders and their institutions, for future transition projects, and as the focal conclusion of this study, there is an urgency to move away from viewing value solely from a monetary perspective, to a much more nuanced and holistic view of values that must be created for instilling sustainability. The analytical study with operationalizing the value framework showed that there is potential for multiple value creation, but on the other end the discussions within the value work group depict that these values are still being viewed through a monetary lens.
- **Flexibility and dynamic nature of the value framework:** This framework can be potentially used in any industry or sector for products and services that are not linked with sustainability transition research. It can create meaningful proposition for the user while embedding the ethical and moral consideration towards society and environment within the innovation

From an academic research standpoint, a couple of relevant directions for continuing research come to light:

1. We discussed that there is need for metadata for understanding how the values of social responsibility and core values permeates through the organization and who has the agency to initiate such changes in values. Researching and developing frameworks for institutional value change towards sustainability could be an interesting research field to explore.

2. Reflecting on the work of value workgroup, a mind map of value flows was generated with revelation of connections based on exchanges and interconnectedness through monetary value. It would be quite an interesting assignment to design a way to map not just monetary value flows between different stakeholders in the innovation ecosystem, but to follow the flow of all the value concepts part of the value framework by coding and mapping the different value exchanges.

3. Within the subject of sustainability transition research, addressing the role of capitalism enabling unsustainability and how can policies be reformed to have a form of *responsible capitalism must be explored and addressed*. Linking multiple value conceptualization to policy reform can help induce new forms of standards and regulations, investment portfolios and subsidies that will favor creating environmental and social values.

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Appendix 1

An initial reading list prepared as part of information package provided to stakeholders within the value workgroup.

Introductory foreword:

Article highlights are being presented here to initiate dialogue and build a background on the change in business thinking and rationale required for actualizing sustainability through transformative innovations, ultimately aiding in the systemic transition.

The change in business thinking and modelling should contribute to embedding sustainability in innovation design, the corresponding business operations and the value network, but simultaneously, it should be aiding in changing the system i.e. breaking down the normative socio technical system and replacing it with a sustainable one. For DWC the ambition is successfully transitioning towards a circular built environment sector.

In business modelling/thinking the entire discussion revolves around **'value'**, where traditionally, companies and organizations have just focussed on creating 'economic value' i.e. monetary gains for themselves and their supply chain. This 'Business as usual view' is inherently wasteful, and the discussion has shifted to creating value for all the stakeholders wherein environment and society are equally important.

Keeping in sight the arguments made above the list of articles has been specifically curated to cover all these dimensions.

Summaries for each of these documents were provided in PowerPoint presentations.

Content List:

1. Transformative Business Models for Sustainability Transition

Proka A., Beers P.J., Loorbach D. (2018) Transformative Business Models for Sustainability Transitions. In: Moratis L., Melissen F., Idowu S. (eds) Sustainable Business Models. CSR, Sustainability, Ethics & Governance. Springer, Cham
https://doi.org/10.1007/978-3-319-73503-0_2

2. Values-Based Business Model Innovation: A Toolkit

Breuer H., Lüdeke-Freund F. (2018) Values-Based Business Model Innovation: A Toolkit. In: Moratis L., Melissen F., Idowu S. (eds) Sustainable Business Models. CSR, Sustainability, Ethics & Governance. Springer, Cham
https://doi.org/10.1007/978-3-319-73503-0_18

3. Value mapping for sustainable business thinking

N.M.P. Bocken, P. Rana & S.W. Short (2015) Value mapping for sustainable business thinking, Journal of Industrial and Production Engineering, 32:1, 67-81,
<https://doi.org/10.1080/21681015.2014.1000399>

4. Collaborative Business Models for Transition

TNO report by Jan Jonker, Frank Berkers, Milou Derks, Naomi Montenegro Navarro, Sara Wieclawska, Finn Speijer and with guest contributions from: Kasper Ploegman, Hilde Engels

5. Business transition management: exploring a new role for business in sustainability transitions

Loorbach, D., & Wijsman, K. (2013). Business transition management: Exploring a new role for business in sustainability transitions. *Journal of Cleaner Production*, 45, 20–28.

<https://doi.org/10.1016/j.jclepro.2012.11.002>

6. Managing sustainability transformations: A managerial framing approach

Lahtinen, S., & Yrjölä, M. (2019). Managing sustainability transformations: A managerial framing approach. In *Journal of Cleaner Production* (Vol. 223, pp. 815–825).

<https://doi.org/10.1016/j.jclepro.2019.03.190>

7. The concept of value in circular economy business models

Uusitalo, T., & Antikainen, M. (2018). The concept of value in circular economy business models. ISPIIM Innovation Symposium, March 1–14.

https://www.researchgate.net/publication/324222810_The_concept_of_value_in_circular_economy_business_models#:~:text=Transition%20towards%20the%20circular%20economy,value%20proposition%20and%20value%20capture.

8. Circular Economy in the building sector: Three cases and a collaboration tool

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>

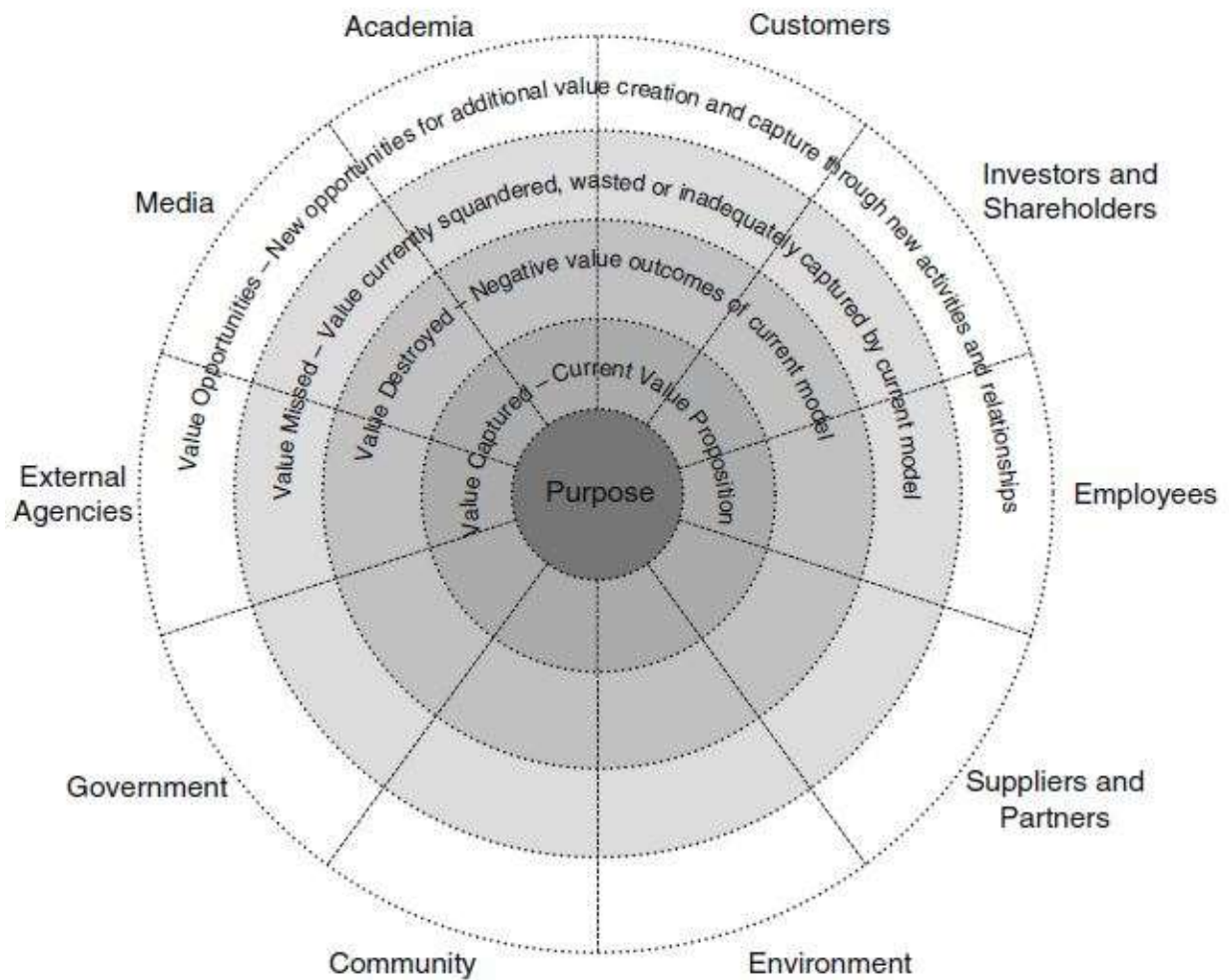
9. Circular Ecosystem Innovation: An initial Set of principles

Konietzko, J., Bocken, N., & Hultink, E. J. (2020). Circular ecosystem innovation: An initial set of principles. *Journal of Cleaner Production*, 253(January).

<https://doi.org/10.1016/j.jclepro.2019.119942>

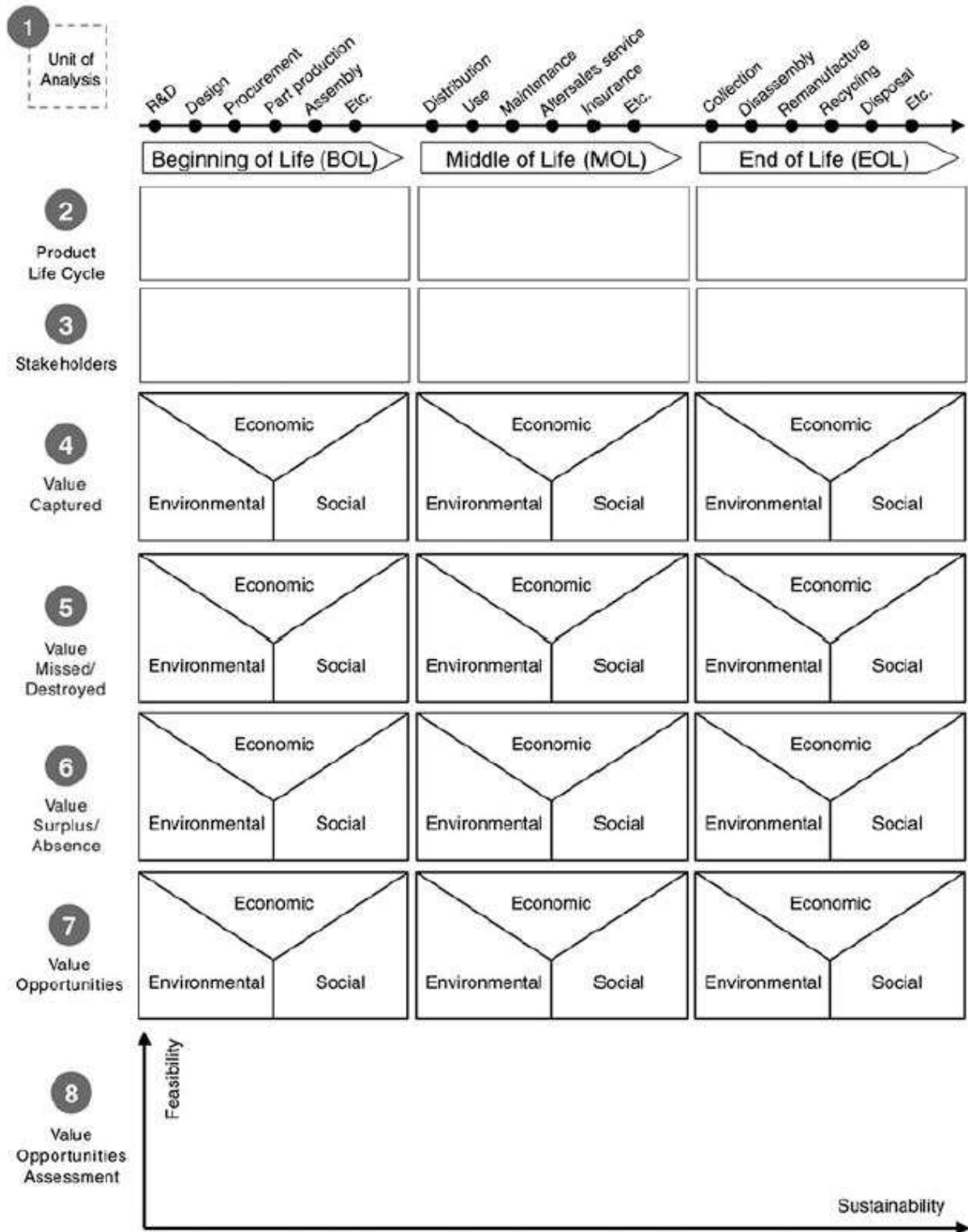
Appendix 2

Graphical representations of frameworks considered through studying literature



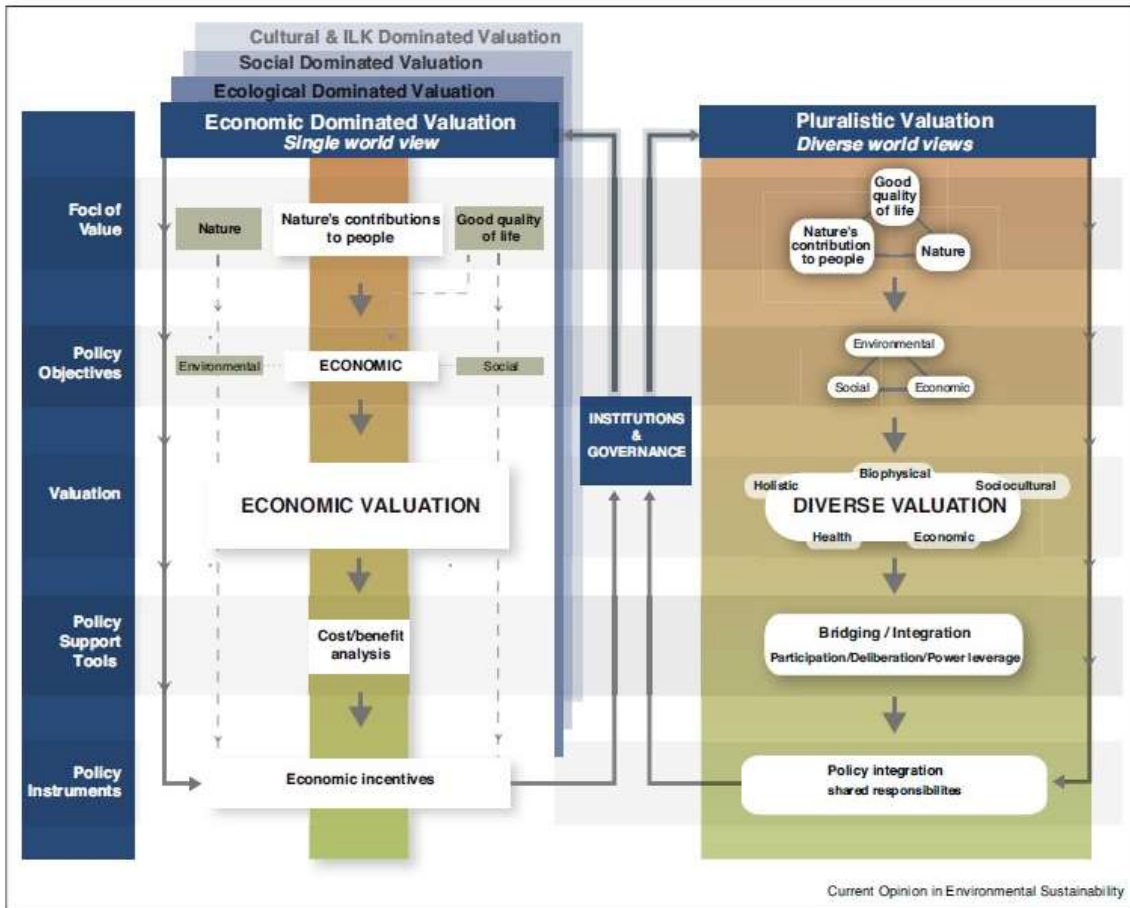
Cambridge Value Mapping Tool

Taken from "Value mapping for sustainable business thinking" (N. Bocken et al., 2015)



Sustainable Value Analysis Tool

Taken from "Creating and Capturing Value Through Sustainability" (Yang et al., 2017)



A stylized illustrative framework of contrasting approaches to the process of valuation. The right side panel emphasizes the importance of a pluralistic valuation approach, compared with value monism or unidimensional valuation approaches to human–nature relationships represented in the left side panel.

Valuing Nature’s Contribution to people: the IPBES approach (Pascual et al., 2017)

Appendix 3

Table 12: Values Mapped for the consortia - Dit is Thoes

	User	Organization	Ecosystem	Society
Economic view	Value for money	Profit	Stability	Wealth
	Sharing Economy - community based sharing of Products and services among residents.	Renting/purchase New market development	Developing new strategic relations and developing new business models; Creating space for new businesses and entrepreneurs to join; Creative commons license - releasing of intellectual knowledge for use by other actors	Economically resilient society; Energy cost savings as self-sufficiency driven communities; Concept of decentralization and creating sustainable market; Repeatability due to transparency and knowledge sharing
Psychological view	Happiness	Core Values	Shared Drivers	Wellbeing
	Pleasant environment; (Social and cultural factors have been thought about) Mentions happiness is paramount	Beyond just circular construction, built environment has large impact on society so they design with taking that in account; Working together;	Building a sustainable, circular community; Share knowledge and collaborate with other 5 consortia Forming a vision on circularity beyond just raw materials Quality of life	Living in healthy and natural surroundings; Design tailored for modern needs - integration of work and personal lives with attention for children (play) leading to happiness
Sociological View	Belonging	Social Responsibility	Reciprocity	Meaningful Life
	Not just a house but about providing sense of community; Building a self-sustaining community which is more resilient to the economic crisis: Community OS and App - Social relationships will be pursued	Circular built environment; Creating awareness and pathways for new businesses; Ecological and social sustainability (Brand image as well)	Open exchange of information; like suppliers, new business models, financial information; Necessary for circular economy and society; Ecological system innovation across different levels of scale; Network of different projects creating new relationships	Contribution to a more sustainable world by way of being in a community; Belonging to a group of like-minded conscious individuals; reduced stress in life; Communities connected
Ecological View	Eco - Footprint	Eco - Effectiveness	Sustainability	Livability of the environment
	Setting up of user practices and initiatives such as: Food production, energy production, most sustainable & circular supply selection, reducing the usage of water and inherent water cycle	Building circularly and hence designing solutions for sustainability; Less ecological impact; Circular social housing; 10-R framework	Circular building; Waste as recourse; material scarcity being addressed; Setting up of relevant KPI's	Saving the essential resources for the next generations;

Table 13: Values Mapped for the consortia - CTC - Cut the crap / Circular future consortium

	User	Organization	Ecosystem	Society
Economic view	Value for money	Profit	Stability	Wealth
	Social housing	True value of the product where externalities have been internalized;	Degree of circularity determining the financial value; Valuing at Real Value along with new regulations and taxation; New revenue and value models to be explored like sharing economy; Platformization in construction	Strengthening economy through developing the Green Hydrogen Economy
Psychological view	Happiness	Core Values	Shared Drivers	Wellbeing
	Focus on resident satisfaction and their experience is mentioned throughout the document!	Moving away from theoretical discussion and bring the knowledge to Practice; Least impact on environment - best method and design; "Integrity as a foundation";	Initiate the change in construction and implement circular economy collectively; Changing view of welfare from 'money' to conservation of Earth's ecosystems; Mention of paying attention to the individual and common drivers - sustainability etc.;	Collaborating and catering to the needs of the partners involved in the project directly, prospective residents and other organizations involved; Wellbeing as a consideration "we encourage resident satisfaction of at least 7.5 by focusing on actively increasing ownership and pride
Sociological View	Belonging	Social Responsibility	Reciprocity	Meaningful Life
	Residents can be open about their needs and participate within Drenthe Woont Circulair	Not building more than necessary; Closing the loop and becoming less and less wasteful; Making sustainability visible; Create social value (?)	Involving actors from quite diverse streams: leading builders, processors, biologists, inventors, technicians, architects, installers, students, communication experts and engineers; Align expectations and visions	Diversity in society and culture; Stimulating safety; Development of the area;
Ecological View	Eco - Footprint	Eco - Effectiveness	Sustainability	Livability of the environment
	Influencing behavior; Composting Toilet; Lesser footprint with green energy consumption	Focus on Use Phase energy use (deemed to be more important) Tightening the environmental performance requirements of the buildings - enabling circular construction; Bio based building materials; Usage of Hydrogen in the design; 9-R framework and IRIS model-examples of techniques that can be used; Less paper and more digitalization	Circular construction sector; Enabling reuse of materials through circular design strategies; Local supply chains and circular materials - selection of partners with that criterion; Sustainable building advisory agencies	Recovering the green cover through designing for reuse of materials; Tapping into existing structures and transforming them to avoid building anew - hence avoiding consumption of new land and building resources; Embracing Biodiversity - Making green cover, also for shading part of the design and making these gardens also friendly/accessible for animals and insects

Table 14: Values Mapped for the consortia - Plan C

	User	Organization	Ecosystem	Society
Economic view	Value for money	Profit	Stability	Wealth
	Mentioning value for money for the residents and easy maintenance and servicing	(Finding new opportunities based on a value map)	Discovering Value streams in the experimental garden; Creating new business opportunities for the entire supply chain and changing the normative way of doing things;	(Nothing specific is mentioned) Ideas about a circular community and society, the idea of people centric design can contribute to creation of sustainable wealth for people
Psychological view	Happiness	Core Values	Shared Drivers	Wellbeing
	(Mention happiness of people as a criterion for designing) (Satisfaction of resident mentioned) Involvement of a Resident consultant in the design phase and beyond; Lifestyle and needs of people are central to the consortia's design - emphasis on loss of social structure and rising alienation. Resident consultant acts as a buffer between the designers and prospective tenants	Circularity in building and going beyond proven concepts; Focus on people and their wishes in their design; Collaboration is key!	Members of the consortia are varied but the vision is the same - building circularly and thinking in an ecosystem way; "Trust, Ownership and intrinsic motivation"; Common denominator - members have worked with circularity	Balance in Ecology, Tech, & people; Adding the journey of customers in the designing, construction and management processes: eg., linking maintenance with tactical operations; Designing for biophilic, livable environment will be beneficial in overall wellbeing of people; "well-being of residents cannot be separated are seen from the surroundings"; "The Good Life" philosophy where rather than technology people are central with focus on happiness and healthy lifestyle - also focusing on psychological wellbeing!
Sociological View	Belonging	Social Responsibility	Reciprocity	Meaningful Life
	Involve the residents in the design and adopt their perspectives (People Centric view mentioned); Resident consultant?! Relationship with their surroundings! - "In a healthy environment there is plenty of opportunity to meet each other: it invites exercise, walking and cycling, also to reach sights at a short distance"; Building a services platform for the community to interact and also be of help to each other;	Establishing their image as frontrunners in circular building; Peoples wishes and the effect of the product on their behavior; Communication and behavior change within the project as well as for future projects; Security and sense of safety for the tenants	Mapping the flow of values in the form of material, service, product, customer relationship, data, image etc. relative to waste; Involvement of diverse group of partners in the consortia that openly share insights and data; Continuous process of value creation throughout the lifetime of the	Changing the way people behave and interact within the consortia - leading to change in work environment on a broader level; Social safety (ambition); Balance and recovery form work stress mentioned as goals;
Ecological View	Eco - Footprint	Eco - Effectiveness	Sustainability	Livability of the environment
	(Influencing behavior is mentioned); Design choices made to influence conscious and unconscious behavior of inhabitant	Designing for circularity and preserving environment; "10-R model and systems thinking"; Biomimicry, biophilic design, working with resourced and recycled materials	Thinking in an exosystemic way and bringing different disciplines together; Bottoms up approach; All partners of the consortia have been experienced in sustainable design and have a proclivity to make a difference;	Creating and maintaining a healthy living environment; Biophilic designer - Bio Inspired Innovation - (BII); Biomimicry, biophilia and circular society will provide the environment and surroundings some much needed breathing space; Quality resilient and sustainable living environment

Table 15: Values Mapped for the consortia - Het Consortium

	User	Organization	Ecosystem	Society
Economic view	Value for money	Profit	Stability	Wealth
	Saving on energy costs makes the house even more affordable; Pay per use for all devices	Less of an investment in procuring new materials; Adaptable living which can reduce maintenance and construction costs	Demolition is not looked as a extra cost activity but it generates capital as materials are being "harvested" and collected for reuse; Housing as a service where	
Psychological view	Happiness	Core Values	Shared Drivers	Wellbeing
	Increasing loneliness and alienation from the world is being addressed and the need to bring some change	The philosophy of "Living" Circular living;	Thinking in systems; Collaborating differently in the in an innovative process; "Living in a resource bank";	Changing Lifestyle on a societal level;
Sociological View	Belonging	Social Responsibility	Reciprocity	Meaningful Life
	Place where people can belong, love, relax and be a part of a community with the common goal of fighting against climate change and threat to our future generations; Involving people in the process of exploring what is to live circularly	Promoting the reuse and recycling of raw materials in the supply chain; Good, affordable living	Collaborating in innovative ways is mentioned; Harvesting of raw materials, their storage, recycling and reuse; The partners in the consortium enter in the long-term partnership of at least 50 years for these domains: Design, Build, Finance, Maintain, Collect and Re-use.	Unity in people on the criticality of the state of our environment and coming together to solve these problems; The house is addressed as "More than a number of walls built and a roof over the resident's head. It is a place where they can "BE" where they love, retreat, relax, and be alone reenergize
Ecological View	Eco - Footprint	Eco - Effectiveness	Sustainability	Livability of the environment
	High quality living space where energy consumption is kept to a minimum; Aiming for energy neutral living	Reuse of raw materials: i.e. high-quality recycling and reuse; Reducing usage of new materials Purchasing of bio-based raw materials which are also reusable; Modular assembly of the living spaces; hence promoting reuse; Modular Prefabrication; Easy replacement for changes in the energetic and performance requirements in future; Use of the house and all equipment as a service which will prolong the use phase and promote reuse	Future Proofing the building; Closing the cycle by the collaboration of all consortium members; building as a temporary composition of demountable components and materials; "OnelinkLCA" - for mapping environmental impact; Dutch environmental database for all calculations; "Making living CO2 neutral"; Materials passport - Madaster platform	"LIVING" - philosophy for the design mechanism; Let people live without exhausting the earth resources; Making sure the raw materials used have the least impact on Earth and that it can recover; Less waste and material loss in the process of prefabrication

Table 16: Values Mapped for the consortia - DWNC

	User	Organization	Ecosystem	Society
Economic view	Value for money	Profit	Stability	Wealth
		Housing will be a material bank or a temporary material depot - hence reducing the costs of investment in future construction and renovations	Creating of these forms of value goes beyond just financial gains; Healthy business case with new forms of value; Looking for new value models	Socio spatial added value that goes further than the land price
Psychological view	Happiness	Core Values	Shared Drivers	Wellbeing
	Comfort of resident will be considered in the designing process	Circular economy answers to the over consumption of earth's resources; Willing to learn and change the normative way of doing things	Conservation of natural and social capital by the way of circular living; New generation of social housing; Fundamentally different basic attitude from all members of the chain; Inducing shared responsibility with the supply chain partners	Health of residents is on focus; Adapt housing to the specific needs of the residents with the flexibility of the housing corporations; Natural building materials will be having a good impact on health of people
Sociological View	Belonging	Social Responsibility	Reciprocity	Meaningful Life
	Individual and communal space, greenery and connection on the streets;	Reducing the negative impact of developing, constructing and using a building;	New forms of Collaboration and cooperation; Being open is sharing and transparent in conveying the developments research and operations by all partners; Well documented, transparent working process in all phases of development and discussion with relevant parties; iteratively making adjustments; The collaborating partners are from diverse backgrounds and the process has been well thought about; Consortium will take on a moderator role with allowing space for everyone to come forth and present ideas	(Mentions several times social sustainability) Circular housing contributing to healthy living environment; Everybody involved will be heard - hence creating more enthusiasm within the teams and generating trust
Ecological View	Eco - Footprint	Eco - Effectiveness	Sustainability	Livability of the environment
	The use phase of the constructed buildings will also have to be co2 neutral and low nitrogen; Using greenery as natural shading and as warming in winters (natural air conditioning)	Bio-based and ecological materials being used in construction; No toxic elements present in the construction process; Search for locally sourced materials; maintenance, future renovations; assembly and disassembly, and reuse; Sustainable materials and building with ease of disassembly; Wood is important in construction process as it imparts a great deal of benefits to the environmental and social health	Co2 neutral and low in nitrogen emissions; By using local, natural materials, we also contribute to a better health of the residents; Reducing impact of logistics by storing and sourcing locally; possibilities become inventoried and cataloged using the Madaster, New Horizon or another materials bank; Rethinking is number one on the priority ladder; Setting up a network of local suppliers for bio-based materials; BREEAM-NL, DGBC and WELL can be innovation points are obtained for innovative technologies and methods that demonstrate the durability of a project	Social living environment for people and nature that is in balance; Circular building means developing, using and reusing the built environment without natural resources unnecessary exhaustion, polluting the living environment and affect ecosystems; Closing natural cycles; (main focus) bio-based and ecological building

Table 17: Values Mapped for the consortia - Trias – A

	User	Organization	Ecosystem	Society
Economic view	Value for money	Profit	Stability	Wealth
		New contract forms;	New contract forms (within the supply chain); Testing ground as an opportunity to experiment with new regulations and push the conventional boundaries; Adaptive and flexible housing structures can create economic opportunities throughout the life cycle of the building/structure	Scalable circular economy
Psychological view	Happiness	Core Values	Shared Drivers	Wellbeing
	User experience is starting point (S0 - social); User health and satisfaction is implicated by every aspect of the building; Philosophy of design implicates that the needs of the residents are central and building the house is done around that	Being fully circular by 2040; Learning by doing and from the mistakes	Radical transformation of the construction chain	Mentions integrating the impact of the building on the ecosystem level; Circular economy supports the health and wellbeing of the people and nature
Sociological View	Belonging	Social Responsibility	Reciprocity	Meaningful Life
	"Resident must feel safe, Pleasant and welcome there"; Social space	Creating demand for new/sustainable materials and drive the supply	Mention of a knowledge bank; Being open and transparent; Developing new strategic relationships?	The vision differentiates the region based on heritage and cultural significance as well as the technological history of the region Drenthe. Also specify the larger economic centers of the region, And based on this analysis the housing needs to be adapted as the criterion and plans for development differ for the social needs of people in the distinct areas
Ecological View	Eco - Footprint	Eco - Effectiveness	Sustainability	Livability of the environment
	Collective energy production; Reducing energy consumption by the resident; Rainwater harvesting (reducing water usage from municipal source); Reducing the energy used through heating and cooling by using materials that prevent overheating in summers and loss of heat in winters; Design elements for maximizing natural lighting (kitchen, living rooms and bedrooms, also windows in ceiling) that reduce electrical energy consumption	Using less materials; Material passports recording all the necessary data of the; Catering to the specific demographic, the need for space changes and design activities can be attributed to save space and energy, maximizing efficiency and providing benefits in other segments; Durable structures that have a prolonged lifespan (contributing to circularity); Adaptive power and high-quality reuse; Use of materials with thermal mass; Vapor open materials;	Less material usage and more sustainable materials sourced locally; Maximum integration of renewable energy; Energy Bank: Area level energy generation and not building level; Use of the 10R model for circularity; Using old houses as material banks; (thinking about housing that is not susceptible to wear and hence has a truly prolonged life; reuse of the house (materials); Bio-based materials being used and moving away from materials inn the technical cycle: sustainable materialization is deemed to be very important	(Caring for animals and nature); soil and water management in consultation with an ecologist; Preserving the flora and fauna of the surrounding area and also take care of the materials being to develop pavements etc.; Cherishing the natural environment (flora and fauna) and new spaces preserves biodiversity, also taking special care of species which are most at risk; Insect population deteriorating: hence planting shrubs and trees provide biological value;

Appendix 4

DiT

	Economic view	Psychological view	Sociological View	Ecological View
User	1	2	3	4
Organization	1	3	2	1
Ecosystem	2	2	3	2
Society	3	2	2	1

CTC

	Economic view	Psychological view	Sociological View	Ecological View
User	0	1	1	3
Organization	1	2	2	4
Ecosystem	3	2	2	3
Society	2	3	2	4

Plan C

	Economic view	Psychological view	Sociological View	Ecological View
User	1	4	3	1
Organization	0	1	1	2
Ecosystem	2	2	2	2
Society	1	3	1	3

Het Consortium

	Economic view	Psychological view	Sociological View	Ecological View
User	2	1	2	2
Organization	1	2	1	4
Ecosystem	2	1	3	3
Society	0	1	2	2

DWNC

	Economic view	Psychological view	Sociological View	Ecological View
User	0	1	2	2
Organization	1	2	1	3
Ecosystem	2	3	3	4
Society	1	2	2	2

Trias - A

	Economic view	Psychological view	Sociological View	Ecological View
User	0	3	1	4
Organization	1	1	1	4
Ecosystem	2	1	2	4
Society	1	2	3	3

	Economic view				Psychological view				Sociological View				Ecological View			
Original	Value for money	Profit	Stability	Wealth	Happiness	Core values	Shared Drivers	Wellbeing	Belonging	Social responsibility	Reciprocity	Meaningful Life	Eco-Footprint	Eco-effectiveness	Sustainability	Livability of the environment
DiT	1	1	2	3	2	3	3	2	3	2	2	2	4	1	2	1
CTC	0	1	3	2	1	2	2	3	1	2	2	2	3	4	3	4
Plan C	1	0	2	1	4	1	2	3	3	1	2	1	1	2	2	3
Het Consortium	2	1	2	0	1	2	1	1	2	1	3	2	2	4	3	2
DWNC	0	1	2	1	1	2	3	2	2	1	3	2	2	3	4	2
Trias - A	0	1	2	1	3	1	1	2	1	1	2	3	4	4	4	3

Appendix 5

Interview Protocol

Agenda:

- ❖ *Introductions*
- ❖ *Interview*
- ❖ *Closing remarks/Questions*
- ❖ *Follow up information*
- ❖ *Feedback on interviewer skills/questions*
- ❖ *Follow up with further questions/thank you mail*

Script prior to interview:

First, I would like to thank you once again for sparing your time to participate in this research interview. As I had mentioned in the mail, our discussion today revolves around value in transformative innovations. This study seeks to understand how creating value is perceived and changed in innovating with the aim for transition. As part of that broad goal this research interview shall deal with the discussion of values which can be embedded in the design of an innovation, which in this case is circular housing.

The interview will last one hour or less approximately. Please feel completely free to ask me for explanation and further context anywhere in our discussion. With your consent, I would like to record this interview for transcribing afterwards to gain a better understanding of our discussion.

Do I have your consent?

(yes) – (Record) Thank you! If there is anything you would want me to keep off the record, please feel free to let me know.

(no) – Alright, I will only be taking notes for this interview.

Introduction: Uday Laiker

Introductory questions

So, to begin this interview I would like to start with getting to know more about you

Interviewee background and Introduction

Tell me about me about your role and what are the major responsibilities that come with that position?

Statement: (Sustainability center stage, Paradigm shift.....)

How did you decide to be part of this consortia and get involved in DWC? What was the motivation behind it?

Since we are talking about the Organizations...

How has sustainability integrated in your own company operations?

Have you and the other companies of the consortia been part of any previous project which has a similarity to DWC, or which required a circular/sustainable design?

Transition Questions

Statement: To make a shift for sustainable development, we need transformational social innovations which deliver sustainable value for society at large. In sustainable business thinking the term “Sustainable value” is used quite frequently in literature and practice and I would like to ask your view on the subject before we move on to a more detailed discussion.

How do you perceive the meaning of value and creating value when talked about it?

(Follow up with environmental and societal value, Triple Bottom Line)

(In your viewpoint, for whom do you think this value is being created?)

From the vision documents I got to know that the consortium has a lot of different partners in the form of universities and consultants...

How are they reflected and included in the value creation discussion?

How has the involvement of such a diverse group effected or changed your design thinking?

Key Questions

Let's start by discussing value for the user

In the vision document there was a lot of focus on resident satisfaction and their experience.

How do you aim to improve the overall user experience of the tenant through the design of the house?

Follow up with happiness and wellbeing e.g. reduced stress, pleasant surroundings; Sense of belonging, community formation; Value for money;

How does your design of the circular houses influence the tenant's living practices or behavior so that it reduces their environmental footprint?

Statement: Let's move the discussion towards value for your organization (Vision for transforming the built environment sector)

Coming to the organizational level

What have the discussions with the housing associations been about?

(Remuneration, New business opportunities, Business modelling)

The value model from Den Ouden has been used to... (ecological value concepts discussion)

What are the your core reasons for participating in Drenthe Woont Circulair?

How much do you co-creatively collaborate with your consortia members?

Closing Questions

How have you tried to preserve nature as part of your design process?

What conscious measures do you take to reduce material wastage as part of your construction process?

What are your views on these multiple value conceptualizations presented as part of the framework?

What difficulties do you see in using this as part of your designing process?

Is there a similar tool (or not) that is being used for designing in your institution?

Thank you!

Appendix 6

Monitoring meeting 1 – 24/09/20

24-09-2020, 10:00 AM

Attendees

Wouter Huuskes (organizer)

Arjan Bruining

Jeroen Wilting

(Brian Bayon, minutes secretary)

Purpose of the gathering

Discussion on a multiple value model for the construction sector

Monitoring

Time

0

Wouter:

Start share of screen

Shares a slide: Budgeting based on standard Corpo home

- Skeleton including foundation 23,250

- Facade 40.508

- Roof 7,175

- Installations 25,402

- Built-in 13,845

- Land 4,622

- ABK 16,837

- Consultancy costs 4,689

- AK, PM, W + R 13,671

- Total 150,000

Something we have been working on for 1.5 years with 3 housing corporations.

The intention was to be able to show all revenue models in 1 spreadsheet (ours, from the corporation up to and

including the demolition) in order to look at connections and whether costs could be achieved by experimenting with

whom the architect controls

Then a slide with foundation costs turnover (too much data to take over)

We have the costs for a traditional home and want to see what happens to the costs if you start using other materials

and what does it mean for the life of the houses.

Jeroen asks: all costs in this model include VAT? Wouter: Yes,

all costs in the model include VAT.

Many additional costs because it concerns products, which are then borne by the contractor, but you also tax

them with 20% VAT. So there are some tax issues that we might be able to change.

A little further in the model: Foundation costs of the operation → results in a rent calculation

Wouter shows a single rental model that consists of: operating costs, organizational costs, landlord levy, investment and

residual value. These are all normal cash flows that are used for calculations.

5

Jeroen: Until 9 years ago I worked for a corporation, only then there was no landlord levy.

Jeroen believes that if the model is properly adapted that there is real potential to make it better for all stakeholders

and that there are gains to be made.

Wouter: the best model would be if you agree on a reasonable return / reasonable cost reimbursement

with each other and then start working from that perspective.

Wouter: the model shows: in 50 years' time whether it will cost more money or generate money

If it is indicated that the return is often 3.5-4%, why do you give that return, he asks housing corporations. And with a

proposal: what if you have much less maintenance costs? Answer from corporations: we have an investment statute,

we have a WSW or a central fund and according to these statutes we have to get going and we can do nothing else.

And that is why everything is reasonably fixed and it no longer matters what we do next.

Wouter: is not possible

I met Diederik Samson and asked: what can natural gas free district cost?

Diederik: it makes money. I am a politician, I am not going to say that it will cost citizens money

Jeroen: there is also something else behind it: whatever it was about it is nice that we make 1 house, fortunately it is not

Drenthe builds circular, but Drenthe lives circular. We want to go one step further. So also looking at the living environment (the

entire neighborhood, not just the houses) there are also many advantages,

10

Jeroen: what we come up against is if a house is powered by gas, the costs will fall to the housing association and the

proceeds to the tenant

Wouter: That's right, but let me finish my story

Show pictures of business case and value case. Business case is single values based on historical figures only

refer to return and input from the organization. Value case on

grounds of multiple social, financial, ecological and health value. Uday is appointed, he has a nice qualitative

model. Would like to have quantitative.

15

Wouter:

On the basis of this model from Uday I have adjusted the rent calculation: a new value model must be created. What we're

going to try is to come up with a model based on the current Anglo-Saxon capitalism to get extra values into it. Those

values are then the same values as those of Uday.

All cash flows that go through that circular home / neighborhood home to characterize it and see what its value is

and how I could redistribute it.

Resident pays amount of rent and energy. Because we build and insulate the house properly, the energy costs are

reduced. We have to invest extra for this, so it would be reasonable if an amount of rent is returned for this, not all

but, for example, half.

Jeroen: if housing costs go down for the tenant then he should indeed have no problems with that.

Wouter:

Health: Somewhere where people feel comfortable and make little use of health care, the health insurer would

have to send a cash flow to the corporations. Which cash flows can qualify and, more importantly, qualify so that

we make a multiple value model. Important for circular housing: The resident, owner, municipality, water board,

society are all parties with left and right cash flows. We can do something with that. Suppose less water is used → less

wastewater than something would have to be done with the pollution levy and treatment levy.

20

Suggests to the others: Please think this way to see which cash flows we can qualify and quantify.

Arjan: The net present value calculation you just showed that model is no longer made by us. The regulators must

value at market value. Shouldn't that model also be ignored?

Wouter: Agrees. But initially want to make this model first so that they have all cash flows in view

Arjan: is thinking this will change the final value of the product, if you build a traditional or circular house, the

house should yield more.

Wouter

Suppose you use circular building materials and you assume scarcity, why are you going to depreciate those building materials, why

are you including them in your cash capital?

Arjan: they do represent a value; we do nothing with that now

Wouter: suppose we use precious metals; we do not have to write off it: I have a value in my house

Jeroen: you are right. The old method that we are used to is depreciation over 50 years and your residual value is 0.

Wouter: this system is still the basis for the system for your market value method.

Jeroen: A solution could be: if we move to a circular economy, suppose you demolish your home in 50 years, raw

materials will become very expensive, and if you do not take them with you, you can never justify that investment.

Shell is good at scenario analysis. To value resources.

25

Jeroen: assume 4 future scenarios, use it at a strategic level. When they see indicators becoming truth, they take

that scenario. So work with scenario analysis to indicate a good valuation.

Wouter: I agree.

Residual value: can you identify all current cash flows that run through a home: can you label and quantify them. First make a

recalculation, because that is the basis. And then you gain insight into what it does for each party and stakeholder involved in that

home. Suppose you have groceries with it. Suppose you would like to organize a vegetable garden collectively in the neighborhood,

or for energy generation, that does something with the cash flows and cohesion in the neighborhood. This could mean that

supervision from the municipality could be reduced and thus the operating costs of the municipality would decrease. How do you deal

with that? How much value do you attach to that?

30

Arjan: we need to realize what the impact is and what the results will deliver immediately. This model, you are right,

seems obvious to me to look at the residual value and end value of a product. And whether we can add values

(ecological values, social values, psychological values). But this says a lot about the valuation of your property. Has

consequences for what your portfolio is worth.

Jeroen:

Responsibility to WSW regulators and other clubs. According to calculation methods you have to demonstrate that you are

within certain ratios.

We do not make decisions based on cash flow schedule or return. We use our own calculation rules (from

WSW). What we do is we calculate a complete investment program of 5 years and that should yield an average

return.

And there are different returns for each target group.

Wouter: so there would be a cash flow overview for every target group. If we, as a society, do not appreciate the other

values (social, ecological, etc.), we will never create circular neighborhoods

Everyone agrees.

Wouter: question try in multiple value model try to qualify and quantify cash flows. And what should I do

extra in neighborhoods and home.

Jeroen: You are right. If this becomes the truth, a lot has to be done in this area.

Wouter: We sat at the table with all stakeholders in a workshop with Woonservice. There was also an alderman at the table

and I asked: how much it is worth and how much they are going to invest. They weren't happy about it.

Jeroen: all authorities do not think at this level.

The difference is in profit maximization and profit optimization 35

I am asked something. Short discussion. 40

Short discussion, no new points.

Monitoring meeting 2 notes - Meeting on the multiple value model

Date: 22-10-2020

Time: 15:30-16:45

Attendees

Wouter Huuskes

Martin Huiskes (LKSVD)

Judith Lansink (Dura Vermeer)

Jeroen Wilting (SUDL)

Arjen Browning (Actium)

Michel Jager (Housing Service)

Ferdinand van der Zee (NICE)

Uday Laiker (NICE)

Brian Bayon (NICE)

Networking/Together
Wouter: Explanation from business case to value case: The goal is to change the capitalist model where only focus on financial value is to a multiple value model where other values are also more considered: Ecological, psychological and sociological value.
Martin Huiskes: Map that it is important to name and quantify the red lines in the mind-map. Starting with the most obvious so that others can get a bit of a picture of the idea.
Jeroen; common value: shared car and vegetable garden. Jeroen: concept of a sharing economy is super interesting for the resident. Judith: advantage; use high-quality products, because the investment can be higher. High-quality products can therefore become useful if several residents can share something together. <ul style="list-style-type: none">• Michel: sport can also contribute to healthier living environments. Develop sports facilities that can be used by residents.
WOUTER ASSIGNMENT FOR SCOUT GROUP: 3 Send cash flows per person. Use the MINDMAP. The aim is to put a number plus red line explanation to explain the value between a particular connection. GOAL: 27 new cash flow ideas with values
Experiment/Do
Wouter: We work with a sheet in which we take an average home of 150,000 euros and then we make different alternatives in which different components of these houses are replaced by bio-based alternatives. In the end, all these alternatives have to come out around 150,000 euros.

<p>Wouter: example: freeing up a house of waste water. The tenant doesn't have much use for that, but then you end up directly at the water board. So there should be a cash flow from the water board, which lowers your premium when your wastewater is free. From personal experience: Greywater installation in which you reuse water for washing clothes and for the toilet there are a lot of loads involved and only saves 50 cubic meters per year. But it costs me a lot for installation and maintenance costs.</p>
<p>Judith: Reuse of water can be done as a temperature controller. For example, absorbing heat from it or storing water on the roof for cooling.</p>
<p>Wouter: example: Thinking from the resident. The moment I start isolating extra there would be benefits for resident. So cash flow to owner.</p>
<p>Visions and expectations, agendas/See</p>
<p>Wouter: Look beyond just the house and also look at the entire neighborhood/ neighborhood. Idea: to create a vegetable garden to strengthen social cohesion and possibly also to realize additional cash flows. Note Ferdinand: A food cooperative may be of value because it strengthens social cohesion in the neighborhood and also generates money from the sale of fruit/vegetables.</p>
<p>Wouter: What happens to the extra revenue that is generated, Wouter says that it has to be cooperatives for the home because this money can be invested again in sustainable purposes. Wouter: Affordability remains super important.</p>
<p>Martin: Ownership of the house: a house that is newly built should check every year what the condition is and whether the residents are economical with the house. Michel and Martin: Discussion: Should the occupant return the house to its original condition? This is the intention, but if the resident has made additional investments that make the house more sustainable, the resident can receive compensation for this when he leaves the house.</p>
<p>Arjan: note: market value and yield. Wouter; the model calculates the market value and residual value. This also takes the investments in the house.</p>
<p>Martin: If the quality is very good and the social environment is very good, then a district also lasts longer and the health remains good.</p> <ul style="list-style-type: none"> • The bit of maintenance of the neighborhood is missing in municipality. Accountability can also be given to the residents. It should be for the benefit of the residents doing maintenance because the costs for the municipality are reduced
<p>Learning/Learning</p> <p>Wouter: Mindmap with the different cash flows and values: Red lines indicate connections of cash flows that can yield money/advantage. Martin: Note; more explanations need to be given to the red lines in order to get the mind map clear. Now the connections between the red lines are sometimes unclear. Martin: It's about the overall picture and that's why it's important to look at the district, because a circular house should also be in a healthy neighborhood.</p>
<p>Brainstorm moment MINDMAP</p>
<p>Judith: developing data. From corporation thought. Certainty on business and therefore room to invest. Monitors. Big data. Big data can also indirectly deliver value.</p>
<p>Governance/Direction</p>
<p>Judith: We should think in housing expenses not in rent.</p>

Arjen Bruining: What the problem is that housing associations can't just ask more from the tenant. For example, if value is added, this will probably cost the housing association more and therefore a new cash flow will have to come to the housing association. We are sandwiched between rent surcharge limits and property valuations.

Michel: the new model is going to provide discussion. Discussing how we can get this done. **Martin:** whether it succeeds in changing the calculation models. **Michel:** other legislation and rules that might hinder something.

- **Martin:** it shows how the 8 houses provide yields and what any possible values are the multiple value model.
- **Arjan:** following a difference between following rules and rules that are imposed. What is responsible? Housing calculation is tricky because there are super many systems old. **Martin:** the money that is released from energy revenues, this should be invested in sustainable cash flows.
 - Any rent increase is not possible because it can cause problems for rent surcharge for the residents.

Michel: Came across a bit defensively, he already expects a lot of discussions and adversity when he presents the new multiple value model to his team.