

Chapter 10. Understanding Eco-industrial Development Processes through Multiple Change Perspectives

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Abstract

Eco-industrial parks are receiving increasing attention in light of the sustainability discourse. Although the formation and development of eco-industrial parks have been investigated, these processes are difficult to grasp. In order to better understand and govern the trajectory of these processes, this chapter attempts to reveal some of their complexity. It addresses the formation of industrial parks from a change perspective, with a focus on the interplay between actors and context. We use two lenses to build a combination of change perspectives: transition management theories, and the episodic and continuous change concepts of organisational theory. Both of these lenses distinguish between change that is planned, abrupt and discontinuous, and change that is emergent, incremental and continuous. The main lesson of the paper is that actors' perspectives of change and development affect possible governance strategies. Planned change assumes that actors are unable to adapt their underlying structures to the new demands for sustainable development and thus require interventions from the outside. In the case of continuous change, actors are seen as self-organising. This process calls more for facilitation and removal of possible stumbling blocks. In order to choose a good governance strategy applied to the circumstances, these perspectives need to be combined.

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1. INTRODUCTION

The eco-industrial park concept comes from industrial ecology theory. This theory sees industry in analogy with natural ecology: *a web of connections between entities enables each entity to use the others' products and waste products* (Frosch, 1992). More concretely, an eco-industrial park is one where co-located firms, or in this chapter co-located intensive agricultural firms, engage in industrial symbiosis. Industrial symbiosis assumes that a group of geographically proximate individual firms enhances its collective economic and environmental sustainability by coordinating its resource management (Ashton 2008), e.g. by physically exchanging by-products, sharing in the management of utilities and sharing ancillary services (Chertow et al. 2008).

Although the idea of industrial symbiosis has been picked up by policy makers (Ehrenfeld and Gertler 1997; Gibbs 2003), and technical and economic opportunities exist, actual implementation of the concept is very difficult to achieve and the rate of failure is high. This chapter intends to improve understanding of the complexity of eco-industrial park development and the consequences for its governance. Rotmans and Loorbach (2009) and Hoffman (2003) have complained that industrial ecology science has a more technocratic approach to physical streams than to the social process of how to achieve them. However, scholars are increasingly concerned with the social facets of this phenomenon, and want to understand how the development of industrial ecology and industrial symbiosis can be stimulated. According to Ashton (2008), research in industrial symbiosis has much to gain by drawing on economic geography or on organisational theories.

There have already been important contributions in industrial symbiosis literature using these approaches, such as the differentiation between planned and emergent industrial symbiosis (Chertow, 2007). In planned industrial symbiosis, the government is involved in the identification and location of the relevant companies. In emergent or spontaneous industrial symbiosis, private actors' decisions are the basis of the industrial ecosystem (Chertow, 2007). For policy makers, this means that emergent industrial symbiosis needs support: the appropriate policy is usually to build on existing or emergent areas that have already passed a market test. Policy can strengthen them through post factum coordination, encouragement, and support in terms of logistics and through technical and financial assistance (Chertow, 2007). For planned projects, developers have to focus first on the characteristics they can control, and second on providing the preconditions (support) for more elusive aspects for eco-industrial parks to evolve. Policy makers should focus on arranging an environment where clusters can arise, rather than purely controlling the content of clustering processes (Deutz and Gibbs, 2008).

Many initiatives for eco-industrial parks are planned *de novo* (Deutz and Gibbs, 2008). However, the most successful examples of these parks have properties of the spontaneous, emergent type (Chertow, 2007; Chertow et al. 2008; Deutz and

Gibbs, 2008). In existing planned cases, other connections between companies precede collaboration on industrial ecology issues (Deutz and Gibbs (2008), as in the case of emergent projects. Baas and Boons (2004) state that the stimulation (not to mention planning) of industrial symbiotic developments is difficult because of its sensitivity to unique local factors, institutional contexts and exceptional events. Moreover, many of the present developments occur without or in spite of governmental support. Some form of steering is however necessary, as otherwise many possibilities for industrial symbiosis will remain unused.

Our chosen theoretical lenses, namely transition management theory and the concepts of episodic and continuous change (Weick and Quinn, 1999) from organisational theory, provide concepts to understand and govern change processes and have a perspective on planned and emergent change. Transition management has already been related to industrial ecology (Rotmans, 2009; Baas 2008; Adamines and Mouzakis, 2009; and de Vries and te Riele, 2006) and industrial symbiosis (Gibbs, 2009), and has a strong focus on process levels. But although this theory emphasises the importance of working with actors with different views, it does not enter into detail on how these views, opinions and beliefs are created by people, and how sharing or not sharing them can influence the process. For that reason, we will also use episodic change and continuous change (Weick and Quinn, 1999).

This chapter examines what the combination of these change perspectives can mean for the understanding and governance of the complexity of eco-industrial park development. We first discuss the insights of transition management theory and of the episodic and continuous change concepts, and then build combined change perspectives based on that discussion. A case study is used to illustrate the value of this combination. To conclude, we discuss its value for eco-industrial park development.

2. COMBINING CHANGE PERSPECTIVES

2.1. Transition management theory

The world consists of different evolving sub-systems, such as technology, economics or culture. Evolutions of these systems, although partly independent, can affect other systems irreversibly, generating new developments in these systems. This means that systems are in co-evolution (Kemp et al. 2007). For example, because of the oil crisis, cogeneration (technological system) in greenhouse horticulture (agricultural system) became economically interesting (economic system), leading to a massive scale increase in the sector (economic and agriculture system) and as such to a higher urgency for greenhouse parks, from both landscape (environmental system) and cost (though scale advantages) perspectives (economic system). When these kinds of changes are congruent through all the different systems at different levels, they generate radical change

(Rotmans, 2005). The punctuation of a long period of slow changes by a short period of radical changes is a transition (Kemp et al. 2007) and usually takes some decades (Geels, 2005).

Transition of the societal system can be a solution for persistent problems such as unsustainable production. Woven into the system (Rotmans, 2003), these problems do not seem to be caused by identifiable actors or factors (Dewulf et al. 2009). The solution is a change of the existing regime of rules and practices into something new. Transition management theory provides a frame to better understand this change process and gives a strategy to solve persistent problems (Rotmans 2003, Rotmans et al. 2009).

Transition management interacts on different levels, as explained by Kemp et al. (2007) and Rotmans and Loorbach (2009). After an integrated system analysis and actor selection, a transition arena is formed at the strategic level. In this arena, different stakeholders develop a shared vision under the direction of an independent transition manager. When there is a shared vision, milestones or steps towards the vision will be fixed, going back and forth between the current situation and the vision of the desired future (back-casting). Different transition pathways towards the vision can thus be designed. Although both pathway and vision can change during the process, the direction remains the same. The transition pathways are a bridge between the strategic level of the vision, across the tactical level of coalitions and network formation to the operational level of the transition experiments. A variety of these innovative transition experiments are executed in collaboration with frontrunners. As these innovations have a focus on solving societal problems, they combine senses of urgency and actors from different parts of society. Because these innovations are at very high risk, they can be protected from normal regulations (strategic niche management (e.g. Kemp et al. 1998), for example in innovation centres). The result of transition experiments and possible changing environments will be used as feedback for evaluation and monitoring and can induce adjustments of the vision and the transition pathways. When a transition experiment succeeds, it can be scaled up to different locations and other parts of society. Successful transition experiments can have a strong influence on different sub-systems of society and on the existing regulations. This can eventually lead to system innovations and transitions.

Although transition management has been applied in different socio-technological contexts in the Netherlands (Loorbach 2007), many scholars have criticised it. In the first place, the extent to which transitions can be steered or managed is under discussion (Shove and Walker, 2007, Woodhill, 2009). Transitions in the past were evolutionary, only clarified as transition in reverse and not goal oriented. As a current phenomenon, they cannot be reduced to a single and progressive shift from one stage to another (van der Ploeg, 2009). Moreover, the intentional application of transition management is considered to have undergone insufficient testing. As such, it is challenged not only in the contexts where it has been used but also in its applicability in different non-technological sectors and in locations outside the Netherlands (Shove and

Walker, 2007; Paredis, 2009; Heiskanen, 2009). Lastly, the framework is considered to be incomplete: it needs to be enriched with other theories (Paredis, 2009; Dewulf et al. 2008). In essence, the answer to these criticisms is the further development of transition management (Heiskanen et al. 2009), to explore complementary theories (Dewulf et al. 2009), to test its value, and to clarify the relationship between top-down planned and bottom-up incremental change (Kemp et al. 2007).

Transition management uses mechanisms of planned and incremental change (Kemp et al. 2007) and places itself in between them, as a third way of goal-oriented modulation or derived incrementalism. “In terms of governance, transition management makes use of what Lindblom (1979) calls ‘partisan mutual adjustment’ but with special attention given to problem structuring, long-term goals and learning about system innovation” (Kemp et al. 2007: 79). The co-evolutionary principle already indicates that it is not possible to fully plan and control change, as other subsystems can have an important influence on a system and cannot always be predicted (Kemp et al. 2007). Moreover, opting for central steering or control can even undermine some of the best innovations and some of the most adaptive processes. Policy strategies for example are, at most, not able to tackle system failures (Kemp et al. 2007). They will merely lead to suboptimal solutions. However, by organising dialogue and collaboration between actors that represent some of these system realities, the system somehow becomes more transparent and governable. As such, transition management recognises the importance of a shared vision and its influence on change by selecting innovations that are congruent with the vision. Deliberation about a shared vision induces incremental changes towards mutual understanding of people’s mindset and ideas. Transition management furthermore recognises change in a system through daily, incremental innovations and planned, more risky transition experiments.

2.2. Episodic and continuous change concepts from organisational theory

In their review on organisational change and development, Weick and Quinn (1999) distinguish between episodic or radical, and continuous or incremental, change. In the two distinguished types of change, episodic and continuous change, an ideal organisation would be capable of continuous adaptation.

Episodic change (Weick and Quinn, 1999) starts with the idea that the ideal organisation does not exist. Due to inertia, organisations fail to adapt their deep structures to the changing environment. To be able to adapt, external interventions are necessary (1) to unfreeze the inertial system, (2) to create transition by cognitive restructuring and consciousness raising, and (3) to refreeze the system to prevent it from reverting to the old situation. The change agent is a prime mover, who creates change by focusing on inertia and seeking points of leverage to bring the system to a new equilibrium. In summary,

episodic change is induced radical change to bring an unbalanced system to a new equilibrium.

In continuous change (Weick and Quinn, 1999), recurrent interactions, improvisation and learning through self-organisation result in numerous small evolving adaptations. These accumulate and amplify, resulting in a system that adapts in the long run. The strategy is (1) to freeze the system in order to make sequences and patterns that are already there visible, (2) to rebalance it by reinterpreting and relabeling sequences and patterns and by reducing possible blockages using the logic of attraction: people do not change because they are forced to but because they are attracted to it; and finally (3) to unfreeze the system again, by resuming continuous change using the insights of (1) and (2). The change agent is a sense-maker who redirects change. As all these small changes accumulate into bigger changes, continuous change seeks equilibrium by endless modifications in work processes and social practices. Intervention in this kind of change is merely a sense-making process about what is already under way.

Sense-making is making sense of reality, as reality is a social construct that can be changed, reconstructed and reflected upon, and is a basis for action. People do this by paying attention to things in their environment, interpreting, externalising and linking them to one another and to their vision of reality (Weick et al. 2005). The process of sense-making is also about how these particular things are filtered from a large flow of ongoing experience, how a meaning is given to them, and how these interpretations are revised based on later actions and their consequences. As such, sense-making works as a frame in which a problem can be defined and which will guide attention and clarification (Weick, 1995; Weick et al. 2005). A small timescale can be a frame to make sense of change as being continuous, while on a larger timescale it may seem to be episodic. This means that both types of change are there together, and the perception of the type of change has an influence on chosen interventions: imposing change from the outside versus stimulating sense-making to create conditions where change can emerge (Termeer and van der Peet, 2009). Although Weick (2000) applies sense-making only at the organisational level, it can be applied successfully in an inter-organisational context of public policy processes (Termeer 2009) such as IS development.

2.2. Combination

Transition management and the episodic and continuous change concepts have other visions on change and are leading to different governance or intervention strategies. Transition management provides a frame for change at different levels (macro and micro). It combines episodic change and continuous change in a multi-stakeholder perspective by providing a strategy. However, it is still important to take the perspectives of planned and continuous change and their governance approach into account when analysing change processes.

Concerning planning and emergence of change, the theories propose different forms of governance. Following Weick and Quinn (1999), many studies in the organisation literature see change typically as episodic *or* continuous. The extent to which change is continuous is underestimated (Weick, 2000). It has an influence on the choice of interventions. Transition management integrates different forms of governance and places itself in between top-down planning and bottom-up incrementalism (Kemp et al. 2007) “as a third way”, a manner of goal-oriented modulation, or derived incrementalism (Kemp et al. 2007). In this way, it tends to take the advantages and to avoid the disadvantages of both types of change perspective. We think however that episodic and continuous change concepts and transition management are all equally important to understand change processes. As such, this combination of change perspectives can help in understanding and in choosing adequate governance methods for change.

3. CASE STUDY

3.1. Methodology

To illustrate the combination of change perspectives, case study research (Eisenhard, 1989; Eisenhard and Graebner, 2007; Yin 2008) was conducted on the development of eco-industrial greenhouse parks in Flanders. Data were collected from semi-structured interviews, written sources such as policy documents, spatial structure plans etc., and field notes from personal communications, field visits, observations meetings and project group meetings.

3.2. Findings

At the beginning of this article we defined an eco-industrial greenhouse park as (1) a co-location of greenhouses and (2) eco-industrial collaboration between horticulturists within the greenhouse park and with other external partners. For that reason, after giving the context, we describe the development of the co-location and of the eco-industrial collaborations separately.

Crossing the North-Flemish countryside, one suddenly sees a wall of glass near a little village. At first it looks as if the Flemish Ministry of Agriculture has created its first eco-industrial greenhouse park. As one approaches, however, things seem to be somewhat more complex. First of all, it wasn't the ministry that planned this greenhouse park, and second, it does not correspond completely with the ministry's vision of what an eco-industrial greenhouse park should be. In the ministry's vision, these parks are not only co-locations of greenhouse horticulture firms, as in this example, but also projects where horticulturists collaborate within the greenhouse park, and, where possible, with other industries to enhance economic performance and sustainability. This may be done, for example, by exchanging residual heat or by joint energy management.

Despite the ministry's best intentions, the creation of planned greenhouse parks is laborious and time consuming. Laws and rules are widely diverse and complex, and the license trajectory is long. Furthermore, a potential greenhouse park runs through many different phases, such as location choice, acquisition of land, infrastructure construction, search for horticulturists, starting collaboration, etc. All these phases require consultation with different actors with varying opinions, beliefs and goals. Different actor groups have an important stake in the process. Horticulturists, for example, are interested in obtaining a license to build a greenhouse; farmers are afraid to lose arable land; infrastructure industry is concerned about the profitability of the investments in gas and electricity infrastructure; and local people are concerned about the landscape and afraid of inconvenience such as traffic increase. Policy makers intend to have an important stake in different projects and plan them rigorously. Moreover, these groups are far from homogeneous: policy makers, for example, are from different policy levels, departments and ministries that can disagree on the location and size of a potential greenhouse park. Ministries of agriculture and spatial planning are intensively involved in these kind of planning processes, but the ministry of environment, nature and energy and the ministry of economic affairs influence important boundary conditions, such as regulations, subsidies and incentives. This makes the creation of a greenhouse park a governance exercise in a complex jungle of actors and processes.

The little village mentioned above drew up a spatial planning vision between 2001 and 2007. Because agricultural land prices increased and relations between farmers and horticulturists came under pressure, the local spatial planning group decided to divide its farmland into a zone where greenhouses could be licensed and one where these developments would be limited. Because of the scarcity of licensable space for greenhouse development (lack of legal security), gardeners were keenly interested. Within a few years, the arable land and small- and medium-scale horticultural land of the licensable zone turned into a large greenhouse park. The area is almost full now. Land is however not very efficiently used because different greenhouses were not adjusted to each other but planned independently. A location with less fertile soil could have been chosen for this footloose agriculture.

The area has only limited internal collaboration among horticulturists, as collaboration is limited to firms with a common owner and to talks among firms with a similar vision. External collaboration is however prevalent. Some greenhouse firms collaborate with external greenhouse firms (joint acquisition of inputs and transportation), and one of them receives heat from a neighbouring manure processing company.

3.3. Interpretation

At first glance, the greenhouse park seems to be mostly continuous change, because internal development of the zone has not been planned. But if we delve

deeper into the case, we find that many other actions are inspired by the philosophy of planned change, such as the intensive agricultural zone and infrastructure works to adapt the zone to its new function. Other things, such as collaboration, design and development of the intensive agricultural zone were not considered in the planning process. Within the greenhouse park, everyone who developed something new acted on their own without common project development. This led to inefficient use of the land.

▪ **Looking at the case from an episodic change perspective**, one sees that the change is merely driven by local policy makers and planners. They had to deal with the problem of increasing competition for farming land-use. Therefore, spatial planning experts studied the region and developed a local spatial structure plan together with the local policy makers. Representatives of advisory committees (controlled by local policy) functioned as stakeholders in the process but consultation of local inhabitants happened only at the end of the planning process, so that spatial planning could seem to be imposed. In hindsight, interest in the intensive agricultural zone was underestimated, as were its effects on the landscape. Furthermore, the area is used inefficiently due to a lack of coordination/planning, and local policy makers are afraid that higher policy-making levels would favour an enlargement of the greenhouse park.

▪ **From a transition management perspective**, we how an actor arena developed a spatial planning vision for the future, based on regional spatial planning studies. The transition management perspective questions whether the actor arena was large enough (were all relevant actors, such as horticulturists sufficiently included?). The arena's vision was attractive for policy makers because the community would have a proactive, greenhouse friendly policy, in comparison with their neighbouring communities, and at the same time the development of intensive agriculture could be limited in other parts of the territory. A trajectory to build the spatial vision and to ensure a participative approach has been designed, and there is a legal trajectory ongoing to make this vision enforceable. Despite this, the participative approach could be perceived as rather limited as some horticulturists bring up that they were not sufficiently included. Within the area, there seem to be not a very active approach; there was rather little communication between actors and no actor arena among horticulturists. There was no transition manager either, to initiate dialogue among horticulturists. In retrospect, the zone grew into the first greenhouse park. The local policy level gives support but is against its spatial enlargement.

▪ **From a continuous change perspective**, other issues emerge as well. Inner development of the agricultural zone was not planned or organised and there was no recurrent interaction between the horticulturists. Despite this social distance, the most successful greenhouse park in Flanders has emerged.

The combination of change perspectives furthers understanding of the process, and ideas from the three perspectives are helpful. This is illustrated with the greenhouse park case. Evaluation varies, using different change perspectives. An episodic perspective reveals a story of different outcomes and missed opportunities, whereas a continuous perspective highlights the emergence of IS and of the most successful greenhouse park in Flanders.

In terms of governance, the episodic change perspective could for example give the idea to run a study to identify the remaining options to use the land more efficiently and to make new top-down plans concerning it. Transition management supports the idea to establish an actor arena with policy makers, horticulturists and other actors, where an independent transition manager facilitates dialogue towards a shared vision on the intensive agricultural zone (greenhouse park). From a continuous change perspective, a place where actors can meet and enter into dialogue with one another can foster reflection, mutual understanding and trust, which then can make actors move to recurrent interaction and ongoing adaptations. Each perspective leads to different ideas for governance of the greenhouse park development. Taking into account the three perspectives enriches the considered governance possibilities and helps to choose an appropriate governance strategy.

4. DISCUSSION AND CONCLUSION

For industrial symbiosis, the combination of change perspectives reveals insight in change processes and eco-industrial park development, as illustrated by the case. Planned and emergent changes are not the only perspectives of organisational science that are applied to industrial symbiosis. We will use our combination of change perspectives to classify the highly differentiated literature on organisational aspects of industrial symbiosis.

First, there are concepts in the literature that can be related to all three perspectives of episodic change, transition management and continuous change. Baas and Boons (2004), for example, considered eco-industrial park development as a dynamic change process. Acquiring knowledge of the system in general is moreover very important in the industrial symbiosis literature. This can be done by analysing technological and economic issues, or through regional approaches such as the clustering approach (Porter, 1998) that sees industrial symbiosis as a kind of business cluster (e.g. Deutz and Gibbs 2008; Chertow 2007). In these clusters, coordination, trust and competitive advantage are generated through proximity of related companies and institutions in one location, and through repeated exchanges among them. Furthermore, the different forms of self-organisation in industrial symbiosis (Boons, 2008) can be related to the different change perspectives. These types are self-governance, pure self-organisation, self-organisation with imposed selection pressure (by the government) and no-self organisation. The form of self-organisation can differ at different moments in the change process. Baas and Boons (2004) integrate the

lifecycle of organisations, stages of industrial ecology and incremental change. They identify three stages in the process, in which actors make use of existing win-win situations (regional efficiency), exchange knowledge within trusting relationships (regional learning), and base their activities on a created vision of sustainability (sustainable industrial district). This knowledge is important for planning change processes.

Then there are many concepts that can be related to parts of the transition literature. As *de novo* planned parks usually are not totally planned and industrial symbiosis in existing parks can also contain planned elements and government interventions, or can be triggered by government incentives, a grey zone exists between planned and emergent change. Different aspects of transition management cover this zone between planned and emergent change, combining components of both. Adamines and Mouzakitis, (2009) and Gibbs, (2009) consider industrial ecology and industrial symbiosis as a niche development, which is unknown by the mainstream regime or for which existing roles are not appropriate. As such, it is a kind of transition experiment where failed experiments generate knowledge for future developments (Gibbs, 2009). Furthermore, a more sustainable world can be seen as a vision or transition image from the perspective of industrial ecology (Geels, 2005; Rotmans, 2005, Rotmans and Loorbach 2009) and hence industrial symbiosis. The vision and successful examples of eco-industrial parks can be inspiring and motivating for others. System analysis is a basis to start not only with problem structuring and vision formation, but also for uncovering possibilities for industrial symbiosis and kernels of industrial symbiosis and emergent industrial symbiosis initiatives (Chertow, 2007). Another overlap between transition and industrial ecology literature concerns process facilitation. Because, at present, planned examples often remain unsuccessful and many opportunities for industrial symbiosis are never taken, different management and governance strategies are required. Chertow (2007) suggests facilitation, incentives and uncovering of emergent industrial symbiosis initiatives, and Howard-Grenville and Paquin (2009) show the possible role of an organisation that serves as an innovation broker. This organisation (or person) is able to make introductions between possible partners and to be a participant in the larger stakeholder network. It (he/she) could be a transition manager or a participant in the dialogue at a more operational level, to manage processes of recurrent interactions in order to foster dialogue based on reflection on (changing) existing rules and incentives or on IS and its possibilities. As such this transition manager could manage people and thereby create an environment where continuous change in the direction of IS can happen more frequently.

In congruence with characteristic episodic change, Boons and Baas (1997) elaborated on the coordination and inflexibility of industrial ecology.

Continuous change can at first be related with emergent industrial symbiosis (Chertow, 2007). The uncovering of industrial symbiosis possibilities (Chertow, 2007) is a continuous change intervention in and of itself, which can motivate actors and prompt them to adopt industrial symbiosis collaboration. In

correspondence with continuous change, actor relations and social networks are considered to be important for industrial symbiosis (Ashton, 2008). Baas and Boons (2004) suggest that actors can make different sense of what is and what is not part of the process. This will influence who will be involved, which projects for possible future change are taken into consideration, and so on. Trust relationships are moreover very important to induce industrial symbiosis linkages (Gibbs 2003; Hewes and Lyons (2008). As such, a good governance of these actor relations could be rewarding for the industrial symbiosis process.

At the beginning of this chapter we chose the perspectives of transition management (Kemp et al. 2007; Rotmans and Loorbach, 2009) and episodic and continuous change (Weick and Quinn, 1999). The combination of these three perspectives gives a better understanding of complex issues in planned and emergent eco-industrial park development. In change management literature, however, other theories exist, such as organisational development (for example Boonstra, 2004). These theories could complete the picture, although the added value of the use of the extra theory and increasing complexity of the combination of perspectives should be balanced with the concern to generate a comprehensive combination. We therefore decided not to include more change theories in our methodology.

The combination of change perspectives reveals governance possibilities. In light of the insights on change mechanisms of episodic and continuous change and the process approach of transition management, intervention possibilities are numerous. As interventions in episodic and continuous change are less concrete than in transition management, elements of the transition management can be used as sources of inspiration or examples of how to tackle a change process. It should be interesting to investigate how to make these governance and intervention strategies more concrete.

In this chapter we have combined different change perspectives to further our understanding of less investigated aspects of eco-industrial parks. Our analysis is based on transition management theories on episodic and continuous change, and can deliver insights into various aspects of change processes. The different change perspectives were also used to classify the widely diverse literature on organisational aspects of industrial symbiosis. Taking into consideration the different perspectives on and possibilities for change processes during the entire process, this study can be used for decision making in the governance of change processes.

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