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The contribution of Collective Business Models in enabling a Transition towards Sustainability

Research into the interface between Collective Business Models and Transition Thinking

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Management summary

In order to realize EU's 2050 vision of 'living well within the limits of our planet', radical changes within business models are needed, particularly in those areas that have the most contribution to environmental pressures and impacts along their entire value chain (Reichel, De Schoenmakere, Gillabel, Martin, & Hoogeveen, 2016). However, only temporary and limited solutions for sustainable development were offered by technological developments due to negative external influences, rebound effects or other unintended consequences (Farla, Markard, Raven, & Coenen, 2012). Therefore, it has been proposed to start initiate so-called transitions towards sustainability in order to restructure consumption and production systems of communities (Farla et al., 2012). Collective business models could be a way to restructure consumption and production systems within communities and therefore contribute in enabling a transition towards sustainability (Korhonen & Seager, 2008). Therefore, the aim of this research is to reveal the contribution of collective business models in enabling a transition towards sustainability by investigating relevant cases aimed at making a transition towards sustainability with the use of collective business models. In order to achieve this, the following research question has been formulated: *To what extent do collective business models contribute in enabling a transition towards sustainability?* In order to be able to answer the research question, this qualitative and explorative research makes use of a theory-driven, deductive research approach, in which a multiple case study was carried out, using one case as a revealing case that serves as a benchmark for two other cases. The results show that on the one hand collective business models follow certain pathways in order to be able to fully express themselves and on the other hand that certain individual developments, which can be seen as pathways, together contribute in enabling a transition and ultimately take a step towards sustainability. The most important factors that play a role in these aforementioned relationships are *consensus between the government and society, participation of the population, technology is followed by participation, legislation and multiple value creation*. However, the contribution of collective business models is only partially, because the analysis shows that two other factors also play a crucial role in enabling a transition towards sustainability, namely the non-linear and iterative process, which is important to keep looking forward and to make the process as effective and efficient as possible and the financial support of the government, which ensures that the developments within the transition towards sustainability are made attractive and financially feasible for the interested stakeholders.

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1. Introduction

1.1 Research context

Sustainable development is a subject that has started a long time ago and was introduced by the World Commission on Environment and Development, in which the definition of the concept is stated as "a development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, Khalid, Agnelli, Al-Athel, & Chidzero, 1987, p. 41). This report gave political prominence to the concept of sustainability and gave rise to initial considerations to change the access to resources and the distribution of costs and benefits (Brundtland et al., 1987). Despite the fact that the term sustainable development was first and foremost driven by environmental concerns, it was subsequently increasingly used in most strategic public communications by companies (Moldan, Janoušková, & Hák, 2012). Although organizations were obviously economically driven, they recognized that an ecological and social position within society was needed to stay economically viable. This was widely accepted as a prerequisite for successful and responsible management. As a result, companies had to manage not only their economic capital, but also their ecological and social capital (Dyllick & Hockerts, 2002). This meant that companies had to focus on mutual interdependent issues: the Triple Bottom Line of people, planet and profit, wherein social, environmental and economic issues had to be integrated (Elkington, 1998). By focusing on people and the environment in addition to the profit motive, the impact on the environment and stakeholders was included in the choice of alternatives, which was likely to lead to a more sustainable result (Elkington, 1994).

The original idea of the Triple Bottom Line was to encourage businesses to identify and control economic, social and environmental added value and not only financial added value. In other words: stimulating the transformation of capitalism. But at this moment, according to Elkington (2018), many Triple Bottom Line reports are produced in which it is far from clear that the resulting data is collated and analyzed in a way that really helps decision-makers and policy makers to detect, understand and manage the systemic effects of human activity. That is why there should be a shift in dedication within companies, to be not just "the best in the world," but "the best for the world" (Elkington, 2018). This shift is in line with the environmental challenges of unrivalled magnitude and immediacy, which Europe will face in the next coming years. Although the EU's environmental and climate policies yielded substantial gains in recent decades, Europe still faces ongoing challenges in the area of sustainability such as biodiversity

loss, the use of resources, the impact of climate change and environmental risks to health and well-being (EEA, 2019). The diversity of these problem areas shows that the sustainability problem does not contain one-sided causes and solutions, and can therefore be seen as a wicked problem, which is "complex, unpredictable, open ended, or interactable" (Head, 2013, p. 712). An example of an ongoing challenge is the worldwide use of material assets, that is expected to be doubled by 2030 compared to 2010 (Reichel et al., 2016), while forecast predicts that the world's population is expected to exceed 11 billion by the end of the 21st century (UN DESA, 2015). Today, however, with 7.2 billion people, the planet is already facing difficulties in meeting the demand of mankind for land, food and other natural resources, and in absorbing its waste (Steffen et al., 2015). Even the global gross domestic product has increased by a factor of 25 since 1900 because continents have been driven by economic development. This has led to an increase in global extraction of raw materials by a factor of ten (Krausmann et al., 2009).

In order to realize EU's 2050 vision of 'living well within the limits of our planet', radical changes within business models are needed, particularly in those areas that have the most contribution to environmental pressures and impacts – food, energy, mobility and housing – along their entire value chain (Reichel et al., 2016). Operationalizing the concept of sustainable development eventually means integrating the notion with transactions between the various constituent parts in such a way that it creates value (Jonker, 2013). However, only temporary and limited solutions for sustainable development were offered by technological developments due to negative external influences, rebound effects or other unintended consequences (Farla et al., 2012). Therefore, it has been proposed to start initiate so-called transitions towards sustainability in order to restructure consumption and production systems of communities (Farla et al., 2012). A transition can be described as "a set of connected changes, which reinforce each other but take place in several different areas, such as technology, the economy, institutions, behavior, culture, ecology and belief systems" (Rotmans, Kemp, & Van Asselt, 2001, p. 16). Transitions are formed by following certain transition pathways, in which each pathway "serves as a dramatic situation influencing the plot of the transition tale" (de Haan & Rotmans, 2010, p. 91). Collective business models could be a way to restructure consumption and production systems within communities and therefore contribute in enabling a transition towards sustainability (Korhonen & Seager, 2008). Collective business models are business models in which multiple organizations that might differ in type (industry, public research and non-profit) position in the value chain (manufacturing, service, etc.) and industry (energy, ICT, etc.) work together to create a value creation system (Rohrbeck, Konnertz, & Knab, 2013).

Within these collective business models, the population has an important role to play. They are no longer passive receivers of goods and services; rather, customers are now active partners who create value in collaboration with organizations (Romero & Molina, 2011). The co-evolution between societal transitions towards sustainability and fundamental shifts within existing business models gives an upcoming trend of corporations and industries that go beyond optimizing the single organization's performance by limiting negative environmental and social impacts, to fundamentally restructure and rethink existing businesses in the light of greater societal changes (Loorbach & Wijsman, 2013).

1.2 Research aim

The aim of this research is to reveal the contribution of collective business models in enabling a transition towards sustainability by investigating relevant cases aimed at making a transition towards sustainability with the use of collective business models.

1.3 Conceptual model

The concepts and relationships that are important to achieve the goal of this research are visualized in the conceptual model below (Figure 1). Within this research it is assumed that the concept of transition thinking and the concept of collective business models both contribute in enabling a transition in order to ultimately create a transition towards sustainability. This conceptual model will be expanded in chapters 2 and 3 to serve as a guideline within this research.

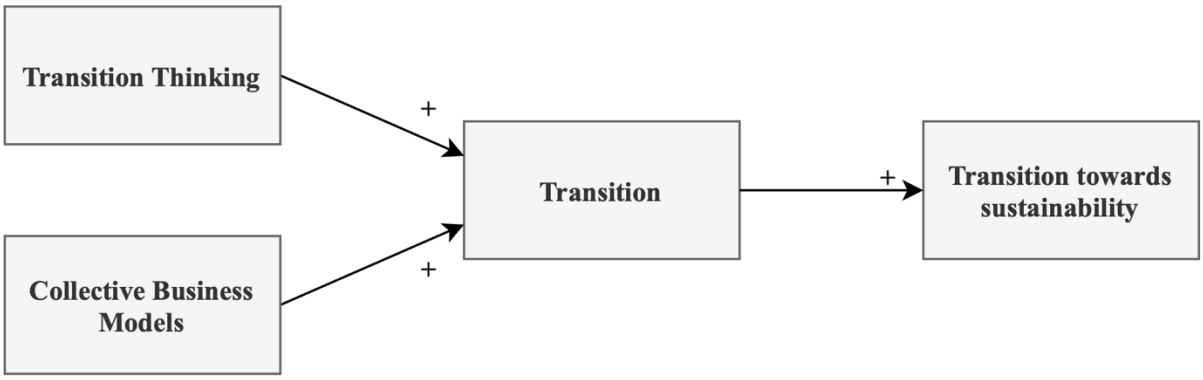

Figure 1. The conceptual model

1.4 Research question

In order to investigate the contribution of collective business models in enabling a transition towards sustainability, the following research question has been formulated: *To what extent do collective business models contribute in enabling a transition towards sustainability?*

1.5 Research approach

In order to be able to answer the research question, this qualitative and explorative research makes use of a theory-driven, deductive research approach, from which two theoretical key concepts emerge that are leading within this research, namely transition thinking and collective business models. In order to empirically demonstrate the contribution of collective business models in enabling a transition towards sustainability, a multiple case study is carried out, using one case as a revealing case that serves as a benchmark for the other two cases. By means of a document analysis, the information from the various cases will be systematically generated, and by using a content analysis, the transition processes that take place within the cases will be further explored with the information found. The result will lead to the generation of knowledge about the contribution of collective business models in enabling a transition towards sustainability.

1.6 Theoretical and practical relevance

Sustainable development is often linked to social responsibility, in which the environmental impact must be reduced. However, practices aimed at corporate social responsibility, that optimize the company's performance, do not contribute to a transition towards sustainability in which environmental and social aspects are internalized (Proka, Beers, & Loorbach, 2018). That is why, there is a growing need for effective transitions towards sustainability within society in order to solve the sustainability problems. The integration of collective business models and transition has a special potential within this debate of transitions towards sustainability, but the co-evolution of business practices and evolving social systems, and the possibilities and threats this poses to businesses in tackling environmental problems strategically, has hardly been discussed (Korhonen & Seager, 2008). Seager (2008, p. 448) argues that “application of sustainability knowledge in decision making, management, policy and design can be recognized as a necessity, but remains in mere nascent stages of development and may even depend upon further progress in other fields to become fully realized”. Hence, it is not a prerequisite for understanding the impact of business models on social transitions, but it is necessary to facilitate discussions about their contribution to sustainable development (Bidmon & Knab, 2018). This research will contribute to this discussion and therefore to the rapidly growing field of sustainable business models and transition thinking, because it provides insight into the contribution of collective business models in enabling a transition towards sustainability. This contribution of collective business models will be investigated by

examining the transition processes within different cases and how these transition processes are influenced by the use of collective business models. This insight, the contribution of collective business models in broader processes of system transformation, can, within practice, help in enabling a transition towards sustainability, because it will make clear how collective business models can shape and manage such a transition more easily and efficiently by following certain pathways.

1.7 Outline of the report

The report is structured in seven parts. Chapter 1 introduced the topic and discussed the motivation, contribution and relevance of this research. Chapters 2 and 3 elaborate on the concepts of transition thinking and (collective) business models and how these concepts are situated within this research. Subsequently, Chapter 4 explains the research methodology which is used to accomplish the objectives of this study. After describing the research approach, Chapters 5 and 6 contain the analysis of the cases. This results in an answer to the main question in Chapter 7, in which also the limitations of this study and the possibilities for future research will be discussed.

2. Transition Thinking

In order to restructure consumption and production systems of communities, it has been proposed to start initiate transitions towards sustainability. However, what is involved in these transitions and what does it take to make them a reality? This chapter elaborates on the concept of transition in order to ultimately determine what is needed to make a transition possible.

2.1 What is the essence of transition thinking?

A transition can be described as "a set of connected changes, which reinforce each other but take place in several different areas, such as technology, the economy, institutions, behavior, culture, ecology and belief systems" (Rotmans et al., 2001, p. 16). This definition shows that changes are taking place in different areas and at different levels within society. Therefore, in order to develop to concept of a transition towards sustainability, it is necessary to start by understanding the structure of a society, which is also called the multi-level perspective (Figure 2) by Rip and Kemp (1998). According to de Haan and Rotmans (2010), society can be seen as a landscape consisting of various societal systems, such as the energy supply system and the legislative system. A societal system consists of various constellations (subsystems) that operate individually and contribute to the overall functioning of the system (de Haan & Rotmans, 2010). Always a single constellation is dominating the functioning of the system, ensuring that society's needs are met, which is called a regime (de Haan & Rotmans, 2010). Contrary to the regime, there are niches, which are constellations in which radical novelties arise that can meet specific social needs and could therefore possess a competitive capacity in relation to the regime (de Haan & Rotmans, 2010; Geels & Schot, 2007). Overall, this means that the landscape constitutes of "an exogenous environment beyond the direct influence of niche and regime actors (macro-economics, deep cultural patterns, macro-political developments)" in which "changes at the landscape level usually take place slowly (decades)" (Geels & Schot, 2007, p. 400).

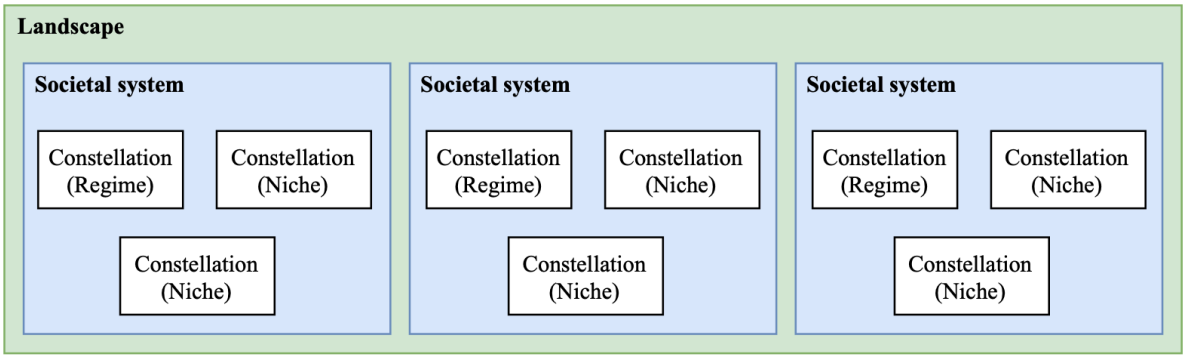

Figure 2. The multi-level perspective based on source by Rip and Kemp (1998)

Against this background, we can continue to examine a transition towards sustainability. However, the aforementioned definition of a transition does not refer to the concept of sustainability, which means a transition in itself is not necessarily sustainable. Therefore, a difference is made between socio-technical transitions and sustainability transitions. Markard, Raven, and Truffer (2012) state that a socio-technical transition is a set of processes that results in a radical shift within societal systems. In the progress of such a transition, new products, services, business models and organizations arise, which are partly complementary to and partly replace existing ones (Markard et al., 2012). In contrast, sustainability transitions are long-term, multidimensional and fundamental processes, through which a regime changes to more sustainable modes of production and consumption (Markard et al., 2012). In this case a technological change takes place, but also changes in other elements, such as regulations, industrial networks, infrastructure and symbolic significance (Geels, 2002; Loorbach et al., 2017). This directly indicates the difference between transitions and organizational development. The focus of organizational development is on the creation of new techniques, while transitions extend the attention to societal systems in general (Loorbach, van Bakel, Whiteman, & Rotmans, 2010). This means, change strategies within transitions are generated for the overall system rather than for the individual organization. In addition, according to Loorbach et al. (2010), most of the established technologies by organizational development are not radical enough compared to the developments of transitions, causing systems to change in an incremental way. These elements of organizational development will not be enough to solve the sustainability problems (Schaltegger & Wagner, 2011). This has raised the question of how to promote and manage a transition towards sustainability (Markard et al., 2012). Loorbach et al. (2017) mention three dominant and prominent perspectives which refer to the way the topic of transition can be approached.

2.2 The different perspectives of transition thinking

The three perspectives mentioned by Loorbach et al. (2017) to address a transition are: the socio-technical, the socio-institutional and the socio-ecological perspective (Figure 3). Although the three perspectives collectively focus on transitions, there are differences in the way in which the concept of transition is understood, what the core subject of the transition is and what the central drivers and mechanisms are within the transition.

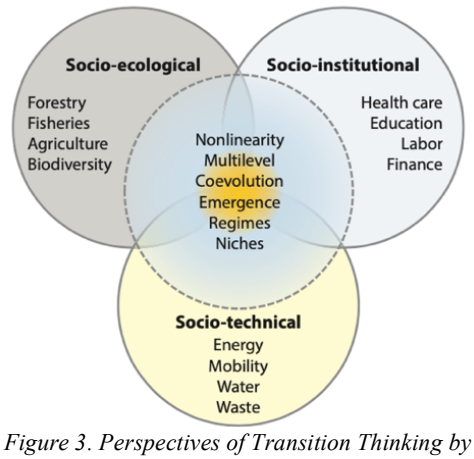

Figure 3. Perspectives of Transition Thinking by Loorbach, Frantzeskaki, and Avelino (2017)

First of all, within the socio-technical perspective, innovation plays an important role (Smith, Voß, & Grin, 2010), which means the main focus of attention are the processes of technological substitution as a result of the interaction between established regime structures, external landscape pressure and emerging niches (Loorbach et al., 2017). When a technology is successful, a process of niche branching can take place, allowing this technology to compete with the dominant technological options in part of its market(s) (Hoogma, Kemp, Schot, & Truffer, 2002). Therefore niches are seen as a protection for innovations to mature within the established societal system and the development of these niches can be controlled by the market itself or by the government (Loorbach et al., 2017). The focus on learning is an essential element and goes beyond technical learning; it is about learning existing preferences within customers demand and finding ways to build new alternatives and change user's needs (Hoogma et al., 2002). As a result, regimes created by dominant technologies are the subject of transitions within this perspective (Loorbach et al., 2017). In comparison with the socio-technical perspective, the socio-institutional perspective is based on institutionalized cultures, structures and practices as regimes within a societal system (Loorbach et al., 2017). This perspective focuses on sectors or geographical areas facing persistent problems, emphasizing the level of dependency between established routines, powers, interests, and regulations and how these are challenged by societal innovations (Loorbach et al., 2016). Technologies can play an important role, but the perspective reflects the interaction between multiple societal systems (Konrad, Truffer, & Voß, 2008). The latter perspective aims to understand the (in)stability of individual ecosystems and the link between these ecological systems. The interaction between ecological transitions and the social context is addressed and it is investigated how this context puts ecosystems at the frontiers of the planet (Galaz et al., 2012; Rockström et al., 2009). Following Haase, Frantzeskaki, and Elmqvist (2014), in recent years, the socio-ecological perspective has increasingly addressed issues such as biodiversity and nature, nature-oriented solutions and ecosystem services and climate resilience, leading to an assessment of the accelerated effects of human activities on the Earth's soil. According to Loorbach et al. (2017) the aim of this perspective is to apply global change to address planetary boundaries.

According to de Haan and Rotmans (2010), two things can be seen in the current literature on transition, namely that the focus within a transition is on technology and (2) the complex phenomenon of 'transition' is tackled with conceptual simplicity. This means that transitions are categorized and defined from a single concept. This is not in line with the perspectives of transition thinking, because these perspectives are not regarded as optimal social blueprints, but

as target images that can change over time, depending on new insights and learning effects (Loorbach & Rotmans, 2006). This conceptual simplicity can make transitions more likely to be ignored as a whole. Therefore, the scope of transitions will have to be broadened from the technological to the social and, in doing so, poses for various researchers, such as policy analysts, advisors, decision-makers and researchers who focus specifically on transitions (de Haan & Rotmans, 2010). There is already a shift taking place in the object and dimensions of sustainability transitions: from a focus on socio-technical systems to a concentration on socio-ecological, socio-economical and socio-political systems, that are seen as equally relevant transition objects (Loorbach et al., 2017). In addition, the concept of sustainability is shifting from a government-led activity, through legislation and government policy, to a broader multi-stakeholder activity, in which members of the public sector, the business community and civil society work together (Driessen, Dieperink, van Laerhoven, Runhaar, & Vermeulen, 2012). This means that the role of citizens within policy processes and efforts are changing in order to determine which responsibilities should be public and which should be private (Van Dam, 2014). As such, citizens will have to organize certain (public) matters for themselves (Herbert-Cheshire, 2000). This fits with the statement by Friedman (1970) who already pointed out that political processes are too slow in nature to be able to solve urgent sustainability problems. That is why, according to Loorbach (2007), it is important to bring different stakeholders together to understand the root causes of complex problems and thus create institutional, mental and financial space for building alternative regimes. The sustainability problem is such a complex problem. This can be recognized by the fact that the sustainability problem is reflected in several areas, such as the loss of biodiversity, the use of resources, the effects of climate change and environmental risks to health and well-being (EEA, 2019). This shows that the solution to the sustainability problem by means of a transition cannot be approached on the basis of conceptual simplicity. Therefore, the use of all three perspectives could provide a solution to address the sustainability problem. These three perspectives are reflected in the pursuit of certain transition pathways, because within each of these pathways different interests and value systems of specific actors are expressed (Hof, van Vuuren, Berkhout, & Geels, 2020).

2.3 Transition pathways as the road towards a transition

In order to make the transition processes manageable, they are referred as transition pathways. Two theories play an important role in approaching transition pathways, namely the theory by Geels and Schot (2007) and the theory by de Haan and Rotmans (2010). The theory by Geels

and Schot (2007) is more a typology of pathways as a whole and lacks a level of detail to identify transition processes. Therefore, the choice was made to use the theory of de Haan and Rotmans (2010, p. 91) within this research, because by means of this theory "the dynamics of transitions can be described and understood better as sequences of patterns of transitional change, telling or retelling a transition storyline, where each pattern serves as a dramatic situation influencing the plot of the transition tale" (de Haan & Rotmans, 2010, p. 91). This means the transition processes can be retold and thus be identified on a detailed level.

Each pathway varies depending on the nature and timing of interactions between the levels of the multi-level perspective (Bolton & Hannon, 2016) and causes the dynamics of the transition to change (de Haan & Rotmans, 2010). According to de Haan and Rotmans (2010, p. 93) "a societal transition is the process through which a different constellation becomes the dominant one, shifting the functioning of the whole societal system". In this case, there are three dominant pathways in which a constellation can gain power within the societal system, namely through *reconstellation*, *empowerment* and *adaptation* (de Haan & Rotmans, 2010). Within reconstellation, a new or existing constellation gains strength through influences from outside the societal system (de Haan & Rotmans, 2010). This may include governments but also other societal systems, which gives it a top-down nature. The following way is called empowerment, in which a new or existing constellation gains strength within the societal system on its own or through interaction with other constellations (de Haan & Rotmans, 2010). This pathway has a bottom-up character, which means that niches become viable in an abrupt way and thus become alternatives to the regime. The final way is adaptation, wherein a regime changes itself by interacting with constellations inside or outside the system and can therefore better meet the needs of society (de Haan & Rotmans, 2010). However, this does not relate to a gradual change, because such changes are not enough to continue to meet the social needs. Here again, there is an abrupt change, but then from the regime itself.

The three above-mentioned pathways can be seen as a composition that has an effect on the societal system, which is therefore called the multi-pattern approach (de Haan & Rotmans, 2010). These three pathways can also be subdivided according to the dominance that one or the other pathway has had in the course of a transition. This results in eleven different pathways and these are shown in Table 1. Looking at the table it can be noted that within each main pathway it is examined whether or not the regime adapts within the societal system. In addition, within each category of dominance, it can happen that a transition fails, which means the

transition does not succeed within the societal system (de Haan & Rotmans, 2010). The differentiated pathways will be explained below.

	Reconstellation (R)	Empowerment (E)	Squeezed (R + E)	Adaptation (A)
With regime adaptation	Radical Reform	Reconfiguration	Teleological	Transformation
Without regime adaptation	Revolution	Substitution	Emergent	
Failed Transition	Collapse	Backlash	Lock-in	System Breakdown

Table 1. The different transition pathways by de Haan and Rotmans (2010)

2.3.1 Top-down pathways

The first dominant category is reconstellation. When the regime tries to adapt, it is called a 'radical reform', in which "the regime is reformed according to the cultures and structures of some outside constellation" (de Haan & Rotmans, 2010, p. 98). This could for example include European legislation, in which the regime adapts to the standards of the European regulations. The second pathway within this category of dominance is 'revolution'. In this case, a constellation from outside the societal system penetrates the system and replaces the regime (de Haan & Rotmans, 2010). For example, sectors that were first organized locally and then moved towards a central organization. This means, the regime does not adapt itself, but is replaced by another constellation. Finally, there is a case wherein the transition fails, as a result of which a reconstellation generally does not lead to a new regime within the societal system (de Haan & Rotmans, 2010). The failure of a transition is referred here as a 'collapse'.

2.3.2 Bottom-up pathways

The second dominant category is empowerment. When the regime starts to adapt, but a niche takes over the role of the dominant constellation and becomes the regime in the societal system, it is called 'reconfiguration' (de Haan & Rotmans, 2010). The niche gets help from the regime itself, because the regime adapts to the niche, increasing the value of the niche in the system. In the end, it turns out that the niche meets the needs of the societal system to a greater extent, as a result of which the incumbent regime is replaced by the niche. The second pathway within the dominance of empowerment resembles reconfiguration, however, the niches gain more power through their own strengths in order to compete with the incumbent regime (de Haan & Rotmans, 2010). An example is the rise of a new political party. The current leading political party (the regime) therefore does not adapt and will eventually be replaced by the new party.

This second pathway is called ‘substitution’. Within this domination there is also a form of failure. In this case it is called a ‘backlash’, in which, according to de Haan and Rotmans (2010), niches initially gain more power within the societal system, but ultimately cannot continue to satisfy the demand. As a result, the current regime will survive anyway.

2.3.3 Squeezed pathways

It can also happen that a transition takes place due to both top-down and bottom-up influences. This means that there are also transition pathways, in which “reconstellation and empowerment both shape the course of the transition”, which are called squeezed pathways (de Haan & Rotmans, 2010, p. 99). The first squeezed pathway is about actively reforming the regime by allowing outside influences, whereby the regime steers the transition processes in order to connect niches with landscape developments (de Haan & Rotmans, 2010). It is therefore a guided transition that is also called the ‘teleological’ pathway. An example is the transition to sustainable energy within the energy sector, in which government legislation is applied and incumbent regimes are driven by niches. The second transition pathway concerns a “niche functioning and influences from outside the societal system somehow team up to a transition without active influence of the incumbent regime” (de Haan & Rotmans, 2010, p. 99). This is called an ‘emergent’ pathway, in which a low degree of coordination by the regime is present and is combined with influences from outside the societal system, resulting in a change (Smith, Stirling, & Berkhout, 2005). Actually, this means that the change occurs in a natural way. An example is the transition from telephone, fax and post to online communication. Finally, there is a pathway that fails. In this case it is called a ‘lock-in’, in which the innovation gains influence in the societal system, but the coexisting regime is not completely replaced (Van der Brugge & Rotmans, 2007). An example is the energy market, in which sustainable forms of energy work within the societal system alongside the current gas and oil solutions.

2.3.4 Adaptation pathways

The core of this dominance is that the regime adapts itself, which is why it only has two different pathways. The first pathway is ‘transformation’, in which the regime adapts itself through co-evolution with the niche function or by absorbing the niche function, in order to fulfill the needs of the societal system again (de Haan & Rotmans, 2010). Within this dominance, the form of failure is called a ‘system breakdown’, in which the regime's attempts to continue to meet the needs of the societal system are failing and the regime is no longer in a position to meet those needs (Van der Brugge & Rotmans, 2007).

2.4 Enabling a transition towards sustainability

Two different definitions of transitions are mentioned within this research. Therefore, a choice has to be made which definition applies within this study. According to Rotmans et al. (2001, p. 16) a transition can be described as “a set of connected changes, which reinforce each other but take place in several different areas, such as technology, the economy, institutions, behavior, culture, ecology and belief systems”. The other definition is from de Haan and Rotmans (2010, p. 93), who mention that “a societal transition is the process through which a different constellation becomes the dominant one, shifting the functioning of the whole societal system”. Looking at the sustainability problem, this problem occurs in several areas which reinforce each other, also called societal systems (EEA, 2019; Rip & Kemp, 1998). This element is specifically reflected in the definition of Rotmans et al. (2001) because it shows that a transition involves changes in various areas that reinforce each other. However, the definition of de Haan and Rotmans (2010) excludes this element, because this definition focuses on a change within a specific societal system. On the other hand, this definition does show what the change within the societal system will look like, namely a change within a constellation. Here the definition of Rotmans et al. (2001) is lacking, because this definition only reflects the fact that multiple changes take place within different areas, but not exactly what these changes look like. As a result, it was decided to develop the following definition of a transition that combines the definitions of Rotmans et al. (2001) and de Haan and Rotmans (2010) and will be used within this research: *“a set of connected changes which reinforce each other and take place within different societal systems, causing different constellations becoming the dominant ones which will shift the functioning of the societal systems”.* In order to ultimately achieve a transition towards sustainability, the functioning of societal systems will have to shift towards more sustainable production and consumption patterns (Markard et al., 2012). This will lead to the following definition of a transition towards sustainability: *"a set of connected changes which reinforce each other and take place within different societal systems, causing different constellations becoming the dominant ones which will shift the functioning of the societal systems towards more sustainable modes of production and consumption".* In order to replicate a transition towards sustainability, the developments taking place within the societal systems are examined. According to de Haan and Rotmans (2010, p. 91), each pathway serves as "a dramatic situation influencing the plot of the transition tale". As a result, some developments can be distinguished as certain pathways that directly influence the transition process, but also indirectly by influencing the path which collective business models follow in order to contribute in enabling a transition towards sustainability. Therefore, the pathways described in section 2.4

are used to demonstrate the various developments and therefore changes within the societal systems. According to Bocken and Short (2016), business model innovation is gradually being recognized as a critical component of transitions towards sustainability. “Successful business model entrepreneurs act as system builders by entering into partnerships to draw on resources and construct a seamless web of technological, political, economic and social components” (Bolton & Hannon, 2016, p. 1740). The aim is to adapt the content, structure and governance of the business model to the changing socio-technical context and thus to be able to shift the regime structures and the political framework towards sustainability (Bolton & Hannon, 2016). However, this requires the involvement of different stakeholders in order to understand the root causes of this complex problem and to create alternative solutions (Loorbach, 2007). Therefore, business models with a collective character could offer a solution to this problem and could be a way to restructure consumption and production systems within communities and contribute in enabling a transition towards sustainability (Korhonen & Seager, 2008). The above reasoning is summarized in Figure 4.

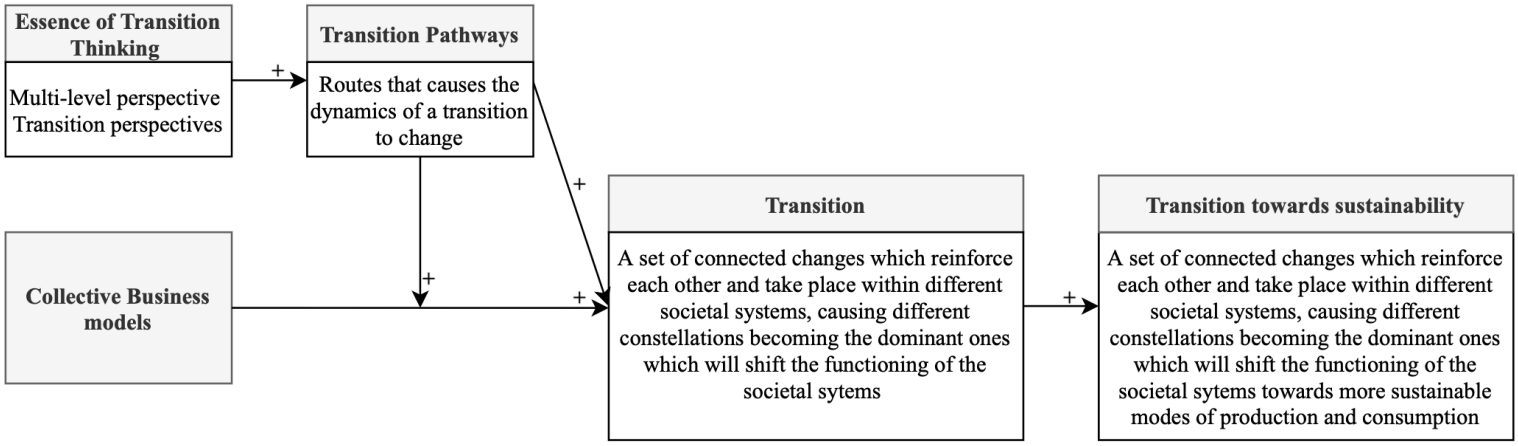

Figure 4. Extended conceptual model by integrating the concept of transition thinking

3. The modification of business models

This chapter elaborates on the concept of business models. First, the current business models in society will be discussed. Then it will be discussed why a change is needed within these current business models to address the sustainability problem and what exactly is meant by this change. Finally, the connection with the previous chapter on transition thinking will be made.

3.1 Conventional business models

A full definition of a business model is given by Osterwalder (2004, p. 15) who said: “A business model is a conceptual tool that contains a set of elements and their relationships and allows expressing a company's logic of earning money. It is a description of the value a company offers to one or several segments of customers and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and sustainable revenue streams. In other words: business models can be described as the logic of how organizations create, deliver and capture value (Osterwalder & Pigneur, 2010). As a result, the concept of a business model is conceived as a construction plan that makes it possible to design and implement the company's structure and systems, which will shape the operational and physical form of the company (Osterwalder, Pigneur, & Tucci, 2005). The relationship between strategy, organization and systems is also referred as the ‘business triangle’ and is constantly under pressure from external parties, such as competitive forces, social change, technological change, customer needs and the legal environment (Osterwalder et al., 2005). However, Zott and Amit (2010, p. 216) mention an alternative definition of the concept of a business model, namely as "a system of interdependent activities that transcends the focal firm and spans its boundaries", or to say an "activity system". It refers to a set of interdependencies and transactions between a company and its multiple networks of suppliers, partners and customers (Bolton & Hannon, 2016). A business model should not be compared one-on-one with the company's strategy. A business model is a system that shows how the pieces of a company fit together, while the strategy also includes the competition (Magretta, 2002). Finally, the difference between business models and enterprise models needs to be clarified. Enterprise models mainly relate to processes and activities, where business models focus on value creation for customers (Wortmann, Hegge, & Goossenaerts, 2001). This makes business models applicable to all (for-profit) organizations because their longevity and prosperity are directly linked to the value creation, distribution and capture mechanisms used (Shafer, Smith, & Linder, 2005; Teece, 2010). This means that a business

model can enable a company to gain competitive advantage and/or to develop a new market (Storbacka & Nenonen, 2011). Particularly within the for-profit context, business models are concerned with ensuring and increasing the comparative advantage of an organization. New communication technology, computer technology and open global trading regimes have given customers more choice and their alternatives to supply are more transparent. Therefore, business models will need to be more customer-focused, especially as technology makes information and solutions cheaper for customers. In other words: the supply-side driven logic is no longer viable (Teece, 2010). This implies a dynamic insight within business models: they need to be modified (Johnson, Christensen, & Kagermann, 2008). This modification is also known as business model innovation, which consist of "adding new activities, linking activities in novel ways or changing which party performs an activity" (Amit & Zott, 2012, p. 41). This business model innovation has led to the emergence of new business models.

3.2 The emergence of new (collective) business models

The emergence of new business models is the result of rethinking what is considered valuable in a business model and how value creation is coordinated (Jonker & Faber, 2015). These innovations of business models are called 'New business models', in which multiple participants are included and wherein a shift is taken place from an organizational-centric perspective towards application of different stakeholder viewpoints or in other words: moving to a network-centric perspective (Jonker, Stegeman, & Faber, 2017). According to Barrett, Velu, Kohli, Salge, and Simoes Brown (2011), companies recognize the fact that innovative ideas no longer just happen internally, but can come from anywhere. Which is why it is more beneficial to involve others in collaborative innovation (Barrett et al., 2011). This resulted in the so-called collective business models, in which multiple organizations that might differ in type (industry, public research and non-profit) position in the value chain (manufacturing, service, etc.) and industry (energy, ICT, etc.) work together to create a value creation system (Rohrbeck et al., 2013). Within collective business models initiatives are developed at a community level, in which people or other actors respond to local needs by organizing social events together (Hajer, 2011). These involved actors have affinity with the initiative and form a network with a shared vision, in order to obtain sufficient resources to ultimately create value between the various stakeholders (McDowall & Eames, 2006). The overall purpose of these business models is to defy barriers of innovation which concerns insufficient out-of-the-box thinking through daily routines, the unwillingness to collaborate with external partners and the

lack of perseverance in driving innovation (Rohrbeck, Döhler, & Arnold, 2009). According to Barrett et al. (2011), this means in its broadest sense that companies should see the ability to work together as a philosophy and develop the resources to do so, which makes openness to collaborate and to co-innovate a mindset. This requires trust and "a commitment to share the rewards and risks in the pursuit of co-creation of innovation" (Barrett et al., 2011, p. 6).

3.3 Value creation

As mentioned in the previous sections, business models are a "description of the value a company offers to one or several segments of customers" (Osterwalder, 2004, p. 15). According to Lepak, Smith, and Taylor (2007, p. 182) value creation depends "on the relative amount of value that is subjectively realized by a target user (or buyer) who is the focus of value creation whether individual, organization, or society and that this subjective value realization must at least translate into the user's willingness to exchange a monetary amount for the value received". This means that value creation has a subjective matter in nature, because it depends on the interpretation given to value creation by a target user, which makes it difficult to define the value creation of businesses in general. However, in order to define the value creation of business models, the concept has been divided into stages by Jonker and Faber (2020). This model, the "stages of value creation", illustrated in Figure 5, is therefore used to give substance within the value creation of business models. However, Jonker and Faber (2020) do not provide explicit definitions of the five stages of value creation. But, it is possible to look at how conventional and collective business models give substance to the different stages.

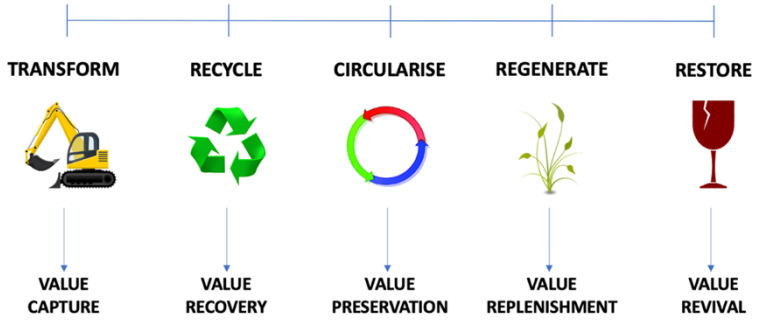

Figure 5. The stages of value creation by Jonker and Faber (2020)

3.3.1 Value creation within conventional business models

Conventional business models create one-sided value because, according to Kamm, Faber, and Jonker (2016), these business models are often organized around one, usually economic, value. Therefore, according to the EMF (2013) the industrial economy has hardly advanced beyond one fundamental characteristic developed in the early days of industrialization: a linear model of resource consumption that follows a pattern of 'take-make-dispose'. Organizations extract

materials, use energy and labor to make a product, and offer it to an end-user – who then throws away the product when it no longer serves its purpose (EMF, 2013). This can be seen as unilateral value creation. According to Friedman (1970), a corporate executive of a company has the responsibility to manage the company in accordance with the desires of the owners, whereby these desires generally came down to making as much money as possible. In doing so, the basic rules of society established by law must be observed, as well as those embodied in ethical custom (Friedman, 1970). This way of thinking is in line with the first phase of the value creation model, namely "value capture". Chesbrough, Lettl, and Ritter (2018, p. 933) define value capture as: "the process of securing financial or nonfinancial return from value creation". This means there are only one-time benefits from creating the value and then the product will no longer yield value anymore, which could be seen as the principle of take-make-dispose. However, this characteristic of conventional business models changed when Freeman (1984) noted that this way of thinking became inconsistent given the amount of changes in the business environment. This resulted in a broader economic focus, where each group or person; who is influenced by or can influence the achievement of an organization's objectives, was taken into account during strategy formation. The satisfaction of, and therefore the support of, stakeholders was necessary for long-term success (Freeman, 1984). This has been commonly acknowledged as a precondition for effective and responsible management. But, due to the stakeholder approach, companies simply acknowledged the fact that stakeholders could impose restrictions on the company's performance. Thus, within conventional business models, only the needs of the different stakeholders are considered in order to create the operating boundaries, leading to a separation of social and environmental stakeholder relationships with other business-oriented stakeholder relationships (Freeman, 1984). This resulted in no further change in the created value. However, businesses needed to control their environmental and social resources and not just their economic capital (Dyllick & Hockerts, 2002). This means that companies had to concentrate on interdependent collective challenges: the Triple Bottom Line of people, planet and profit, wherein social, environmental and economical concerns had to be incorporated (Elkington, 1998). Through focusing on individuals and the environment in addition to the profit incentive, the effect on the climate and stakeholders was included in the value creation, which was likely to lead to a more sustainable outcome (Elkington, 1994). Organizations were challenged to have extensive interaction with external stakeholders, both on the product and how the organization can develop economically responsible solutions to future social and environmental problems (Hart & Milstein, 2003). This ensured that the Triple Bottom Line was intended to stimulate a transformation of capitalism and to take a step towards

the second phase of value creation "recycle", which is about value recovery. According to Oxford Dictionaries recovery is defined as "the action or process of getting something back that has been lost". However, at this moment, many Triple Bottom Line reports are being generated in which it is far from obvious that the resulting evidence is being gathered and interpreted in a manner that actually let decision makers and policy makers track, understand and control the systemic impacts of human activities (Elkington, 2018). In practice, this often makes the social responsibility of conventional business models a cover for actions that are justified for other reasons, leading to the second phase of the Stages of Value Creation being seen as an additional luxury rather than a core input in the business model, which was already been predicted by Friedman (1970) and Freeman (1984) in the past.

3.3.2 Value creation within collective business models

Within collective business models, residents are willing to invest various means and will ultimately share the common outcomes of their actions (Kamm et al., 2016). Faber and Jonker (2015) mark this as the development of multiple, collective and shared values. This allows to give substance to the Triple Bottom Line of people, planet and profit, because value can be created in multiple areas at the same time (Elkington, 1998). Therefore, unlike conventional business models, collective business models do not use the results of the created value as a cover for actions that are justified for other reasons. As described earlier, collective business models are the result of business model innovation, enabling them to achieve what conventional business models can achieve and beyond. This is why, these business models have the potential the fully incorporate the last three stages of value creation. Collective business models, have a disruptive approach, in which only rapid, scalable changes in the problems are accepted, both within and outside the sector (Visser, 2017). This means that the integral value manifests itself through synergy, which Ackoff (1999, p. 40) described as the principle purpose of a social system: "to contribute to the development of its parts, itself, and the larger system of which it is part". This synergy is the result of system thinking that takes place within collective business models, in which the different parts of the system are not isolated, but are closely linked to each other, forming a complex structure (Seiffert & Loch, 2005). Within these collective business models, the individual will, as Friedman (1970) once argued, serve a more general social interest. Society will be a collection of individuals and the various groups they voluntarily form, in which there are no values and no social responsibilities other than the shared values and responsibilities of individuals (Friedman, 1970). This system approach within collective business models enables these business models to implement and maintain value throughout

the system. This means that collective business models are giving substance to the stage of circularise, because this stage consists of value preservation. According to Oxford Dictionaries preservation is defined as “the act of making sure that something is kept”. Therefore, value preservation can be seen as making sure value is being kept within the process, which takes place within a collective business model by addressing systems thinking. The fourth stage of value creation is 'Regenerate', in which value replenishment is the key concept. According to Oxford Dictionaries replenishment is “the act of making something full again by replacing what has been used”. The replenishment economy basically comes down to the question: what if customers no longer have to think about or select the product at all and the selection is largely done for them by technology? Within this economy, devices become responsible for ordering products, requiring people only to approve or reject the order before it is sent and executed (Stephens, 2015). However, there no known research linking this form of value creation to collective business models. Yet, it is possible that collective business models could take advantage of the technological development emerging from the regeneration stage. The last stage of the model is restoring, in which the key concept is value revival. According to Oxford Dictionaries, the definition of revival is as follows: "an improvement in the condition, strength, or fortunes of someone or something". It can be concluded that this phase is about the reuse of products, or in other words: the restoration of products. However, there is no known research linking this form of value creation to collective business models. Yet, it is possible that collective business models could focus on the reuse and restoration of products. Therefore, it can be concluded that collective business models can contribute to the realization of the phase of circularise and have the potential to fulfil the stages of regenerate and restore. But what is the reason for rethinking what is considered valuable within business models and why is the described value of collective business models essential for today’s society?

3.4 Wicked problems

Although, the EU’s environmental and climate policies yielded substantial gains in recent decades, Europe still faces ongoing challenges in the area of sustainability such as biodiversity loss, the use of resources, the impact of climate change and environmental risks to health and well-being (EEA, 2019). Only temporary and limited solutions for sustainable development were offered by technological developments (Farla et al., 2012). The diversity of areas which relate to the sustainability problem shows that this problem does not contain one-sided causes and solutions, and can therefore be seen as a wicked problem, which is “complex,

unpredictable, open ended, or interactable" (Head, 2013, p. 712). There is currently a world of limited rationality in which there is a lack of consensus between values and experiences (Jones, 1999). This means, according to Head (2013) that the poor definition of modern social problems derives from political judgements rather than scientific certainties, which makes these wicked problems immune to a simple definition and an accepted solution (Rittel & Webber, 1973). This has ensured that wicked problems relate to certain associations, namely to "social pluralism (multiple interests and values of stakeholders), institutional complexity (the context of interorganizational cooperation and multilevel governance), and scientific uncertainty (fragmentation and gaps in reliable knowledge)" (Head, 2013, p. 716). "The diverse sources of policy divergence on complex value-laden issues underline the point that there is no "root cause" of complexity, diversity, uncertainty, and ambiguity—hence, there is no root cause of "wickedness" and no single best approach to tackling such problems" (Head, 2013, p. 715). Wicked problems require a transdisciplinary approach, integrating ecological, social and economic considerations (Komiyama & Takeuchi, 2006). Therefore, the shortcomings of superficial sustainability solutions of conventional business models require new forms of collaboration or network management, in which executives collaborate across boundaries alongside those with appropriate experience and an engagement in the specific problem they are trying to address (Weber & Khademian, 2008). This means, radical changes within business models are needed, particularly in those areas that have the most contribution to environmental pressures and impacts – food, energy, mobility and housing – along their entire value chain (Reichel et al., 2016). According to Rittel and Webber (1973), the days of addressing serious problems with a technology approach are over, which makes room for other ways of targeting and decision making than the rationale of the goal-oriented model (Head, 2013). This means that new ways of thinking, leading, managing and organizing have to be created in order to recognize the complexity of the sustainability problem and establish new requirements that go beyond one's own organization (Head, 2013).

3.5 Comparison between conventional and collective business models

Table 2 shows the characteristics of conventional and collective business models. Conventional business models focus on a linear economy, taking advantage of the pattern of 'take-make-dispose'. This is done through co-operation within the value chain, creating unilateral value with a supply-side driven logic. Through these business models, organizational-centric innovation takes place, using the Triple Bottom Line as an additional luxury within the business

model in order to cover actions that are justified for other reasons. As a result, these business models are capable of implementing incremental changes, allowing routine problems to be solved. In contrast, collective business models focus on a circular economy, pushing aside the pattern of 'take-make-dispose'. This is done through co-operation in the value creation system, in which multiple value is created with a demand-side driven logic. Through these collective business models, network-centric innovation is carried out, using the Triple Bottom Line as core input within the business model. As a result, these business models are capable of making radical changes in the societal system in order to eventually solve wicked problems.

Elements	Conventional Business Models	Collective Business Models
Economy	Linear	Circular
Co-operation	Within value chain	Within value creation system
Value creation	Unilateral	Multiple / mutual
Logic	Supply-side driven	Demand-side driven
Innovation	Organizational-centric	Network-centric
Triple Bottom Line	As additional luxury within business model	As core input within business model
Problems	Routine/standard challenges	Wicked
Change	Incremental	Radical

Table 2. Comparison between business models

3.6 The solution to the sustainability problem

The diversity of areas which relate to the sustainability problem shows that this problem does not contain one-sided causes and solutions, and can therefore be seen as a wicked problem, which is "complex, unpredictable, open ended, or interactable" (Head, 2013, p. 712). Therefore, the sustainability problem requires a transdisciplinary approach, integrating ecological, social and economic considerations (Komiyama & Takeuchi, 2006). However, only temporary and limited solutions for sustainable development were offered by technological developments (Farla et al., 2012). Therefore, it has been proposed to start initiate transitions towards sustainability in order to restructure consumption and production systems of communities (Farla et al., 2012). According to Bocken and Short (2016), business model innovation is gradually being recognized as a critical component of transitions towards sustainability, because conventional business models are often organized around one, usually economic, value, which results in one-sided value creation (Kamm et al., 2016). This leads to shortcomings of these conventional business models in creating sustainability solutions. Therefore, business model innovation is needed to create new forms of collaboration or network management in which collaboration across boundaries takes place (Weber & Khademian, 2008). These

innovations of business models are called ‘new business models’, in which multiple participants are included and wherein a shift is taken place from an organizational-centric perspective towards a network-centric perspective (Jonker et al., 2017). This results in the so-called collective business models, in which multiple organizations that might differ in type, position in the value chain and industry work together to create a value creation system (Rohrbeck et al., 2013). Within collective business models, residents are willing to invest various means and will ultimately share the common outcomes of their actions (Kamm et al., 2016). Faber and Jonker (2015) mark this as the development of multiple, collective and shared values. This allows to give substance to the Triple Bottom Line of people, planet and profit, because value can be created within the social, ecological and economic area simultaneously (Elkington, 1998). As a result, the transdisciplinary approach needed to solve the wicked sustainability problem can be met (Komiyama & Takeuchi, 2006). Therefore, business models with a collective character could offer a solution to this problem and could be a way to restructure consumption and production systems within communities by following certain transition pathways and contribute in enabling a transition towards sustainability (Korhonen & Seager, 2008). However, there is a gap within the literature on transition and collective business models. So far, the integration of collective business models and transition and thus the contribution of collective business models in enabling a transition towards sustainability has hardly been researched (Bidmon & Knab, 2018; Korhonen & Seager, 2008). In order to investigate this gap, this qualitative research makes use of a deductive research approach, in which a multiple case study will be carried out. The above reasoning is summarized in Figure 6.

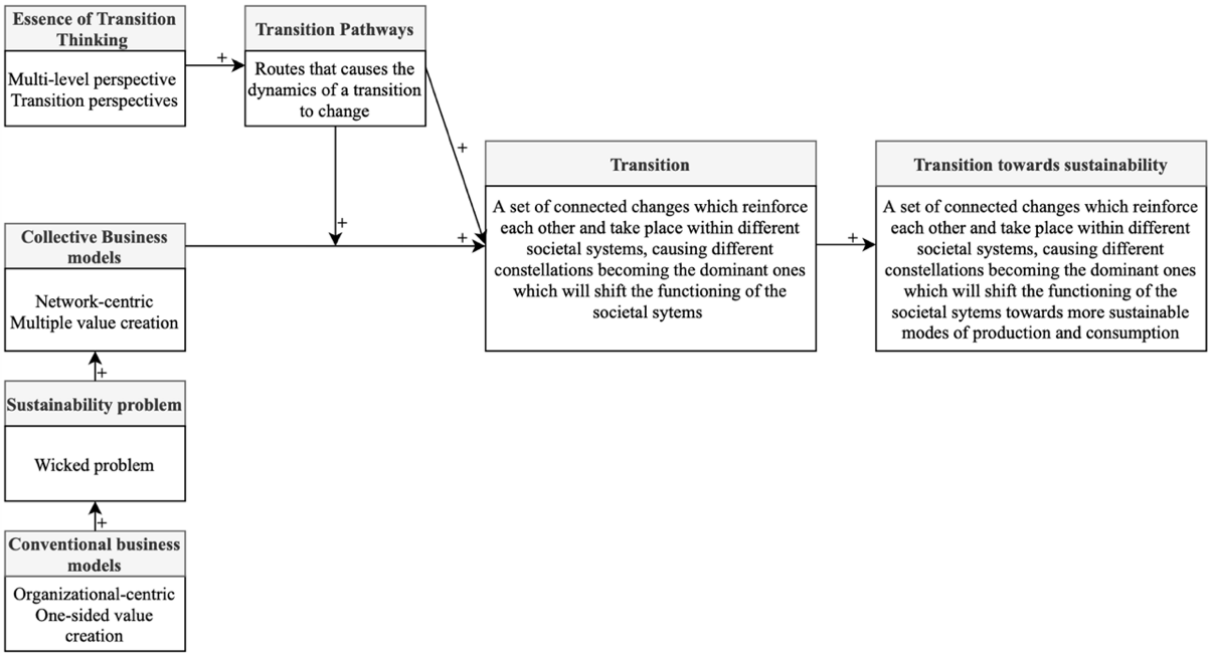

Figure 6. Entire conceptual model by integrating the concept of transition thinking and collective business models

4. Methodology

Within this chapter the research process will be described. It will provide information on the chosen methodology and the justification of the method used. In addition, a description of the data collection process is given. The chapter will end with a discussion of the quality criteria within this research.

4.1 Research strategy

The contribution of collective business models to a transition towards sustainability has so far hardly been researched (Bidmon & Knab, 2018), which is why this qualitative research has an explorative nature (Verschuren, Doorewaard, & Mellion, 2010). Within this research, an in-depth study was chosen, in which a small-scale approach was pursued that generates knowledge in order to demonstrate the contribution of collective business models in enabling a transition towards sustainability. This was done using a theory-driven, deductive research approach, which means that the starting point of this study was the existing theory (Yin, 2014). According to Verschuren et al. (2010, p. 42) a "theory-oriented research is all about solving a problem encountered in the theory development in a particular scientific area, and within this area, with regard to a specific issue". The scientific area within this research concerns sustainability, in which the specific issue concerns the contribution of collective business models in enabling a transition towards sustainability. A case study has been carried out to investigate this issue and to see how the theoretical concepts are applied in practice. However, this is a study of multiple cases, in which one case was used as a revealing case that served as a benchmark for the other two case studies. As a result, this gave this research a multiple design, making it a multiple case study (Yin, 2014). This resulted in an in-depth insight into the way in which the different transition processes took place within the cases. Since little research has yet been done on this subject and collective business model are currently being deployed into practice on a small scale, there are only a few cases that have been properly documented. As a result, the choice was made to use cases with good qualitative documentation. In practice, these turned out to be cases that were carried out successfully.

4.2 Case description

This section describes the revealing case and the other two cases that have been analyzed in order to answer the main question of this study.

4.2.1 Revealing case project Samsø

Samsø is an island in Denmark whose vision is to be free of fossil fuels by 2030. To this end, a project has been set up that describes various scenarios to provide the population with renewable energy, reduce the demand for heating and convert transport into electric transport. This is being done to eventually create a 100% sustainable energy system within Samsø by 2030, in which only local electricity production by wind turbines and PV systems in combination with the use of biomass sources will be used (Project SMILE, n.d.).

4.2.2 Project Sønderborg

Sønderborg is a city in Denmark with a vision to make the entire Sønderborg area CO2 neutral by 2029. A public-private partnership called ProjectZero has been set up to achieve the ambitious goal of CO2-neutral growth and sustainable urban development on the basis of improved energy efficiency, conversion of energy sources into renewable energy sources and the creation of participation of all stakeholders (Project Zero, n.d.-a).

4.2.3 Project North Karelia

North Karelia is an area in Finland that has set itself the goal of becoming an oil-free and low-carbon environment by 2040. By abandoning the use of fossil oil for energy production in 2020 and creating a bio- and circular economy and abandoning fossil oil in traffic by 2030, a basis is set for achieving the overall objective of the area by 2040 (Regional Council of North Karelia, Finnish Environment Institute SYKE, & Karelia University of Applied Sciences, 2012).

4.3 Research design

Within this research a document analysis was used as a qualitative research method to systematically assess and evaluate the documentation of the different cases (Bowen, 2009). A strategic sample was used. This means that in the selection of the research units (cases) the principle of coincidence was replaced by the use of the research questions to be addressed (Verschuren et al., 2010). The selection of the cases was made before the method of data analysis was chosen and has been performed with the help of three other Business Administration students. The selection process involved two steps. The first step was the creation of a long list of cases based on certain criteria. The only thing that was checked was whether these criteria were present, but not how they were implemented. Within this step, one more criterion was added, namely the requirement that the case documentation should contain

the English language in order to avoid errors in the interpretation of the documentation. This resulted in a longlist of 31 cases. The second step consisted of selecting the best cases from the created longlist. Also, within this selection, the following criteria were used, but were intended for further elaboration. First of all, a configuration was given about the different stakeholders within the case (e.g. business, government and citizens), in order to identify the further structure of the collective business model. Next, the scope of the case was assessed to determine whether the project had a national, regional or urban scope and how many people were involved. This made it possible to find out the size of the transition within the case. The preference was given to the largest possible scope because this increased the chance of coherent developments within multiple systems. Once the scope had been determined, the duration/period of the case was examined. This made it possible to assess whether actual developments had already been applied in practice in order to determine the actual contribution of collective business models in enabling a transition towards sustainability. It was then discovered whether the case had a specific focus on a particular system (e.g. energy, food or transport). Preference was given to cases that focused on multiple systems, as transitions involve coherent changes that take place within different areas (Rotmans et al., 2001). Subsequently, it was determined which multiple values (economical, ecological and social) the developments within the case yielded with the help of collective business models, enabling a basis to be formed for a transition. After that, it was examined whether this multiple value creation was based on a specific transition pathway in order to be able to find out how the collective business model had been created. On the basis of the elaborations of the aforementioned criteria within step two, the case was assessed, giving it a total score of 0 = totally unsuitable and 5 = totally suitable, to see whether the case was suitable for the analysis. The format of the second step is included in Appendix 1. This assessment resulted in three cases. Together with the three cases of Prof. Dr. J. Jonker, the total of the cases to be analyzed came down to six. However, it appeared that some of the selected cases did not contain sufficient or correct information to be able to analyze them. This led to three suitable cases, namely Samsø, Sønderborg and North Karelia. Samsø possessed the highest quality documentation, because the information given here was well applicable to the analysis protocol, which can be found in section 4.5. The Sønderborg and North Karelia cases had a minimum level of correct and applicable information. This gave reason to use Samsø as a revealing case, which served as a benchmark for the other two cases.

4.4 Operationalization of the research concepts

To investigate the contribution of collective business models in enabling a transition towards sustainability, the concepts of transition towards sustainability, transition pathways, collective business models and multiple value creation contain dimensions of which the stipulative definition will be given. On the basis of the dimensions, indicators are formed, which form the basis for identifying the research concepts within the case studies. In order to clarify the definition of the transition pathways, items have been identified, which can be found in the overview of the operationalized concepts in Appendix 2. After each descriptive operationalization of the research concept, an overview is given in a table for clarification.

4.4.1 Operationalizing the concept of transition towards sustainability

The definitions of Rotmans et al. (2001) and de Haan and Rotmans (2010) on transitions and the definition of Markard et al. (2012) on a sustainability transition have led to the following stipulative definition of a transition towards sustainability: "when a case shows a set of connected changes which reinforce each other and take place within different societal systems, causing different constellations becoming the dominant ones which will shift the functioning of the societal systems towards more sustainable modes of production and consumption". This concept contains two dimensions: a transition and a sustainability transition. The first dimension of transition, consists the definitions by Rotmans et al. (2001) and de Haan and Rotmans (2010) and is defined as: "a set of connected changes which reinforce each other and take place within different societal systems, causing different constellations becoming the dominant ones which will shift the functioning of the societal systems". This dimension is reflected in the following indicators: a set of connected changes, changes that reinforce each other, changes in different societal systems, different constellations becoming dominant, shift of the function of societal systems. The second dimension of sustainability transition is defined as: "long-term, multidimensional and fundamental processes, through which a regime changes to more sustainable modes of production and consumption" (Markard et al., 2012, p. 956). This definition has the following indicators: long-term, multidimensional and regime changes to more sustainable modes of production and consumption (Table 3).

Concept	Dimension	Indicators
Transition towards sustainability	1. Transition	1. A set of connected changes 2. Changes that reinforce each other 3. Different constellations becoming the dominant 4. Shift of the function of societal systems
	2. Sustainability transition	1. Long-term 2. Multidimensional 3. Regime changes to more sustainable modes of production and consumption

Table 3. Operationalization of the concept of transition towards sustainability

4.4.2 Operationalizing the concept of transition pathways

Transition pathways have been defined by de Haan and Rotmans (2010, p. 91) as: "each pattern serves as a dramatic situation influencing the plot of the transition tale". Therefore, the stipulative definition of a transition pathways is defined as follows: "when within a case a pattern serves as a dramatic situation influencing the plot of the transition tale". This concept contains eleven dimensions, which will be discussed together with their indicators, namely: *radical reform* (indicators: top-down & regime adaptation), *revolution* (indicators: top-down & without regime adaptation), *collapse* (indicators: top-down & failed transition), *reconfiguration* (indicators: bottom-up & regime adaptation), *substitution* (indicators: bottom-up & without regime adaptation), *backlash* (indicators: bottom-up & failed transition), *teleological* (indicators: top-down & bottom-up & regime adaptation), *emergent* (indicators: top-down & bottom-up & without regime adaptation), *lock-in* (indicators: top-down & bottom-up & failed transition), *transformation* (indicators: regime adaptation) and *system breakdown* (indicators: regime adaptation & failed transition) (Table 4).

Concept	Dimension	Indicators
Transition pathways	1. Radical Reform	1. Top-down 2. Regime adaptation
	2. Revolution	1. Top-down 2. Without regime adaptation
	3. Collapse	1. Top-down 2. Failed transition
	4. Reconfiguration	1. Bottom-up 2. Regime adaptation
	5. Substitution	1. Bottom-up 2. Without regime adaptation
	6. Backlash	1. Bottom-up 2. Failed transition
	7. Teleological	1. Top-down 2. Bottom-up 3. Regime adaptation
	8. Emergent	1. Top-down 2. Bottom-up 3. Without regime adaptation
	9. Lock-in	1. Top-down 2. Bottom-up 3. Failed transition
	10. Transformation	1. Regime adaptation
	11. System Breakdown	1. Regime adaptation 2. Failed transition

Table 4. Operationalization of the concept of transition pathways

4.4.3 Operationalizing the concept of collective business models

Collective Business Models have been defined by Rohrbeck et al. (2013) as: "business models in which multiple organizations that might differ in type, position in the value chain and industry work together to create a value creation system. Therefore, the stipulative definition of a transition pathways is defined as follows: "when a case contains a business models in which multiple organizations that might differ in type, position in the value chain and industry work together to create a value creation system. This concept contains two dimensions: multiple

organizations and cooperation to create a value creation system. The first dimension of multiple organizations is reflected in the following indicators: difference in type of organization, difference in position in the value chain and difference in type of industry. The second dimension of cooperation to create a value creation system consists of the following indicators, namely: cooperation of multiple organizations and the creation of a value creation system (Table 5).

Concept	Dimension	Indicators
Collective business models	1. Multiple organizations	1. Difference in type of organization 2. Difference in position in the value chain 3. Difference in type of industry
	2. Cooperation to create a value creation system	1. Cooperation of multiple organizations 2. Creation of a value creation system

Table 5. Operationalization of the concept of collective business models

4.4.4 Operationalizing the concept of value creation

Value creation has been defined by Lepak et al. (2007, p. 182) as: "the user's willingness to exchange a monetary amount for the value received". Therefore, the stipulative definition of a value creation is defined as follows: "when the case shows sign of the user's willingness to exchange a monetary amount for the value received". Value can be created in three different areas (Elkington, 1994), underlining three dimensions, which will be discussed together with their indicators, namely the: *social area* (indicator: value for people), *environmental area* (indicator: value for planet) and *economical area* (indicator: monetary value) (Table 6).

Concept	Dimension	Indicators
Value creation	1. Social area	1. Value for people
	2. Environmental area	2. Value for planet
	3. Economical area	3. Monetary value

Table 6. Operationalization of the concept of value creation

4.5 Data analysis

The method that has been used to analyse the data is a content analysis. According to Symon and Cassell (2012, p. 396) "content analysis provides a tool for understanding meanings that are reported in documents". It is a suitable technique for this research because it can be used to give an indication of the intensity or strength of the concerns (Symon & Cassell, 2012). This is the case within this research, because this study examines the extent to which collective business models contribute in enabling a transition towards sustainability. According to Symon and Cassell (2012, p. 397) a "content analysis requires the development of a framework to code and help transform the evidence from documents into answers to specified research questions". That is why, an analysis protocol based on the multi-level perspective and a time perspective has been developed. After consultation with Prof. Dr. J. Jonker, it was decided to add the levels

of technology and citizens to the three mentioned levels by the multi-level perspective, namely landscape, societal system and constellation. This choice has been made in order to better identify the collective aspect within the transition. Based on this analysis protocol, a descriptive analysis was made of all three cases in order to identify the transition processes. This analysis described the steps that were taken and defined the content of the transition processes. First of all, an attempt was made to code the documentation in an open way, using the coding program atlas.ti8. However, this resulted in a complicated set of data, because the documentation contained a large amount of information. Therefore, it was decided to adapt the analysis strategy. Based on the documentation, a matrix was created per case that combines the five levels of analysis with the displayed timeline of the transition. This resulted in a clear overview of the most important events of the transition process. These matrices were then used to select relevant text fragments from the documentation. Next, these text fragments were manually coded in Word on the basis of the five aforementioned analysis levels, the time perspective and the concept of multiple value creation. On the basis of these text fragments, the descriptive analysis was written which was subdivided into the five levels of analysis. Further interpretation of the text fragments has led to some differences between the matrix and the actual descriptive analysis (Chapter 5). The descriptive analysis was then manually coded in Word at the concept level, based on the indicators from the operationalization of the concepts of collective business models and the transition pathways. By means of these codes, the analytical analysis of Chapter 6 was created. On the basis of both the descriptive and the analytical analysis, the answer to the main question was given in chapter 7. A note to be mentioned is the fact that this research was carried out during the period of COVID-19. However, the lock-down situation resulting from the actions taken by the Dutch government did not impose any restrictions on the research to be carried out.

4.6 Quality criteria

The quality of a qualitative study depends on a number of criteria, namely: saturation, traceability, transferability, understandability, utility, reliability and communality (Jonker & Pennink, 2010). "When additional analysis no longer contributes to discovering anything new about a category" the criteria of saturation is met (Strauss, 1987, p. 21). Within this study, different data sources have been combined when analyzing the multiple cases, which indicates data triangulation (Patton, 1999). In addition, three other Business administration students assisted in the selection of the cases to be analyzed, resulting in researcher triangulation

(Denzin, 2017). This has been useful to make the selection process more feasible in time and reduces the bias of the researcher to meet the criteria of saturation (Jonker & Pennink, 2010; Symon & Cassell, 2012). Moreover, a content analysis was carried out in a structured manner, applying the operationalized concepts and the codes that came directly from the theory. Furthermore, the research choices made are described. It was made clear which criteria were used in the selection process of the cases and also the reason why one case was used as a revealing case. This gave insight into the choice process and the research context, which helped readers to determine whether or not the research is applicable outside the specific context in which the data was generated (Symon & Cassell, 2012). In doing so, these factors cause an interpretation of the quality criteria traceability, transferability and understandability (Jonker & Pennink, 2010). An analysis protocol based on the multi-level perspective and a time perspective was used. By doing so, it was shown in which way the analysis was conducted. Furthermore, only second-hand documentation from the projects themselves was used. This could give an incorrectly picture of the transition process, but it also increased the chance of obtaining the most reliable data, because the projects themselves got the best insight into the transition project. These factors increased the reliability of the research (Jonker & Pennink, 2010). However, due to the COVID-19 situation it was only possible to perform a content analysis, which may have affected the utility of this research (Jonker & Pennink, 2010). In addition, only three cases were examined, which limits the commonality of the investigation. However, despite the fact that the researcher was unfamiliar with the research concepts, which can lead to a limitation in answering the research question, but also to a limitation in the researcher's bias, the preliminary education of the researcher, namely Business Administration, has given the researcher a good view of how business models can be deployed. This aspect in combination with the research strategy, in which one revealing case was used and the other two cases were used as a supplement, resulted in more specific knowledge at multiple levels (Verschuren et al., 2010), which was beneficial for the reliability of this research.

5. Research analysis

This chapter provides a descriptive analysis of the three different cases. Using the analysis method described in Chapter 4, the developments that shape the transition are analyzed at the various levels, which are: landscape, social system, constellation, technology and the citizens level. Ultimately, this leads to a description of the specific transition processes within the particular case. At the end of each case, the described transition is visualized in a matrix.

5.1 Project Samsø

Samsø's overall transition (Figure 7) is divided into three phases. These phases are intertwined and within each phase the specific focus of the project differs. The phases are divided as follows (Energi Akademiet, n.d.-a)

- Island 1.0 - Utopia is possible: 1997 – 2017
- Island 2.0 - This IS difficult: 2007 – 2030
- Island 3.0 - Common sense: 2011 – 2050

5.1.1 Island 1.0 – Utopia is possible: 1997 - 2017

Within the first phase, the project has ensured that Samsø produces more renewable energy than it uses, making the island call itself 100% self-sufficient with renewable energy (Energi Akademiet, n.d.-b). The details of this transformation within phase one are described below.

Landscape level

Samsø started their transition towards sustainability after the Ministry of Energy announced a competition in 1997 which area or island could present the most realistic and feasible plan for a 100% transition to self-sufficiency with renewable energy. Samsø's plan was considered the best by the energy authority of Denmark. As a result, the island had to become self-sufficient in renewable energy within ten years (Jørgensen et al., 2007).

Technological level

Within the heating sector, a district heating plant was built in Tranebjerg in 1994, generating heat by burning straw (Jørgensen et al., 2007, p. 11). After the city of Tranebjerg the cities Mårup and Norby where integrated in the project. This district heating installation was carried out in 2002 and produces heat through the combustion of wood chips and through a solar heating installation (Jørgensen et al., 2007, p. 11). Subsequently, a district heating installation

was built in Onsbjerg in 2003, which also creates heat by burning shredded straw (Jørgensen et al., 2007, p. 12). Finally, a district heating installation was built in 2004 for both the city of Ballen and Brundby. Again, heat was produced by burning straw (Jørgensen et al., 2007, p. 12). During the development of the various district heating systems, private homeowners and companies invested in individual renewable energy production units, such as solar power plants, biomass boilers and heat pumps. In addition, various energy-saving investments, such as additional house insulation and window renovation, were realized, mainly within private households (Jørgensen et al., 2007, p. 41). In addition, it was determined that, within the electricity sector, eleven wind turbines and fifteen offshore wind turbines had to be installed in order to generate the annual amount of electricity and to compensate the transport sector because it was not possible to meet the energy needs of this sector with renewable energy (Jørgensen et al., 2007, p. 21). Attempts have been made to introduce electric cars, but this market is almost non-existent, because people are waiting for better batteries and hybrid vehicles in which electric propulsion can be installed (Jørgensen et al., 2007, p. 26).

Societal-system level

In all societal systems, the Danish government made an important legislative requirement. Within the various systems, such as the heating sector, energy sector and transport sector, the developments to shape the transition had to be carried out within the existing legislation (Energi Akademiet, n.d.-b). Specifically, within the heat sector, a number of events took place that relate to the social system level. In order to be able to realize the construction of the various district heating stations, Samsø City Council guaranteed the mortgage loans used to finance the district heating station and several grants were paid by the government to enable the realization of these district heating installations. (Jørgensen et al., 2007, p. 11). The connection to one of these district heating systems is not mandatory for the whole population. Only new buildings constructed in areas with existing or planned district heating are required to be connected to the district heating systems (Jørgensen et al., 2007, p. 11). In addition, the government disbursed about DKK 3 million (EUR 400 000) in grants to private homeowners and companies for the construction of individual renewable energy production units and DKK 4,5 million (EUR 600 000) in grants for the energy saving investments in private households (Jørgensen et al., 2007, p. 41). The government has also subsidized various campaigns relating to energy supply and energy savings (Jørgensen et al., 2007, pp. 13-14-15-16). Within the electricity sector it soon became clear that there was no shortage of potential investors for the wind turbines, with farmers in particular being keen to invest in their own wind turbine (Jørgensen et al., 2007, p.

21). To assist this process, the Danish Energy Authority financed the preparatory sea floor studies and the required environmental studies (Jørgensen et al., 2007, p. 22). For the various sectors, the project has set up a socio-economic development project called the Samsø Energy Academy. This academy is a meeting place for energy companies, for energy and local development (Jørgensen et al., 2007, p. 30).

Constellation level

Under the direction of the Danish Technological Institute, a course for blacksmiths, plumbing and heating services took place which led to professionals being awarded a certificate which enables them to install state-authorized technologies in houses too far from the district heating systems (Jørgensen et al., 2007, p. 13). This in turn gave benefits to the population of Samsø, which will be discussed later at the level of citizens. In addition to this possibility of certification, local farmers were involved in the district heating process. The straw and wood chips needed to create heat are produced by the local farmers (Jørgensen et al., 2007, p. 11).

Citizens level

As far as the population of the island is concerned, the government insisted that the project should ensure broad public support (Energi Akademiet, n.d.-b). Within the heat sector, this was reflected in a number of events. Apart from the new-build houses, the city council opted for a voluntary participation regarding district heating for all existing houses. This allowed these citizens to accept or refuse connection to district heating (Jørgensen et al., 2007, p. 11). However, the connection to the district heating system was made very cheap, namely DKK 80 (EUR 10). In order to be able to repay the investment costs, these investment costs were added to the price of the heat supplied, resulting in a higher heating price. Nevertheless, this price is more advantageous than the price for heating on oil or electricity (Jørgensen et al., 2007, p. 11). In addition, the national energy saving association 'Energisparefonden' gave a subsidy to citizens who switched from electric heating to district heating (Jørgensen et al., 2007, p. 11). Within the electricity sector, the project has implemented an ownership scheme that gives all islanders the opportunity to invest in wind turbines in order to facilitate implementation and create broad public support. "The psychological effect of spreading ownership also greatly improved citizen acceptance for the erection of these wind turbines" (Jørgensen et al., 2007, p. 21). Also, several energy campaigns were organized to inform the population about the planning of district heating systems and to offer each resident a private visit from a renewable energy advisor in order to achieve possible energy improvements and financing possibilities

(Jørgensen et al., 2007, pp. 13-14-15). In addition, various campaigns have been carried out to increase investments in both the installation and the production of PV cells (Jørgensen et al., 2007, p. 23). Also, a campaign was launched aimed at pensioners, in which they received a subsidy from the Danish Energy Authority when they carried out energy-saving renovations in their homes (Jørgensen et al., 2007, p. 15). Finally, the certification of professionals in the heat sector still needs to be reviewed. This led to the installation of systems authorized by the government. By using these installations, citizens were given the right to a subsidy that reimbursed 30% of the initial costs (Jørgensen et al., 2007, p. 13).

Resulting value due to the developments within the different levels of phase one

Although energy consumption has not changed within the first phase of the project, the ways to generate this energy have changed. As a result, the contribution of renewable energy to the overall energy consumption has increased to more than 100% and its impact on the environment, particularly the atmosphere, has been reduced significantly. This means there is a surplus of renewable energy that can be exported from the island (Jørgensen et al., 2007, p. 34). In addition, the number of tourists per year is increasing, with a new trend developing: "educational or professional tourism" and the increasing demand for seminars, courses and exhibitions. Many tourists come to the island to see the project Renewable Energy Island (Jørgensen et al., 2007, p. 30). In addition schools and universities are increasingly using the island as part of their study programme (Jørgensen et al., 2007, p. 30). As a result, the Energy Island project is, as it states itself, an educational experiment with great development potential, from which an improved awareness of each individual's role in the field of energy consumption and production emerges (Jørgensen et al., 2007, p. 30). Another outcome is the fact that the project generated an estimated 20 man-years of employment per year in the period 1998 - 2007 and used local contractors for the foundation work and local machine shops and electricians for the installation work in both the district heating projects and the wind turbine projects (Jørgensen et al., 2007, p. 41).

5.1.2 Island 2.0 – This IS difficult: 2007 – 2030

While the first phase involved restructuring society and the transition from fossil to renewable energy, the second phase involves the efforts Samsø need to make the island independent of fossil fuels. In this phase, the aim is to examine the various technologies in order to achieve not only a balanced energy accounting, but also a sustainable local energy production and use (Energi Akademiet, n.d.-c).

Landscape level

The project aims to expand Samsø's role as an exhibition space for Danish knowledge and experience, to learn from international experiences and to ensure that it is open to the outside world, in order to show how effectively energy solutions can be implemented in a community (Energi Akademiet, n.d.-c).

Technological level

Renovations and improvements to the building stock reduces heat demand and ensures an equal distribution of heat demand across production technologies, i.e. "the technology shares remain the same, but the demands changes" (Mathiesen, Hansen, Ridjan, Lund, & Nielsen, 2015, p. 32). After this, separate district heating systems will be integrated and large heat pumps will be installed in order to reduce biomass consumption and improve the efficiency of the district heating network (Mathiesen et al., 2015, pp. 33-34). To further improve efficiency an extension of the district heating system has been proposed (Mathiesen et al., 2015, p. 34). After the expansion of the district heating system, the focus will be on replacing all individual heating with small heat pumps (Mathiesen et al., 2015, p. 36). The last point to consider is to make the transport sector 100% renewable in the future. Six different transport scenarios have been developed and are seen as possible options to change the system. The first option replaces electric vehicles for all cars and vans and 50% of the bus fuel needs, with the other five options complementing this switch to electric vehicles in order to ultimately create a fully sustainable system (Mathiesen et al., 2015, p. 37).

Societal system level

No further developments have taken place at this level of analysis.

Constellation level

No further developments have taken place at this level of analysis.

Citizens level

Trust and faith will be strengthened, because there is a need for solid budgets and funding, and if these conditions are not met by the project and the economics were short-sighted and uncertain, the support of the population will be weak (Energi Akademiet, n.d.-c).

Resulting value due to the developments within the different levels of phase two

With the inclusion of large heat pumps, most of the heat demand is met and in addition, the intended export of electricity can be used instead within the local system to replace other fuels. This integration of the electricity and heating sectors will make relatively cheap heat storage available (Mathiesen et al., 2015, p. 34). In addition, the integration of the three separate district heating systems is intended to exploit the operational benefits of a larger network, i.e. sharing production capacity over the existing networks and increasing heat storage (Mathiesen et al., 2015, p. 33). The investments and the rising operation and maintenance costs may contribute to the creation of local employment, but this exact number is difficult to determine. In spite of the fact that these investments reduce the income from electricity exports, they replace the current fuel and CO2 costs (Mathiesen et al., 2015, p. 63). The last point is the ownership structure of the investments, as this offers local advantages. Indeed, local ownership of renewable energy technologies ensures that revenues from the sale of electricity remain within the local community (Mathiesen et al., 2015, p. 65; Sperling & Mathiesen, 2015).

5.1.3 Island 3.0 – Common sense: 2011 – 2050

Although phase two focuses on the independence of fossil fuels, there are still functions in the system that require imports of fossil fuels, such as ferry services and other transport of goods to and from the island, transport on the island itself, and domestic heating in areas not covered by renewable energy sources (Nielsen & Jørgensen, 2011, p. 7). Phase three focuses on real sustainability within society, where there is no longer dependence on finite resources, by no longer using them, by using the fuels at the same rate as they are being renewed or to fully recycle them by using energy from renewable sources. This means, the focus is on the circular economy (Nielsen & Jørgensen, 2011, p. 8).

Landscape level

Samsø's focus is on the circular bioeconomy in which actions are aligned. The intention is that a circular mentality exists among the entire population of the island and that a circular economy can be developed with the help of various developments. The aim is that waste can support the daily life of the population in many ways (Energi Akademiet, n.d.-d).

Technological level

Within this phase, a biogas plant will be built for agriculture, fed with organic material and producing methane for the ferry Isabella to Jutland (Energi Akademiet, n.d.-d). In addition, it

is intended that the filtered waste water that is pumped into the sea every year will be recycled for agriculture (Energi Akademiet, n.d.-d). Finally, the project is identifying sources of daily waste that could potentially be recycled and become sources for other products.

Societal system level

The focus is on agricultural production in which the aim is to guarantee the long-term fertility of the land and there should be no linear loss of nutrients (Energi Akademiet, n.d.-d). In addition, research will be carried out into ways and strategies needed to bind more CO2 from the ambient air, which will promote food production (Energi Akademiet, n.d.-d).

Constellation level

The Samsø Energy Academy wants to take its responsibility for the circular economy by defining the way forward and inspiring other communities to ultimately support more opportunities for resource recycling (Energi Akademiet, n.d.-d).

Citizens level

The aim is to increase the general knowledge of local residents to enable them to take an active part within the decision-making process of technologies and investments that are crucial for the circular mentality. Through newspaper articles and theme meetings, island residents and tourists will be informed about the entire island. In addition, research will be conducted into decisive ways of communicating about the circular economy (Energi Akademiet, n.d.-d).

Resulting value due to the developments within the different levels of phase three

When the annual filtered waste water filled with nutrients is used for agriculture, the entire food chain on the island is better supplied. (Energi Akademiet, n.d.-d). In addition, by focusing on agriculture in this phase it will be possible to generate more jobs throughout the value chain and can the recycling of components also create new jobs and opportunities (Energi Akademiet, n.d.-d).

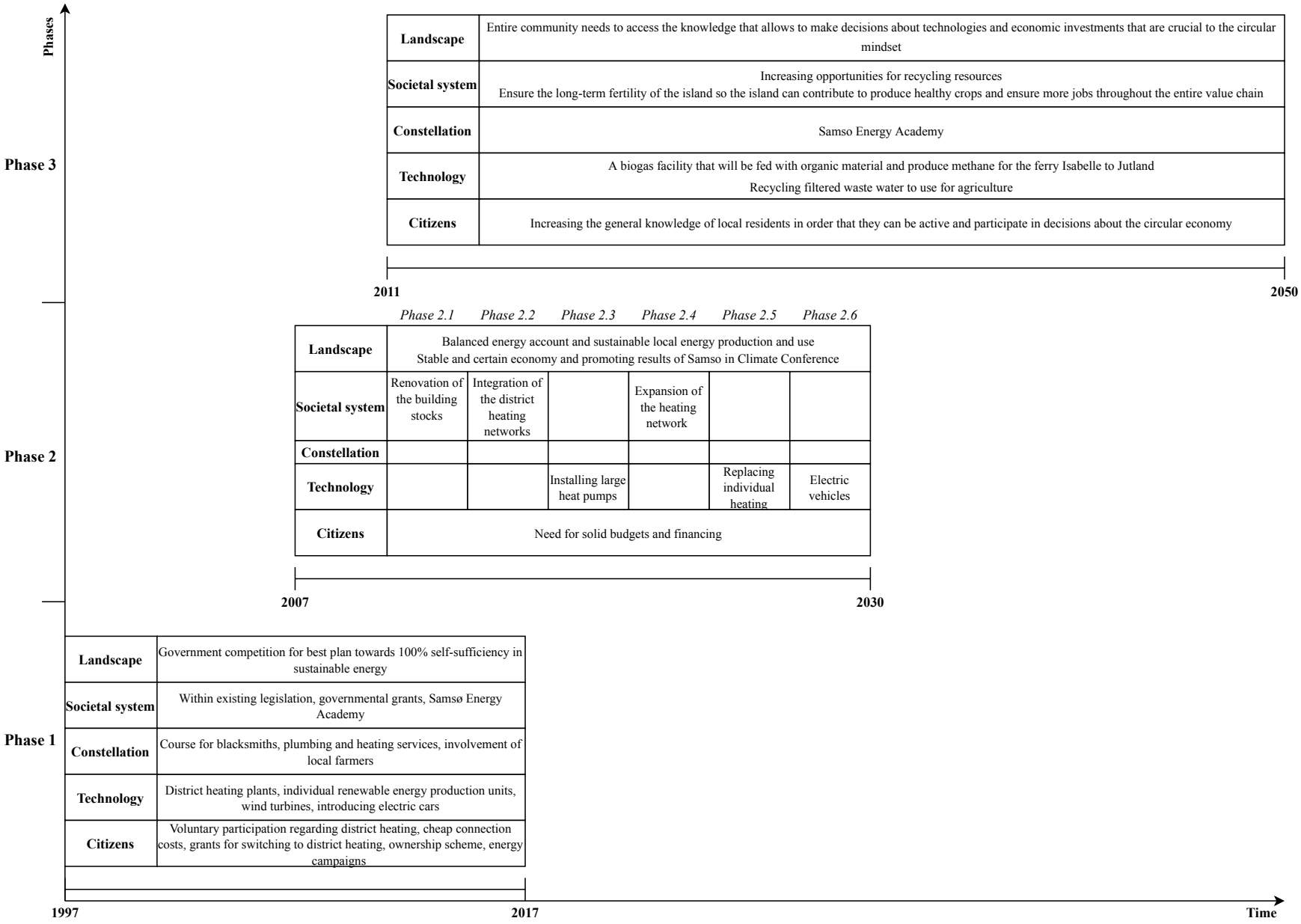

Figure 7. The visualized transition process of project Samsø

5.2 Project Zero Sønderborg

Sønderborg's overall transition (Figure 8) is divided into phases, in which the specific focus of the project differs. Three phases up to and including 2025 are currently defined (Project Zero, n.d.-b):

- Roadmap 2015: 25% Co2 reduction by 2015 compared to the level in 2007
- Roadmap 2020: 50% Co2 reduction by 2020 compared to the level in 2007
- Roadmap 2025: 75% Co2 reduction by 2025 compared to the level in 2007

5.2.1 Roadmap 2015 – 25% Co2 reduction by 2015 compared to the level in 2007

Within the period up to 2015, a number of developments were envisaged which could be divided into technical measures and implementation measures. The technical measures are technical solutions that had to be implemented in order to achieve a 25% CO2 reduction, with the implementation measures being the initiatives to keep the interest and back-up of the technical measures up to date (Kristensen & Dyhr-Mikkelsen, 2009, p. 10).

Landscape level

The municipality of Sønderborg aims to become a role model and a forerunner in climate initiatives. To achieve this ultimate goal, a public-private partnership has been set up by the municipality of Sønderborg in cooperation with the business community in the area, called ProjectZero (Project Zero, n.d.-b).

Technological level

The first development is the replacement of all oil, natural gas and electric furnaces with heat pumps and biomass furnaces in rural districts. Both heat pumps and biomass furnaces are supplemented by solar heat with heat tanks (Kristensen & Dyhr-Mikkelsen, 2009, p. 32). In addition, all individual natural gas furnaces in the area of existing district heating are replaced by district heating, which in the long term will run on renewable energy sources (Kristensen & Dyhr-Mikkelsen, 2009, p. 38). Within the electricity sector, the project addresses the construction of offshore wind turbines and this will eventually be expanded (Kristensen & Dyhr-Mikkelsen, 2009, p. 52). Also, energy-efficient renovations, adaptation of existing buildings and adaptation of fixed installations in existing buildings have been applied. In this respect, new buildings have been built using an energy-efficient design (Kristensen & Dyhr-Mikkelsen, 2009, p. 61). The last development consists of testing electric vehicles and the

adaptation of the infrastructure in such a way that a behavioral change can actually take place within the societal system (Kristensen & Dyhr-Mikkelsen, 2009, p. 88).

Societal system level

In order to promote the prevalence of heat pumps, an obligation has been imposed on electricity, gas, oil and district heating companies to find energy savings among end users (Kristensen & Dyhr-Mikkelsen, 2009, p. 34). In addition, the government has allocated a fund of 30 MDKK for information campaigns and subsidy schemes for owners of individual oil furnaces in rural districts to switch to heat pumps (Kristensen & Dyhr-Mikkelsen, 2009, p. 34). Furthermore, pressure is being exerted to change the rules in order to make it possible to produce electricity if renewable energy resources are not available. It even should be possible to reduce electricity production if there is a surplus of resources (Kristensen & Dyhr-Mikkelsen, 2009, p. 45). In order to promote sustainable transport, car-free and CO2-neutral industrial and residential areas have been implemented and a cycle route network has been created (Kristensen & Dyhr-Mikkelsen, 2009, pp. 88-89). Also, collaborations have been established between educational parties and training options are constantly being developed to keep the learning cycles innovating in order to develop knowledge and creativity within society (Kristensen & Dyhr-Mikkelsen, 2009, p. 101 & 106). Finally, the focus is on conducting research at the university within CO2-neutral development and growth (Kristensen & Dyhr-Mikkelsen, 2009, p. 102).

Constellation level

Compensation payments to the natural gas distribution company are considered when areas are shifting from natural gas supply to district heating and when a switch is taking place from natural gas to other fuels in a heat or power plant (Kristensen & Dyhr-Mikkelsen, 2009, p. 39). Looking at the implementation of the large wind farms, local companies can contribute to the process by being the initiator and through co-financing. In this way, local businesses are offered an opportunity to create a green profile (Kristensen & Dyhr-Mikkelsen, 2009, p. 53). In addition, a "knowledge center for energy saving in buildings" has been set up, with the task of gathering knowledge and communicating ways to reduce energy consumption in buildings (Kristensen & Dyhr-Mikkelsen, 2009, p. 70). Another development is the communication platform ZEROcompany which is created to make exchange of experiences possible and visualize the work to make Sønderborg CO2 neutral by 2029. Finally, in order to provide companies and the population with energy-efficient solutions, local consultants are trained and educated (Kristensen & Dyhr-Mikkelsen, 2009, pp. 81-82).

Citizens level

Special package offers or discounts are used in order to achieve increased customer interest in heat pumps instead of oil furnaces and to ensure that they participate more quickly (Kristensen & Dyhr-Mikkelsen, 2009, p. 34). Such a way has also been implemented to guide building owners to realize savings. In addition, open house events were organized in smaller buildings to present the renovation as a good example (Kristensen & Dyhr-Mikkelsen, 2009, p. 71). Also, in order to reduce electricity consumption, the population is made aware of electricity consumption through information and promotion campaigns. In addition, the population is exposed to energy-saving products in shops, websites and in advertisements (Kristensen & Dyhr-Mikkelsen, 2009, pp. 74-75). To further raise awareness, the project has set up four communication platforms to visualize the contribution to a CO2-neutral future and ensure that businesses and citizens are committed to the project, which are ZEROambassador, ZEROshop, ZEROfamily and ZEROcompany (Kristensen & Dyhr-Mikkelsen, 2009, p. 77).

Resulting value due to the developments within the different levels of phase one

Within the periods of cheap generation, heat can be stored which then can be used in periods when the prices are rising, also called the 'dynamic system' (Kristensen & Dyhr-Mikkelsen, 2009, p. 32). In addition, the use of bio gas in electricity and heat production reduces CO2-emissions (Kristensen & Dyhr-Mikkelsen, 2009, p. 45). Furthermore, the ZEROcompany programme encourages companies to invest in energy savings that create jobs in various sectors (Kristensen & Dyhr-Mikkelsen, 2009, p. 83). The other communication platforms create awareness. For example, the use of electric vehicles reduces CO2 emissions, but also influences the behavior of the population. If the electric car becomes a natural choice, the daily focus on supporting the climate can be increased (Kristensen & Dyhr-Mikkelsen, 2009, p. 88).

5.2.2 Roadmap 2020 – 50% Co2 reduction by 2020 compared to the level in 2007

The aim is to achieve a 50% reduction in CO2 emissions through market-based partnerships to speed up the transition developments. Certain focus segments and development themes are designed to maximize impact based on value creation, networking and cross-sector synergies in order to reach the previous mentioned goal (Project Zero, 2015, p. 2&4).

Landscape level

The focus is on making the corporate social reasonability culture more cooperative in finding joint solutions by cross-sectoral partnerships to reduce CO2 emissions, create green jobs and

offering the best energy solutions to the community (Project Zero, 2015, p. 6&8). Setting up these strong partnerships goes beyond Sønderborg itself and is also focusing on regional networks to create a larger market for the development of green businesses and to influence thinking and policy within the region (Project Zero, 2015, p. 10).

Technological level

The focus is on Bright Green Business. This specifically concerns products and services in order to offer climate and energy-saving solutions for all kinds of applications (Project Zero, 2015, p. 8). The aim is to strategically link energy supply and demand by using electricity as an energy source in combination with green district heating and green gas from renewable sources or in other words: creating a Smart Grid. To this end, the energy production capacity will be expanded with wind and solar energy production, thereby maintaining a high local level of ownership (Project Zero, 2015, pp. 12-13). In addition, in order to create a sustainable use of biomass resources, a biogas plant based on a combination of manure and biomass waste from other local sources and a biorefinery has been set up (Project Zero, 2015, p. 14).

Societal system level

In order to accelerate the transition of the housing stock, a new cooperation between the seven Sønderborg housing associations and the residents has been set up, a cooperation with local craftsmen to accelerate the transition from heat sources to renewable energy sources has been realized and new participation methods have been developed within the sector of private rental buildings. In addition, the project facilitates the training of energy consultants in the construction sector in order to provide homeowners the best information, guidance and confidence about the transition (Project Zero, 2015, pp. 6-7). In order to promote the expansion of wind and solar capacity, specific campaigns are carried out, based on cooperation with stakeholders in the area (Project Zero, 2015, p. 13). Furthermore, the project facilitates a knowledge base of best practices, enabling companies to develop strategies for reducing emissions and also to improve their bottom line and CSR activities (Project Zero, 2015, pp. 8-9). And for tourism in Sønderborg, the focus will be on the professionalization of new green business and tourism initiatives including efficient service and follow-up of visiting guests in order to raise awareness of the project (Project Zero, 2015, p. 10).

Constellation level

In order to promote a transition within the transport sector, companies with more than ten vehicles are offered 'fleet consultancy', in which an advisor provides advice on how a company can make better use of its vehicle fleet (Project Zero, 2015, p. 16).

Citizens level

Energy consultants in the construction sector provide homeowners with the best guidance and attractive financing options are provided to motivate citizens to make energy-saving investments (Project Zero, 2015, p. 6). In addition, within the transport sector resources will be used to make sustainable transport easy, safe and smart for citizens and campaigns are being conducted to encourage people to use green transport (Project Zero, 2015, p. 16).

Resulting value due to the developments within the different levels of phase two

By reducing energy consumption in the building stock and improving the energy label, energy costs are reduced, the selling price of the building is improved and further employment and growth in the construction sector is created (Project Zero, 2015, p. 7). In addition, the participating companies within the ZEROcompany and ZEROshop programmes stimulate the development of new Bright Green Business markets and the Smart Grid initiatives will reduce CO2 emissions. Overall, these developments add economic growth and employment at local, regional and national level by expanding the production of renewable energy (Project Zero, 2015, pp. 12-13). The bio-economy contributes to the elimination of the use of fossil fuels, the reduction of CO2 emissions and the green transition within the transport sector. In addition, bio-economic solutions have an export potential, they can contribute to the creation of local jobs and companies and other institutions can strengthen their image by switching to the use of bio-energy (Project Zero, 2015, p. 15). The transition within the transport sector creates an improvement in the health of citizens by reducing the use of cars, resulting in less noise and CO2 emissions in urban and rural areas (Project Zero, 2015, p. 17).

5.2.3 Roadmap 2025 – 75% Co2 reduction by 2025 compared to the level in 2007

In this phase it is investigated to develop the Sønderborg area through eight segments and to achieve a CO2 emission reduction of 75% in 2025 and eventually become a CO2-neutral city in 2029 (Project Zero, n.d.-b).

Landscape level

The focus is on the preservation and development of sustainable urban and rural communities, making it attractive to live and work in both urban and rural areas (Project Zero, 2018, p. 51). Various companies within Sønderborg will have to make an active effort, that is why the 15 largest companies work together and act as role models for the whole society (Project Zero, 2018, p. 32). The ultimate goal is to create flexibility within the energy system, integrating heating and gas systems to balance the overall system in the most economic and efficient way possible (Project Zero, 2018, p. 59).

Technological level

Heat pumps are being implemented in the homes of the population in order to reduce the use of oil and gas burners. In addition, homeowners will realize a roof-integrated solar cell solution due to the increasingly lower prices of solar cells (Project Zero, 2018, p. 17). Also housing corporations will install solar cells to produce a large proportion of their own energy consumption and will be more data-driven to improve the energy efficiency and the use of renewable energy (Project Zero, 2018, pp. 20-21). In addition to the building stock an increasing number of chargers are being implemented and the range of electric vehicles is increasing, making a switch to these vehicles more attractive (Project Zero, 2018, p. 28 & 36). Furthermore, the construction of two large bio-gas plants is planned, in which local farmers will play a central role as suppliers for the production of green gas (Project Zero, 2018, p. 41). These plants, together with various solar power stations, the offshore wind farm and the green district heating system, will provide the energy supply of the future (Project Zero, 2018, p. 44).

Societal system level

In order to promote energy-saving renovations, new training programmes are being developed in order for the construction companies to act as energy consultants and for private landlords to develop their own renewable energy systems (Project Zero, 2018, p. 14 & 24). Also, pressure is being exerted for a reduction of the electricity tax, which will enable heat pumps to become an important part of energy production (Project Zero, 2018, p. 4). With regard to the transport sector, the focus is on increasing the use of public transport and influence on legislation is being exerted to ensure that taxes favor electric cars over a long period of time. Within the agricultural sector, a strategic partnership is being established between the project and the major agricultural association LandboSyd. The aim of this partnership is to provide energy advice on energy efficiency for its members (Project Zero, 2018, p. 40).

Constellation level

In order to attract more companies to the ZERO-shop program, which ensures that companies are committed to the overall goal, campaigns will be carried out that increase the visibility of the results of the participating shops (Project Zero, 2018, p. 33). In addition, the possibility of environmental zones in the center is being investigated and independent advisors are used in order to motivate companies to convert transport to more environment-relevant solutions (Project Zero, 2018, pp. 36-37). Farmers who invest in energy efficiency and reduce their own carbon emissions by at least 10% can participate in the ZEROagriculture programme, in which online energy advice can be obtained that focuses on LED lighting and ventilation (Project Zero, 2018, p. 40).

Citizens level

Certain campaigns and the ZEROhousing concept are aimed at changing the traditional behavior of the population to reduce energy consumption by having the population carrying out energy renovations and switch to sustainable equipment (Project Zero, 2018, pp. 14-15). Within the case of electric vehicles, various tools such as car events, special parking conditions and campaigns are used to raise public awareness of these products and to make them more attractive (Project Zero, 2018, pp. 28-29). Finally, Sønderborg has joined the "Attractive Nordic Towns project" of the Council of Ministers in order the increase the involvement of young people (Project Zero, 2018, p. 7).

Resulting value due to the developments within the different levels of phase three

The data-driven efforts provide more insight into the benefits of energy renovations for the population, which increases the awareness of individual energy consumption and makes clear what the residents themselves can do to save energy and money (Project Zero, 2018, p. 20) Overall the developments of energy-saving renovations reduces the energy consumption and costs (Project Zero, 2018, p. 15 & 17).

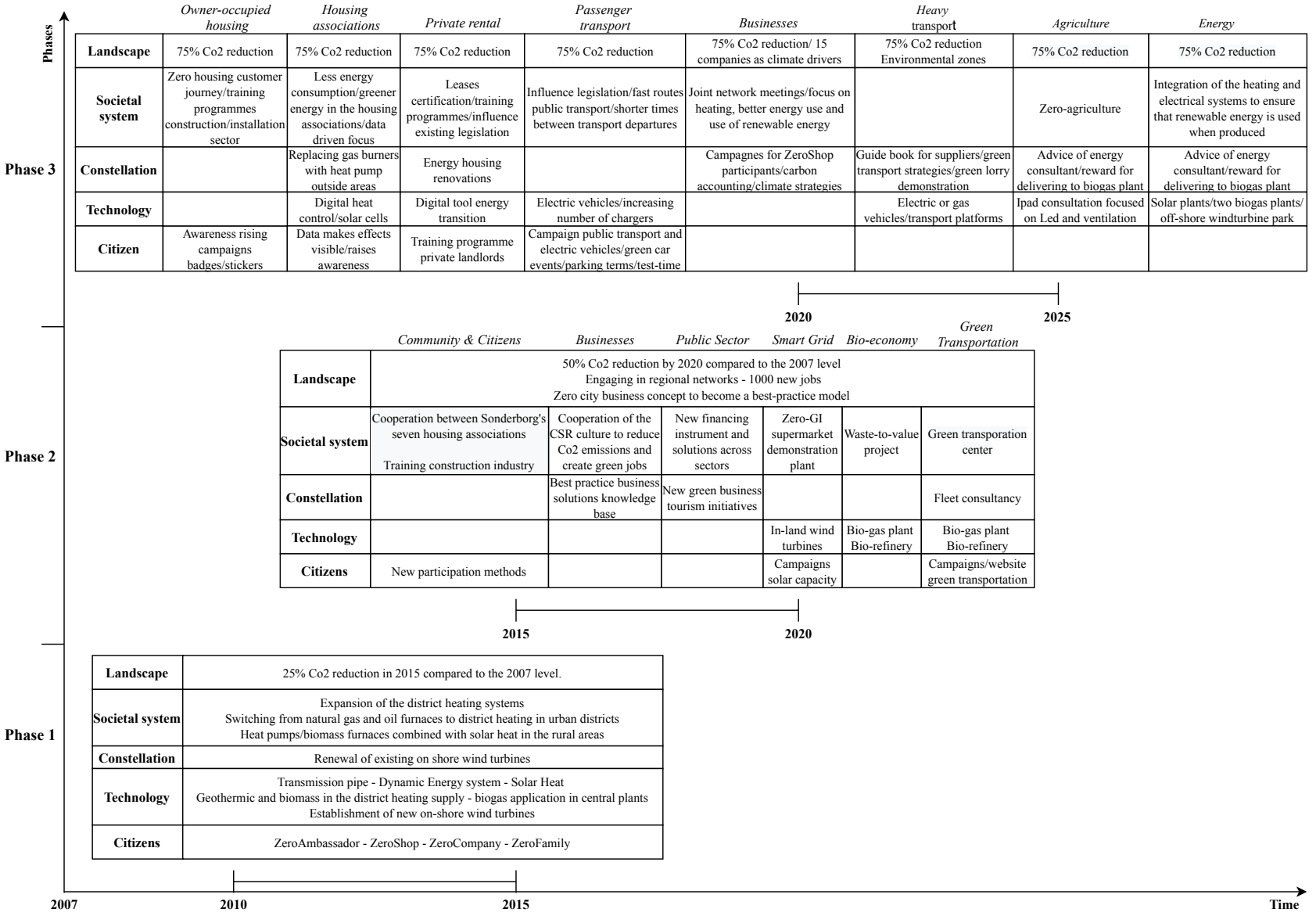

Figure 8. The visualized transition process of project Zero Sønderborg

5.3 Project North Karelia

North Karelia's transition (Figure 9) is divided into several phases, in which the developments will be implemented within certain sectors: 1) energy & climate, 2) transportation, 3) land-use & housing, 4) circular economy, 5) natural resources & bio-economy and 6) innovations & know-how. The phases are defined as follows (Regional Council of North Karelia et al., 2012, p. 3):

- Roadmap 2020: Abandon the use of fossil oil for energy production
- Roadmap 2030: Creation of the bio- and circular economy
- Roadmap 2040: An Oil-Free and Low-Carbon North Karelia

5.3.1 Roadmap 2020 – Abandon the use of fossil oil for energy production

North Karelia has set the goal of abandoning the use of fossil oil for energy production by 2020 (Regional Council of North Karelia et al., 2012, p. 3).

Landscape level

The long-term strategic work of the Regional Council in building on the competencies of the region has been an important part of starting the development process of the bioenergy and bioeconomy sector in North Karelia. This strategic work in which society joins for the further elaboration, financing and implementation of these plans has yielded benefits in terms of investment, more sustainable consumption and additional income for local businesses (Berlina & Mikkola, 2017).

Technological level

Investments in a decentralized biorefinery are planned and the focus is on the direct use of waste heat within the buildings that generate it or that it is used as part of the district heating network by means of bidirectional heat exchangers (Regional Council of North Karelia et al., 2012, p. 5&12). In addition, oil is being replaced by liquid and gaseous biofuels within the old vehicle fleet and conversion kits are being built for these vehicles, creating markets for alternative fuels (Regional Council of North Karelia et al., 2012, p. 7). Within the circular economy, the focus is on increasing the recycling rate of household waste and on the transition from disposable products to sustainable products that reduces the economic and environmental impacts during the product life cycle (Regional Council of North Karelia et al., 2012, p. 11).

Societal system level

The focus is on decentralized energy production and the creation of new references for circular and bio-economic solutions. New financing and implementation models are being set up (Regional Council of North Karelia et al., 2012, p. 9&12) and there is also the aim to influence legislation in order to enable the sale of electricity in two directions, such as energy supply from household to household. Finally, within this area, the project focuses on improved building regulations to achieve higher energy efficiency (Regional Council of North Karelia et al., 2012, pp. 4-5). With regard to the transport sector, urban planning is used as a tool to reduce the need for mobility (Regional Council of North Karelia et al., 2012, pp. 7-8). A partnership and cooperation network has been set up to accelerate the exploitation of new opportunities, develop circular ecosystems for the region and at the same time replace sub-optimization for systems thinking (Regional Council of North Karelia et al., 2012, p. 11&13&15). Finally, education and research institutions will be linked to businesses in order to improve the sustainable development (Regional Council of North Karelia et al., 2012, p. 15).

Constellation level

No further developments have taken place at this level of analysis.

Citizens level

The focus is on the total reduction of energy consumption by raising the awareness of the population with inspiring of energy saving and by objective energy guidance and through active communication. These developments will enable participation the achievement of regional climate and energy objectives (Regional Council of North Karelia et al., 2012, p. 15).

Resulting value due to the developments within the different levels of phase one

No specific value resulting from developments within the levels of analysis is described.

5.3.2 Roadmap 2030 – Creation of the bio- and circular economy

North Karelia has set the goal of creating a bio- and circular economy and abandon the use of fossil oil in traffic by 2030 (Regional Council of North Karelia et al., 2012, p. 3).

Landscape level

Investments in fossil fuels will no longer be made in the entire North Karelia area and non-renewable materials are replaced by recycled materials (Regional Council of North Karelia et

al., 2012, p. 4&8&11). In addition, the project participates in national and international cooperation projects in order to jointly adapt to climate change and thus avoid negative consequences for society (Regional Council of North Karelia et al., 2012, p. 8). To achieve this, innovation platforms for bio-products are being set up within the region to provide the next generation of renewable energy solutions, waste and water management and environmentally sustainable means of transport (Regional Council of North Karelia et al., 2012, p. 13).

Technological level

The focus is on the development and renewal of the infrastructure for the distribution of district heating, in order to minimize heat losses and expand the network and batteries will be used to equalize peaks and troughs in demand (Regional Council of North Karelia et al., 2012, p. 5). Within the transport sector charging and refueling stations for electric vehicles will be expanded and the use of technologies and applications based on the use of data will enable flexible transport combinations (Regional Council of North Karelia et al., 2012, p. 7).

Societal system level

Fossil oil heating in government buildings will be abandoned by 2025 and new business models are being developed in order to make use of water ecosystems through water cultivation (Regional Council of North Karelia et al., 2012, p. 5&13). Within the transport sector more efficient route planning with linked routes are created, participation platforms for shared cars and bicycles are applied and park-and-ride systems are developed to reduce emissions within this sector (Regional Council of North Karelia et al., 2012, p. 7). Furthermore, innovative financing models are set up, such as crowdfunding, and R&D activities of small enterprises are supported through experimentation and simple financial solutions to enable investment in renewable energy (Regional Council of North Karelia et al., 2012, p. 15).

Constellation level

Experiments and development platforms are offered through public procurement and advice is given to businesses to apply flexible working solutions, in order to create innovations for new products and technologies (Regional Council of North Karelia et al., 2012, p. 11&15).

Citizens level

Everyone has an equal chance to participate within the project and to be active in accordance with his or her personal capacities, which means everyone should be able to participate regardless of the educational level (Regional Council of North Karelia et al., 2012, p. 15).

Resulting value due to the developments within the different levels of phase two

Investments in circular and bioeconomy creates new opportunities and new jobs. This will improve the employment rate, increase vitality throughout the region and lead to green economic growth (Regional Council of North Karelia et al., 2012, p. 9 & 11 & 13 & 15).

5.3.2 Roadmap 2040 – An Oil-Free and Low-Carbon North Karelia

The previous phases will serve as a basis to ensure that North Karelia's climate and energy programme over the last decade can focus on an oil-free and low-carbon region by 2040, generating energy from biomass (Regional Council of North Karelia et al., 2012, p. 3).

Landscape level

The focus is on taking risks within society in order to create a culture in which experimentation is possible, mistakes can be made and ultimately failures can be reduced with new solutions and possibilities (Regional Council of North Karelia et al., 2012, p. 15).

Technological level

The use of fossil oil is being replaced by bio-based oil and solar energy sources (Regional Council of North Karelia et al., 2012, pp. 4-5) and imported energy will be replaced by local alternatives (Regional Council of North Karelia et al., 2012, p. 13). Within the circular economy, Internet of Things and open data are used to identify the most suitable raw materials for new developments and the possibility to incorporate recycling within the production processes will be investigated (Regional Council of North Karelia et al., 2012, p. 11). In addition, automated mobility services will be deployed to improve passenger and freight transport and the focus is on the development of hydrogen-powered vehicles (Regional Council of North Karelia et al., 2012, p. 7). Furthermore, Sharing Economy platforms will be developed to enable joint ownership and make the transport sector more flexible (Regional Council of North Karelia et al., 2012, p. 7 & 11). Finally, the flexibility of the buildings will be taken into account during their design in order to allow the building to be used for different purposes throughout its life cycle (Regional Council of North Karelia et al., 2012, pp. 8-9).

Societal system level

Energy markets will be regulated on the basis of the availability of energy resources and through these smart and flexible energy markets the demand side will be exploited as intensively as possible (Regional Council of North Karelia et al., 2012, p. 5). In addition, preference is given to transport by railway and water instead of road (Regional Council of North Karelia et al., 2012, p. 7). In order to reduce material consumption in the various sectors, support is provided from the programme for the development of new 3D printing companies (Regional Council of North Karelia et al., 2012, p. 11). This will allow regional development of new expertise and business opportunities in 3D printing. The products that emerge from 3D-printing and solutions developed in the field of the bio-economy may lead to an increase in export earnings (Regional Council of North Karelia et al., 2012, p. 13).

Constellation level

No further developments have taken place at this level of analysis.

Citizens level

Throughout the region, emphasis is placed on the role of the active citizen and the programme focuses on the involvement of different age groups in the planning processes of housing estates and green areas (Regional Council of North Karelia et al., 2012, p. 15).

Resulting value due to the developments within the different levels of phase three

No specific value resulting from developments within the levels of analysis is described.

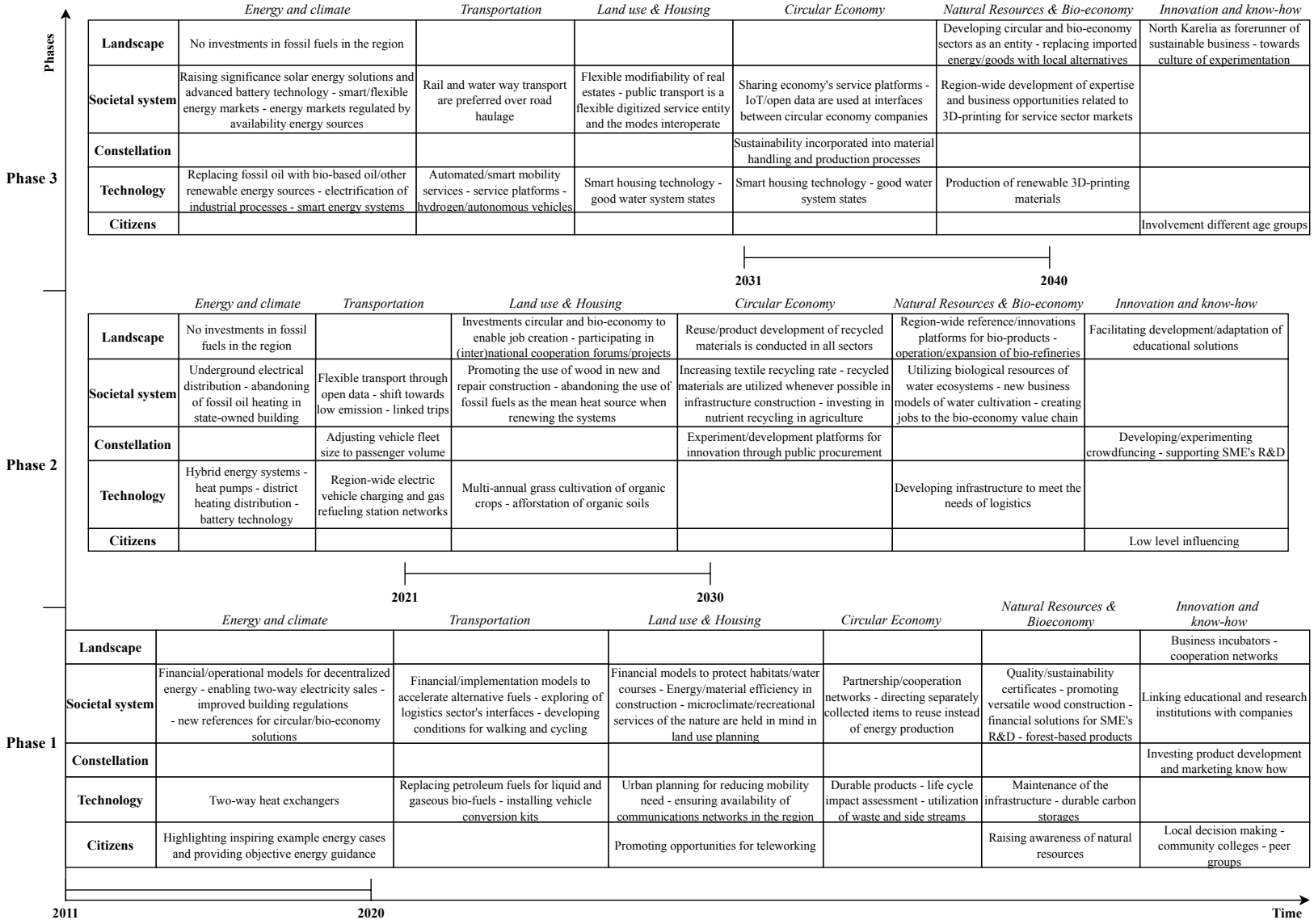

Figure 9. The visualized transition process of project North Karelia

6. Analytical analysis

The previous chapter provided a descriptive analysis of the transition within the different cases and what value the developments at the different levels created for society. By coding the descriptive analysis at the concept level, as mentioned in section 4.5, this chapter discusses the influence of collective business models in enabling transition processes. To make these transition processes manageable, they are referred as transition pathways. This is being done in order to ultimately determine the contribution of collective business models in enabling a transition towards sustainability.

6.1 Project Samsø

6.1.1 The transition pathways within the transition of Samsø

The announcement of a competition by the Danish government and the fact that Samsø's plan has been chosen as the most feasible option to realize a change, has set the transition towards sustainability of the island in motion. This can be seen as a squeezed pathway, because the transition is driven both by top-down influences, i.e. the competition from the government, and by bottom-up influences, i.e. the ambition of the island itself to come up with a plan for a transition towards renewable energy. Despite the fact that Samsø had to come with a plan of its own, the government set a number of conditions that could be related to a reconstellation pathway. For example, the developments to switch to renewable energy had to take place within the framework of existing legislation and the requirement to meet a broad public support base for the project had to be met. However, it is unclear from the case study whether the incumbent regimes will adapt to these developments. That is why, it is not possible to choose between the specific pathways within this general pathway.

The project itself proposed several developments in the first phase of the project to become self-sufficient with renewable energy. In the first place, heating based on oil and electricity was replaced by a district heating system based on biological sources and several wind turbines were built to meet the electricity needs. These developments take place due to bottom-up influences, as the project facilitates a change within the heating and electricity sector, which indicates an empowerment pathway. It is unclear from the case study whether the incumbent regime will adapt to the developments. For this reason, it is not possible to choose between the specific pathways within this general pathway. For houses outside the district heating area, local energy organizations initiated a number of projects to facilitate the transition towards renewable

energy. For example, these residents could receive advice on solar heat, heat pumps or biomass systems, and energy campaigns were carried out to promote the switch to renewable energy. However, it is a voluntary choice by the residents themselves to change towards renewable energy solutions. This means that the changes mentioned above take place due to bottom-up influences, as the island's residents can choose for a change. As a result, these developments can be seen as an empowerment pathway. However, it is unclear from the case study whether the incumbent regime will adapt to the developments, which makes it is impossible to choose between the specific pathways within this general pathway. In addition to these developments, attempts have been made to use renewable energy to meet the energy needs of the transport sector. For instance, attempts have been made to power agricultural vehicles with rapeseed oil and even to introduce electric vehicles. However, due to the same price of energy taxation of rapeseed and diesel fuel and the lack of appropriate technological developments of electric vehicles, these developments were not more advantageous for citizens than the current supply. As a result, there was no change within the transport system. This means that this part of the transition has failed, as the market for both rapeseed oil and electric vehicles remained practically undeveloped. Both developments indicate an empowerment pathway and in particular a backlash pathway, because both niche developments initially gained greater support within society but were ultimately unable to meet the public demand.

Within the second phase of the transition, the project focuses on Samsø's role as an exhibition for the rest of the world. The project wants to expand the knowledge and experience by learning from international experiences and wants to be open to the outside world, in order to serve as an example to apply renewable energy solutions within a whole community. In doing so, the project aims to change the island's mindset and wants to be open to outside influences in order to continue its development. This can be seen as an adaptation pathway and more specifically a transformation pathway, because the culture is adapted through interaction with different constellations, both inside and outside the system. In addition, the focus within this phase of the project is on the expansion of the district heating system. This expansion will take place through the integration of existing individual district heating systems and the construction of new district heating systems. Also, large heat pumps in the district heating system will ensure that the surplus of electricity could be stored and used in the local system to replace other fuels. This will improve the efficiency of the system and will enable operational benefits of a larger network, which means the creation of network externalities. This does not mean that the regime within the societal system will be replaced by a niche, but the project is implementing

developments to improve itself, which indicates an adaptation pathway and more specifically a transformation pathway. Finally, in this phase the project focuses on the earlier failure within the transport sector. Different transport scenarios have been developed that are seen as possible options to change the system. Through these scenarios, current vehicles will be replaced by electric vehicles or vehicles powered by multiple biological sources. This indicates a niche that will replace the current regime in the transport sector, so this development can be seen as an empowerment pathway. However, the case does not indicate whether the regime is adapting to this development, as a result of which a specific pathway within this overarching pathway cannot be chosen.

Samsø's transition is still an ongoing process, which means that the final phase is still in its early stages. However, the goal within the final phase is to increase the general knowledge of the inhabitants, enabling them to actively participate in the decision-making process regarding technologies and economic investments that are crucial for the circular bio-economy. The project wants to extend the current business models towards the circular bio-economy, in which the actions are aligned and the waste from one system is a source for the other system. Again, the island wants to improve and change itself through interaction with constellations inside and outside the system in order to ultimately meet the needs of society in a better way. This implies that this development can be seen as an adaptation pathway and more specifically a transformation pathway.

6.1.2 The formed business models within the transition of Samsø

In order to become self-sufficient with renewable energy in the first phase of the project, Samsø has developed three main collective business models. The first one was the development of district heating installations where heat was generated from biological sources. In order to achieve this development, local farmers were involved in the district heating process. New buildings were connected to district heating on an obligatory basis, but a voluntary participation scheme was applied to existing housing. This meant that these citizens could accept or refuse the connection to district heating. However, the district heating system was made very attractive for the inhabitants. For example, the costs to connect to the district heating system are low and the price for district heating is cheaper than the price for heating on oil or electricity. In this way, the system offered benefits to the citizens, which created public support. The further development of this business model is aimed at creating network externalities by expanding the district heating network. In addition to the district heating system, it was determined on the

basis of the island's electricity consumption that wind turbines had to be implemented as the second collective business model in order to meet the electricity needs. Here, the population of the island was involved in order to facilitate the implementation of the wind turbines and in order to create broad public support. Even, an ownership scheme was introduced which gave all islanders the opportunity to invest in the wind turbines. The psychological effect of spreading ownership increased acceptance by the islanders. The developments of the district heating system and the wind turbines resulted in a surplus of renewable energy. This surplus could then be exported and by involving the population through, for example, the ownership scheme, the revenues from the sale of electricity stayed within the local community. The ultimate goal is to extend the existing business models with a third collective business model focused on the circular bio-economy, in which sources of waste are recycled or used as a source for other products. The aim is to ultimately ensure that waste can support the daily life of the population in many ways. Therefore, an increase of the general knowledge of the inhabitants is needed, allowing them to actively participate in the decision-making process of technologies and economic investments that are crucial for the circular mindset. However, the project has not yet reached the stage. An overview of the transition pathways and the deployment of collective business models is shown in Figure 10.

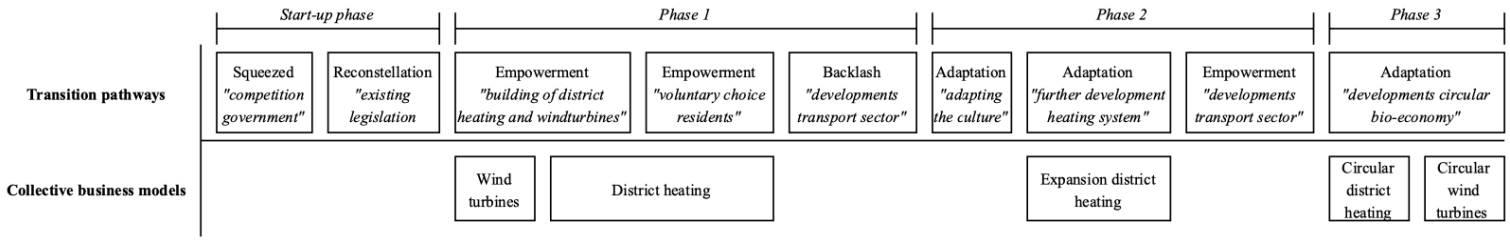

Figure 10. The transition pathways and the formed business models within project Samsø

6.2 Project Sønderborg

6.2.1 The transition pathways within the transition of Sønderborg

Sønderborg municipality's goal of becoming a forerunner in climate initiatives in cooperation with the business community in the area, resulting in a public-private partnership, has set the transition towards sustainability in motion. This can be seen as a squeezed pathway, because the transition is driven both by top-down influences, i.e. the aim of Sønderborg municipality of becoming a forerunner in climate initiatives, and by bottom-up influences, i.e. the cooperation with the business community in the area. However, the case does not indicate whether the regime changes within the system, which means that no specific choice can be made within this overarching pathway

Within the first phase, the project implemented several developments to reduce CO2 emissions by 25%. In rural areas all oil, gas and electric furnaces were replaced by heat pumps and biomass furnaces, which were then supplemented with solar heat and heat tanks. In addition, all individual natural gas furnaces in the area of existing district heating were replaced by district heating that will run on renewable energy in the future. Also, offshore wind turbines were realized to support the energy production. These developments suggest an empowerment pathway can be identified, as the project facilitates a change within the heating and electricity sector. However, it is unclear from the case study whether the incumbent regime will adapt to the developments, which makes it impossible to choose between the specific pathways within this general pathway. In order to stimulate these developments, the municipality imposed an obligation on electricity, gas, oil and district heating organizations to find energy savings among end users. This involves a reconstellation pathway, because external influences ensure that the developments gain strength within the societal system. Again, the case does not indicate whether the regime changes within the system, which means that no specific choice can be made within this overarching pathway. In addition, the infrastructure was adapted, such as car-free areas to lay the foundations for CO2-friendly road transport, and tests were carried out with electric vehicles. This indicates a niche development is gaining strength within the societal system due to top-down and bottom-up influences, which indicates a squeezed pathway. However, the case does not indicate whether the regime changes within the system, which means that no specific choice can be made within this general pathway.

In the second phase of the project the focus is on making the corporate reasonability culture more cooperative in finding joint solutions to reduce CO2 emissions and create green jobs. The focus is on cross-sectoral partnerships to provide the best private energy solutions and on developing regional networks outside Sønderborg to create green businesses and influence thinking and policy in the region. As a result, the project no longer focuses solely on Sønderborg itself, but extends its scope and adapts, indicating an adaptation pathway and more specifically a transformation pathway. This is reflected, among other things, namely the creation of a Smart Grid, which strategically links the energy supply and demand, based on electricity as the main source, supplemented by green district heating and green gas from renewable sources. In addition, there is an initiative to collect domestic waste from the environment and use it for new biomass installations or to convert it into high-quality products. Again, this means that the system wants to improve itself, which indicates an adaptation pathway and more specifically a transformation pathway.

Within the third phase of the project, Sønderberg will focus on the preservation and development of sustainable urban and rural communities, making it attractive to live and work in both urban and rural areas. This development points to an adaptation pathway and more specifically a transformation pathway, because the project will improve the system. This is stimulated by obliging the fifteen largest companies to work together, to make an effort and act as role models for the whole society to achieve the ultimate goal of a CO2-neutral city. This indicates a top-down approach, which can be seen as a reconstellation pathway. However, the case does not indicate whether the regime adapts within the system, which means that no specific choice can be made within this pathway. In order to stimulate the further development of the bio-economy, two large biogas plants will be built to provide the energy supply of the future together with the various solar power plants, wind farms and green district heating, which can be seen as an adaptation pathway and more specifically a transformation pathway, because the system is extending and adapting itself. With regard to the transport sector, the project seeks to influence legislation on tax and tariff reductions to ensure that taxes on electric cars are taxed over a long period of time. Through interaction with the government, the niche of electric cars tries to gain strength in the societal system, which indicates a squeezed pathway. However, the case does not indicate whether the regime is adapting to these changes, which means that no specific choice can be made within this overarching pathway. Finally, the possibility of establishing environmental zones that motivate and partially oblige companies to use transport, powered by climate- and environmentally neutral solutions, is being investigated. This means that the development of climate-neutral transport will gain more strength within the system as a result of external influences, which means this development can be seen as a reconstellation pathway. But even here, the case does not indicate whether the regime changes within the system, which means that no specific choice can be made within this general pathway.

6.2.2 The formed business models within the transition of Sønderborg

The business models implemented consist of district heating and offshore wind turbines. From the data it is not exactly clear how the business models are constructed. However, a number of elements are given that indicate a collective business model is used to create a transition, which makes these elements worth mentioning. It becomes clear that the business model of the district heating is focused on flexibility, which means that the business model makes it possible to store electricity via central heat pumps in times when electricity production is cheap and in times of expensive production, electricity can be produced via biomass-fired boilers. The collective element of the business model of wind turbines becomes visible, because local companies can

contribute to the development of these wind farms as initiators, through co-financing or by collaborating with stakeholders in the area. This gives them the opportunity to strengthen their green profile. In order to further develop the bio-economy, two large biogas plants are being built, in which local farmers play a central role as suppliers for the production of green gas. Also, in the further development of bio-economic solutions, the role of companies will be emphasized. By switching to the use of bioenergy, employment can be created in the energy sector and the overall image can be strengthened. Finally, bioenergy is seen as a source of potential exports, which in turn can be beneficial to society. An overview of the transition pathways and the deployment of collective business models within project Sønderborg is shown in Figure 11.

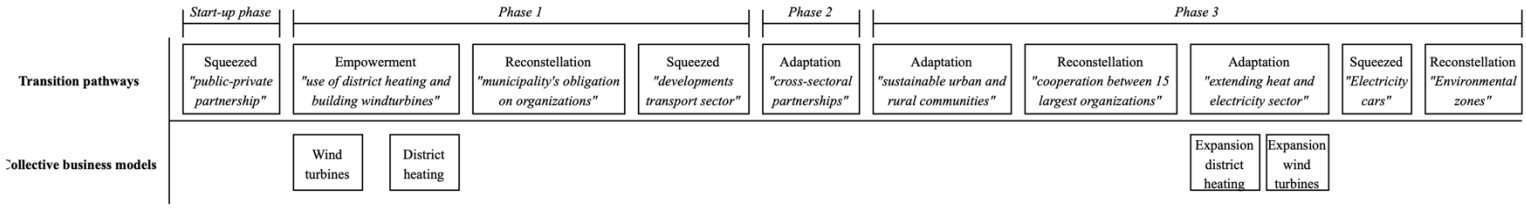

Figure 11. The transition pathways and the formed business models within project Sønderborg

6.3 Project North Karelia

6.3.1 The transition pathways within the transition of North Karelia

The long-term strategic work of the Regional Council building on the competencies of the region in bioenergy and bioeconomy and the connection of the society for the further elaboration, financing and implementation of these plans, has set the transition towards sustainability in motion. This can be seen as a squeezed pathway, because the transition is driven both by top-down influences, i.e. the long-term strategic work of the Regional Council and by bottom-up influences, i.e. the connection with the society. However, the case does not indicate whether the regime changes within the system, which means that no specific choice can be made within this pathway

Within the first phase of the project, the focus is on creating a foundation for abandoning the use of fossil oil for energy production, focusing on decentralized energy production and creating new references for circular and bio-economic solutions, indicating the energy system is changing and being modified. These developments indicate an empowerment pathway, as the project facilitates a change within the energy production and towards the circular and bio-economy. However, the case does not indicate whether the regime changes within the system, which means that no specific choice can be made within this general pathway. Legislation to

enable the sale of electricity in two directions and building regulations to achieve higher energy efficiency are affected by the project. As a result, interaction with the government is exerting pressure to change the systems, which indicates an empowerment pathway. It is not possible to see whether the regime is adapting to it, which means that no choice can be made within this pathway category. In addition, within the transport sector oil is being replaced by liquid and gaseous biofuels, creating markets for alternative fuels. This means that a change is taking place within the system. These developments suggest an empowerment pathway, as the project facilitates a change within the transport sector. It is not possible to see whether the regime is adapting to it, which means that no choice can be made within this overarching pathway.

In the second phase of the project no more investments in fossil fuels are being done and the focus will be on creating a bio- and circular economy. In addition, non-renewable materials will be replaced by recycled materials, in order to apply the reuse of recycled materials within all sectors, which means the system will be adapted. Even here, the project facilitates a change, in this case towards the bio- and circular economy, suggesting an empowerment pathway. However, it is not possible to see whether the regime is adapting to this, which means that no choice can be made within this pathway category. To further assist these developments, fossil oil heating in government buildings will be abolished by 2025. This development concerns a reconstellation pathway, since external influences will force the system to adapt towards a workable system without fossil oil. Since regimes have to abide by rules and legislation, they are obliged to adapt, which indicates a radical reform pathway.

In the final phase of the project, a low carbon region will be created, generating energy from biomass. The use of fossil oil will be replaced by bio-based oil and other renewable energy sources. This is a further development of the system by the project compared to the previous two phases, which will change the system and can therefore be seen as an empowerment pathway. It is not possible to see whether the regime is adapting to it, which means that no choice can be made within this pathway category. Lastly, digital sharing economy platforms will be developed to enable joint ownership and make the transport sector more flexible, indicating an empowerment pathway, as the project facilitates a change within the transport sector. Again, it is not possible to see whether the regime adapts to this, which means that no choice can be made within this pathway category.

6.3.2 The formed business models within the transition of North Karelia

The ultimate goal is to replace fossil fuels for renewable sources. The case describes both a business model within the energy sector and within the transport sector. Within the energy sector, investments are made in decentralized bio-refining. The focus is on the direct use of waste heat within the buildings that produce it or that it is used as part of the district heating network by means of bi-directional heat exchangers. To enable decentralized solutions, new operational models are being developed, replacing imported sources and products with local alternatives. R&D activities of small companies are supported by new financial models, such as crowdfunding to enable investments in renewable energy. The project aims to ensure that everyone has an equal opportunity to participate and be active regardless of the educational level or age group of the citizen concerned. In this way, the collective aspect of the business model is expressed, and the population is involved in the ultimate goal of the project. The new products resulting from the developments in renewable energy can lead to an increase in export revenues. Finally, within the transport sector, digital sharing economy platforms are being developed to enable joint ownership and create vitality and flexibility within the transport sector. An overview of the transition pathways and the deployment of collective business models within project North Karelia is shown in Figure 12.

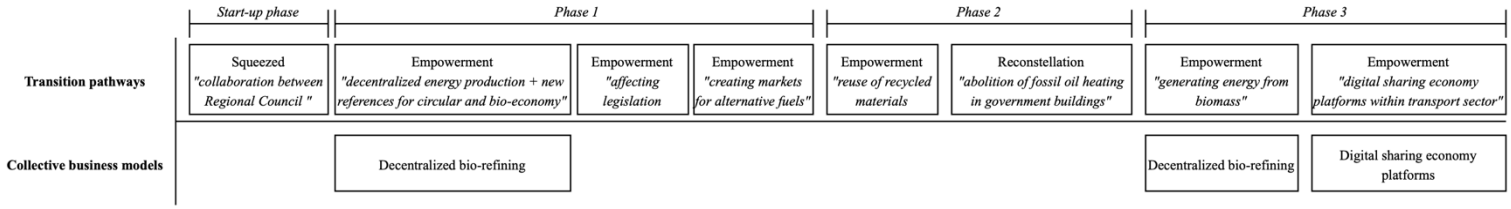

Figure 12. The transition pathways and the formed business models within project North Karelia

6.4 Interpretation of the results

The five levels of analysis (Chapter 5) made it possible to analyze the cases in such a detailed way that business models and transition pathways could be identified in order to ultimately identify the contribution of collective business models in enabling a transition towards sustainability. It can be seen that all three cases start with a squeezed pathway, in which an agreement is reached about the necessity of a transition. Subsequently, the first phase within all three cases starts with an empowerment pathway, in which bottom-up initiatives ensure the creation of the collective business models, which then act as the guiding principle within the transition processes. All these collective business models are focused on renewable energy and the population is involved in the creation of these business models from the very first moment. However, the collective business models differ in the way sustainable energy is produced. In

order to get the bottom-up initiatives in the cases off the ground, regulation plays an important role. Regulation is influenced by the projects and the government itself adapts the legislation in line with the developments of the project. In the following phases it can be seen that the Samsø and Sønderborg cases mainly focus on further developments within the current systems by means of adaptation pathways and that North Karelia is developing further by means of diversification within the systems by means of empowerment pathways. But what is striking is that each case continues to evolve while previous developments have not yet been fully completed. In the end, the collective business models, together with the pathways followed, provide multiple value creation in the ecological, social and economic spheres, leading to steps towards a sustainable society. However, the descriptive analysis on the five levels of analysis reveals another factor that can influence a transition, namely the fact that subsidies are paid by the government within the cases of Samsø and Sønderborg to assist sustainable developments. This is not the case within the North Karelia case.

7. Conclusion & Discussion

This last chapter provides an answer to the research question, discusses the limitations on both the theoretical and methodological choices and suggestions for further research will be given.

7.1 Conclusion

The reason for this research is the fact that modern communities are confronted with major sustainability problems. So far, only temporary and limited solutions have been offered to these problems. In order to change this towards solutions which are sustainable in the long term, it has been proposed to make transitions towards a sustainable society (Farla et al., 2012). The integration of collective business models and transition has a particular potential, as collective business models can restructure consumption and production systems in communities to allow a transition to take place (Korhonen & Seager, 2008). However, the contribution of these models to a transition towards sustainability has hardly been researched (Bidmon & Knab, 2018). In order to investigate this, the following research question has been formulated: *To what extent do collective business models contribute in enabling a transition towards sustainability?* Relevant theories on transition thinking and business models have been used in order to build the foundation of this research. As visualized in the conceptual model of Figure 6, conventional business models, with their one-sided value creation, are only able to provide temporary solutions to the wicked sustainability problem. In order to solve the sustainability problem, a series of coherent and mutually reinforcing changes from different perspectives will have to take place within different areas of the societal system. These different perspectives create room for the deployment of collective business models that can change the societal system via transition pathways and thus contribute in enabling a transition towards sustainability. This was investigated on the basis of a multiple case study in which one case was used as a revealing case that served as a benchmark for the other two cases. On the basis of five different levels and a time perspective, the transition processes were identified and the contribution of collective business models to the transition towards sustainability was analyzed.

The analyzed cases confirm the mentioned relationships in the conceptual model of Figure 6, namely that on the one hand collective business models follow certain pathways in order to be able to fully express themselves and on the other hand that certain individual developments, which can be seen as pathways, together contribute in enabling a transition and ultimately take a step towards sustainability. The most important factors that play a role in these

aforementioned relationships are *consensus between the government and society, participation of the population, technology is followed by participation, legislation, multiple value creation, non-linear and iterative process and financial governmental support.* Within Samsø it can be seen that a transition is made possible by consensus between the government and society, in which both parties take the initiative to take steps towards a transition. A similar approach can be seen at both Sønderborg and North Karelia. The fact that several organizations, which differ in type, position in the value chain and industry, work together to realize such a transition shows that the first steps are being taken towards a collective business model. The further elaboration of the concept of the collective within the business models is reflected in the creation of support among the population, resulting in participation. Within a collective business model, participation is regarded as an operating ideology. The collective business model is set up in such a way that the participation of the population is embedded, after which the technological interpretation is examined. In other words, technology follows participation. However, the cases reveal a condition for the creation of this support base, namely the fact that the collective business model must offer advantages to the population compared to the current supply. As a result, the population will invest in the transition and will see the direct result of these investments, both financially and ecologically. Once participation and support has been created, it can be seen that the collective business models are able to adapt and develop, allowing them to act on a larger scale. In order to make the aforementioned development possible, an important condition emerges from the cases. Pressure is exerted on existing legislation, as a result of which it is subsequently adapted to stimulate further development in various areas of the transition. Development in various areas creates common value in the social, economic and ecological fields, which means collective business models contribute partly in enabling a transition towards sustainability. The contribution is only partial because the analysis show that other factors as well play a crucial role. Within the cases, it can be seen that the transition process is both non-linear and iterative, because regardless of whether the developments have been completed, new developments are already being applied. In this way, developments can be adjusted at any time. This is done in order to keep looking forward and to make the process as effective and efficient as possible. The second and last factor that seems to be important is the financial support of the government. Within the case of Samsø and Sønderborg, the government offers financial incentives in the form of subsidies at the macro, meso and micro level. These subsidies ensure that the developments within the transition towards sustainability are made attractive and financially feasible for the interested stakeholders.

7.2 Discussion of the limitations

7.2.1 Reflection on theoretical choices

Theory about transition thinking, business models, and sustainability is found to be of great importance to this research. However, the choice has been made not to investigate the sustainability concept. This can be seen as a separate study in which the contribution of the identified transition to the improvement of sustainability can be specifically examined. Elements have been taken from the theory of business models to be able to identify the collective business models within the cases in order to ultimately determine the influence these models exert on the shaping of transition processes. The transition pathways were used to identify these transition processes and make them manageable. But, in most cases it was not possible to identify a specific pathway within the general pathway category due to a lack of information. Furthermore, during the research process it became clear that within the theory of transition, the multi-level perspective was not extensive enough to identify the collective aspect within the transition. Therefore, it was decided to add two levels to the levels of the multi-level perspective, namely technology and citizens. Ultimately, this research shows that collective business models contribute partially in enabling a transition towards sustainability. However, the research also revealed other factors that make a transition towards sustainability possible. These factors have been taken into account in answering the research question. This leaves room for enlargement of the theoretical frame than can explain the factors that could contribute in enabling a transition towards sustainability.

7.2.2 Reflection on methodological choices

This research is of a qualitative nature and has been set up as an exploratory research, because there is little research available about the contribution of collective business models in enabling a transition towards sustainability. The choices within this study were described in a consistent manner and a simple registration of the data analysis was described. In addition, insight was given into the way in which and on the basis of what criteria the choice for the cases to be analyzed was made and the analysis was carried out by means of five levels and the time perspective. These elements resulted in the quality criteria which were discussed in detail in section 4.6. Furthermore, three other Business Administration students assisted in the selection of the cases to be analyzed. This helped in making the selection process feasible in time and to prevent bias, thereby increasing the requirement of saturation. However, the researcher was aware that these students were not familiar with the subject of the research, which could influence the selection process and thus affect the reliability and transferability of the research.

For this reason, a final check of the selection was carried out by the researcher himself. In addition, the choice was made to only carry out a content analysis and only second-hand documentation from the projects themselves was used. This means that no methodological triangulation took place. As a result, only the factual process of the transition has been identified and not how the transition has been experienced by the population itself. This could give a more positive situation of the transition processes than is actually happening in reality. Furthermore, the perceptions of the population can play a major role in determining the actual value that is being created by the transition, which in the end allow for a better understanding of the contribution of collective business models in enabling a transition towards sustainability. However, it was not possible to carry out field research due to the COVID-19 situation. These choices were able to influence the traceability and reliability of the research. Finally, the initial goal was to analyze six cases. Unfortunately, during the analysis process it was noticed that not all cases contained the right documentation to be able to apply the analysis protocol. This resulted in a reduction of the cases to be analyzed, possibly affecting the communality of the research. Nevertheless, the reduction of cases to be analyzed and the chosen analysis strategy ensured that an in-depth study could be realized, resulting in useful information to make statements about the contribution of collective business models in enabling a transition towards sustainability.

7.2.3 Reflexivity

The researcher has designed a study in which the contribution of collective business models in enabling a transition towards sustainability has been investigated. The researcher was not familiar with the concept of collective business models, which means there was no experience with the subject. As a result, all information was processed directly from the theory. But, the current developments in the world have encouraged the researcher to think, which makes him a supporter of the development of a sustainable society. However, the preliminary education of the researcher, namely Business Administration, has created an individualistic thought. This means that the researcher thinks that people want to do certain things for others, but always look at themselves before making a choice. People do not choose the option that is disadvantageous to them and are more willing to do something when there is a financial motive involved. In order for a person to change towards sustainability, the new alternative should therefore better meet the needs. These assumptions have led to the design of this research in order to find out whether collective business models can meet people's needs and contribute to the development of a sustainable society.

7.3 Discussion of the relevance and recommendations for further research

7.3.1 Theoretical relevance and practical relevance

The theoretical relevance consists of the contribution to the discussion on the integration of collective business models and transition. The research results in the answer to the research question, namely that collective business models contribute partly in enabling a transition towards sustainability. It identifies how these business models influence the transition process through certain transition pathways, consensus between the government and society, public participation, technology follows participation, influencing legislation and the creation of multiple value. However, this research shows that not only the creation of collective business models contributes in enabling a transition towards sustainability. Several other factors contribute in making this process happen. These factors are subjects for follow-up research, which will be discussed in section 7.3.2. Furthermore, the practical relevance consists of the improved clarification on how collective business models contribute in simplifying the transition process to sustainability through the use of certain transition pathways.

7.3.2 Recommendations for further research

Because of the mentioned limitations of this research, some recommendations for follow-up research on this subject can be made. During the research it became clear that collective business models contribute in part in enabling a transition towards sustainability. Within this research, it was not clear to what extent the identified transition contributes to fostering sustainability. A study of the contribution of a transition may be applicable to the further development of a sustainable society. Furthermore, it became clear from this research that the available technologies play a role in the success of a collective business model. The available developments must offer benefits to the population compared to the current situation. However, it is not clear to what extent the available technologies will have an impact on enabling a transition towards sustainability. This requires further research. In addition to the influence of the technologies, it became clear within this research that the government plays a major role in facilitating a transition towards sustainability. Within the cases analyzed, the government provided various subsidies to ensure that the developments within the transition towards sustainability were made attractive and financially feasible for interested stakeholders. However, it is not clear to what extent the government contributes in enabling a transition towards sustainability. Here as well, further research is needed.

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Appendices

Appendix 1: Format for assessing cases

Case:	
A configuration of multi-parties (multi-stakeholders) e.g. business, government and citizens. What is the leading configuration?	
Does the project (case) has a city/regional/national reach? How many people are involved?	
The project (case) is already running during a substantial period of time (3 / 5 or even 10 years?). So not just plans but real in place practices.	
Does the project (case) has a focus on a specific (or more) domains (e.g. energy, food, transport). Preferably: a combination of domains.	
Which multiple values for various stakeholders is the project (case) creating? Embedded in a specific collective business model logic leading to - or at least creating the basis for - a transition (interpreted as a fundamental change of the system).	
Is this multiple value creation based on a (explicit or potential) transition path? Can it be identified?	
Score (0 = totally unsuitable, 5 = totally suitable)	

Appendix 2: Overview of the operationalized research concepts

Concept	Dimension	Indicators	Items
Transitions towards sustainability	1. Transition	1. A set of connected changes 2. Changes that reinforce each other 3. Different constellations becoming the dominant	
	2. Sustainability transition	4. Shift of the function of societal systems 1. Long-term 2. Multidimensional 3. Regime changes to more sustainable modes of production and consumption	
Transition Pathways	1. Radical Reform	1. Top-down 2. Regime adaptation	A constellation gains strength through influences from outside the societal system, top-down nature, regime adapts to the constellation
	2. Revolution	1. Top-down 2. Without regime adaptation	A constellation from outside the societal system penetrates the system through influences from outside the societal system, top-down nature, regime does not adapt to the constellation, constellation replaces the regime
	3. Collapse	1. Top-down 2. Failed transition	A constellation gains strength through influences from outside the societal system, top-down nature, failed transition, regime will not be replaced by another constellation

	4. Reconfiguration	1. Bottom-up 2. Regime adaptation	A constellation gains strength through interaction with the regime, bottom-up nature, regime adapts to the constellation, constellation meets the needs of the societal system in a greater extend and replaces the regime
	5. Substitution	1. Bottom-up 2. Without regime adaptation	A constellation on its own gains strength within the societal system, bottom-up nature, regime does not adapt to the constellation, constellation replaces the regime
	6. Backlash	1. Bottom-up 2. Failed transition	A constellation on its own or through interaction with other constellation gains strength within the societal system, bottom-up nature, constellation cannot continue to satisfy the demand of the societal system, failed transition, regime will not be replaced by another constellation
	7. Teleological	1. Top-down 2. Bottom-up 3. Regime adaptation	A constellation gains strength through influences from outside the societal system and on its own or through interaction with other constellations within the societal system, top-down and bottom-up nature, high degree of guidance/coordination by regime,

			regime adapts to the constellation through allowing outside influences
	8. Emergent	1. Top-down 2. Bottom-up 3. Without regime adaptation	A constellation and influences from outside the societal system team up to a transition, top-down and bottom-up nature, low degree of guidance/coordination by regime, regime does not adapt to the constellation, constellation replaces the regime
	9. Lock-in	1. Top-down 2. Bottom-up 3. Failed transition	A constellation gains strength through influences from outside the societal system and on its own or through interaction with other constellations within the societal system, top-down and bottom-up nature, constellation does not completely replace the regime
	10. Transformation	1. Regime adaptation	Regime adapts itself by co-evolution with constellation inside or outside the system or by absorbing the constellation function, constellations causes small problems within regime, regime is able to solve this through incremental innovations to continue to meet the needs of the societal system
	11. System Breakdown	1. Regime adaptation 2. Failed transition	Regime adapts itself by co-evolution with constellation inside or outside

			the system or by absorbing the constellation function, regime's new attempts to continue to meet the needs of the societal system are failing, regime is no longer in a position the meet those needs
Collective business models	1. Multiple organizations	1. Difference in type of organization 2. Difference in position in the value chain 3. Difference in type of industry	
	2. Cooperation to create a value creation system	1. Cooperation of multiple organizations 2. Creation of a value creation system	
Value creation	1. Social area	1. Value for people	
	2. Environmental area	2. Value for planet	
	3. Economical area	3. Monetary value	