

Innovation projects and visions on the future: ambition and commitment in the Agropark case

Anne-Charlotte Hoes, Barbara J. Regeer and Marjolein B.M. Zweekhorst

VU University Amsterdam, Athena Institute, De Boelelaan 1085, 1081 HV Amsterdam, the Netherlands, anne-charlotte.hoes@wur.nl.

Abstract

Since the 1980s, Dutch agricultural policy focuses on changing the agricultural sector into a more sustainable sector. In this article we explore an Agropark visioning initiative and four Agropark innovation projects to provide further understanding in how visions on the future influence innovation projects. In addition we question which innovation strategies actors adopt to ensure both high levels of ambition and high degrees of commitment towards the innovation Agropark. Our study shows that future visions can lead to high expectation within the policy and public domain which creates both opportunities and tensions for innovation projects. Furthermore, the analysis shows that each Agropark innovation project applied specific innovation strategies that suited their distinct context and network of actors. Furthermore, actors within the innovation projects contextualise and thereby re-design future visions into local visions. They thus create a more viable design but at the same time dilute initial ambitions. Recognising these tensions and opportunities in their different guises, and making them part of the learning process time and again, both at regime level and at niche level, assist actors that aspire to guide far-reaching innovations.

Keywords: new technologies, innovation, visions, implementation, innovation management

1. Introduction

The 'licence to operate' of Dutch agriculture is being challenged due to persistent environmental, public health, animal welfare, and spatial pressure problems (Beekman, 2008; Driessen, 2012). Increasing use of agro-chemicals, pesticides, and antibiotics, and the outbreaks of veterinary diseases, scaling up of land use and increasing ethical concerns about animal welfare urge the need for a more sustainable agricultural sector in the Netherlands. Since the 1980s, the Dutch government has endeavoured to motivate the agricultural sector not only to focus on increasing the scale of production but also to pursue alternative directions such as precision agriculture, agriculture that is energy and waste efficient, multifunctional land-use, and biological agriculture. Sustainability scholars argue that far-reaching sectoral-wide agricultural innovations are needed to transform the agricultural sector into one that is more beneficial to economic, environmental, and social values (Grin *et al.*, 2004). Such far-reaching sectoral-wide innovations have been conceptualised as system innovations (Geels, 2002).

It is tough to realise agricultural system innovations. Current routines in the agrifood chain, which are formalised through institutional rules or embedded as norms, prove remarkably resistant to radical change. Or as Geels (2002: 1258, referring to Freeman and Perez, 1988) notes: 'Radically new

technologies have a hard time to break through, because regulations, infrastructure, user practices, maintenance networks are aligned to the existing technology. New technologies often face a mismatch with the established socio-institutional framework'. Therefore, a crucial role in any far-reaching innovation process is played by so called niches. Niches are sheltered spaces in which actors can experiment with radical new products, processes, and technologies that are considered desirable (Geels, 2002). Wijnands and Vogelesang (2009) note that the Dutch government adopted two types of strategies, on niche-level, to trigger the sustainable development of agriculture. The first type of strategy aims to stimulate agricultural change by developing visions on a sustainable future (i.e. future vision initiatives). The second type of strategy supports change by assisting innovators who want to develop and implement new more sustainable agricultural businesses (i.e. innovation projects). Wijnands and Vogelesang (2009) specify that the first strategy follows a route from future vision to practice while the second strategy follows a route from practice to future vision.

Visioning initiatives and innovation projects both aim to contribute to the sustainable development of the agricultural sector. Furthermore, both are 'niched' as they are partly sheltered from existing dynamics such as market conditions (i.e. they are publicly financed). Despite these parallels, the purpose and approach of formulating visions on the future

on the one hand and designing concrete entrepreneurial projects on the other differ. Below we briefly discuss visioning initiatives and innovation projects and pose two research questions that will be addressed in this article.

2. Underlying principles behind visioning initiatives and innovation projects

Visions can be seen as narratives and representations of a specific stakeholder group that depict their perspective on a desirable future (Beers *et al.*, 2010; Van der Helm, 2009). Visioning initiatives aim to construct visions of a future, which address a multitude of perceived problems and opportunities, are not too futuristic and have a broad support base. The underlying assumption is that these 'utopian' visions inspire actors to innovate. In addition, Beers *et al.* (2010: 723) note that: 'Increasing image awareness can help a project to adapt more effectively to existing societal discourses and the images embedded in them'. Roelofsen summarises in her literature overview, visions are 'seen as generative in guiding actions, mobilising resources, and bridging between actor communities and organizational boundaries' (Roelofsen, 2011: 15, referring to Borup, *et al.*, 2006; Robinson *et al.*, 2007).

Approaches for developing visions on the future, such as interactive technology assessment (Grin and Van de Graaf, 1996; Roelofsen, 2011) and transition management (Loorbach, 2007) note that numerous individual visions need to be integrated to develop a broadly shared vision. These approaches can be seen as design strategies to overcome the issues of the *I-methodology*, a term introduced by Oudshoorn *et al.* (2004) to refer to the phenomenon that designers take their own preferences and knowledge as guiding during the design process which results in designs that inadequately address the variety of needs and desires of stakeholders.

Thus, several scholars from different research traditions work from the assumption that creating new, enticing images can motivate actors to change their 'business as usual'. However, others have questioned this. For instance, Schot and Geels (2008: 542) argue that: 'in practice there are too many fruitless scenarios and visioning exercises, with few substantial follow-up activities. In a critical interpretation, one might say that many of these exercises have become rituals, where actors express good intentions as a form of "public impression management"'. Therefore they stress; 'the importance of "hands-on", real-life experiences in demonstration projects' (Schot and Geels, 2008: 542).

Wijnands and Vogelezang (2009) too argue that synergy between visioning initiatives and innovation projects is important when aiming to achieve a more sustainable agricultural sector. The idea is that future visions could inspire innovators to reach for more ambitious aspirations in innovation projects. Surprisingly enough, the issue of *how* future visions influence innovation projects is not addressed. In this article we explore the case of *Agroparks* to gain insight into the following research question:

1. What does the case of Agroparks reveal about how visions of the future influence innovation projects?

Let us explore the concept of innovation projects before posing our second research question.

Innovation projects aim to trigger agricultural system innovations, that is, innovations which bring along sector-wide changes that potentially contribute to sustainable development, by supporting entrepreneurs that aspire to innovate. In innovation projects pioneering entrepreneurs, researchers and other actors jointly develop and implement new agribusiness. Others in the field of system innovation have referred to similar projects as transition experiments (e.g. Loorbach, 2007), system innovative projects (e.g. Van Mierlo *et al.*, 2010), pioneer projects (Meijer, 2008), demonstration projects (Schot and Geels, 2008), niche experiments (Grin, 2008; Kemp and Rotmans, 2004) and innovative practical projects (Van Latesteijn and Andeweg, 2010). Rogers (2003) articulates the reasoning behind supporting entrepreneurship for system innovation rather straightforwardly by stating that entrepreneurs 'play a gate keeping role in the flow of new ideas into a social system' (Rogers, 2003: 248). The notion that entrepreneurs play an important role in bringing about change was already pointed out in the beginning of the 20th century by the economist Schumpeter (1982). He argued that entrepreneurs introduce 'new combinations' that create a new economic equilibrium (Schumpeter, 1982).

Innovations that are considered to have the potential to trigger far-reaching sectoral change (i.e. system innovations) are usually ambitious, complex and risky. In the agricultural sector, the entrepreneurs are mainly farmers: small medium sized businesses (SME) with, in contrast to the frontrunners in other sectors, limited resources in the way of capital and manpower. Nor can they dispose of venture capital in a measure comparable to other multinationals. Thus, the underlying assumption of innovation projects is to provide: 'the necessary trial and error spaces. [...] which enable entrepreneurs to explore yet uncertain opportunities, and learn from them'. (Mommaas and Eweg, 2010: 47).

Without it, innovations will be slow to develop or strand in a deadlock, as 'commitment' of farmers towards such 'high investment, high risk' projects will be low. Also it is argued that successful innovation projects may trigger others to innovative which, in turn, may lead to a cascade of technical, practical and cultural changes within the sector. Thus, innovation projects may, in time, result in far-reaching change of the agricultural sector into a more sustainable sector.

Moreover, as farmers typically apply incremental bit-by-bit innovation strategies (Driessen, 2012) it can be anticipated that farmers will have the tendency to minimise the risk and investments needed, thereby potentially minimising the value (i.e. ambition) of the innovation as well. From this contemplation a key dilemma emerges; how to stimulate commitment while at the same time maintaining high levels of ambition? In this article we will investigate how this tension played out in four Agropark innovation projects. More specifically, we investigate the following research question:

2. Which specific types of innovation strategies did actors within four innovation projects apply to ensure both high levels of ambition and high degrees of commitment towards the implementation of an Agropark?

3. Methodology: exploring the Agropark case

We apply a multiple case study approach to gain further understanding in the relationship between visioning initiatives and innovation projects and to formulate strategies for developing ambitious innovations that will actually be implemented by entrepreneurs. A case study approach is appropriate for studying complex socio-technical phenomenon (Yin, 2009) such as agricultural innovation, as it takes into account the full spectrum of the phenomenon. Within the case study approach, researchers provide a deeper understanding of a certain phenomenon by presenting (personal) interpretations on a selected case (Yin, 2009).

Agroparks were selected as cases because Agroparks appear in both visioning initiatives and in innovation projects. Agroparks are envisioned clusters of diverse large scale agricultural and industrial functions that recycle each other's input and output streams to create an energy and nutrient effective system. A recently published PhD thesis by one of the founding fathers of the Agropark concept (Smeets, 2009) covers Agropark projects until 2009. Smeets (2009) describes one broad visioning initiative in the Netherlands

(i.e. Deltapark), three Agropark innovation projects in the Netherlands and three Agropark innovation projects in Asia. After the completion of his thesis, an additional Agropark innovation project was initiated in the Netherlands making up a total of four Dutch Agropark innovation projects. In this article we explore all four innovation projects:

- case A: Agrocentrum Westpoort;
- case B: New Mixed Farm (in Dutch; Nieuw Gemengd Bedrijf);
- case C: Biopark Terneuzen; and
- case D: C2C Agropark Flevoland.

Case B, C and D all developed in the context of TransForum; a Dutch innovation programme that ran from 2005-2010 to support the sustainable development of agriculture in the Netherlands by bringing local practices (of farmers, growers, civil servants) together with scientists with the aim to induce changes in both science and practice (see Veldkamp *et al.*, 2009). 'TransForum's overall strategy is to let practice lead! In order to link firmly to current reality and practice, TransForum has organised >20 practice or innovative projects, in which the KOMBI partners attempt to overcome obstacles (real problems) concerning system innovation which prevent the current agro-sector from becoming a more sustainable system' (Veldkamp *et al.*, 2008: 89). KOMBI is a Dutch acronym for 'knowledge institutes, governmental authorities, civil society organisations (including consumer organisations) and the private sector (including farmers)' (Veldkamp *et al.*, 2008: 89); in English the acronym KENGI is used for Knowledge institutes, Entrepreneurs, Non-governmental and Governmental institutions, with the I for their joint objective of innovation (see Peterson and Mager, 2010). Within these innovation projects TransForum: 'enables entrepreneurs to explore yet uncertain opportunities' (Mommaas and Eweg, 2010: 47). The three Agropark projects discussed in this article (B to D) are examples of TransForum's strategy.

From March 2006 until December 2010, the first author of this article investigated three Agropark innovation projects (Hoes, 2011) using the Interactive Action and Learning (ILA) monitoring approach (Regeer, 2009; Regeer *et al.*, 2009). ILA monitoring is a participatory evaluation approach that focuses on the inner workings of initiatives. As such, a rich body of empirical data was collected for case B (conducted thirty interviews and attended fifteen project meetings and four public debates between 2006 and 2010), C (conducted fifteen interviews and attended two project seminars between 2006 and 2008) and D (conducted eleven interviews and attended a project workshop and a project seminar between 2009 and 2010).

In addition to this ethnographic approach, analyses were conducted based on publicly accessible project documentation, (policy) reports (Breure *et al.*, 2007; Broeze, *et al.*, 2000; De Wilt and Dobbelaar, 2005; De Wilt *et al.*, 2000), while secondary analyses were performed on documented Agropark cases (Grin and Van Staveren, 2007; Smeets, 2009; Termeer *et al.*, 2009; Van Gendt *et al.*, 2003). As the first author of this article joined the Agropark network in 2006, the above documentations were especially needed to gain empirical insight in: (1) the historical origin of Agroparks; (2) the Dutch visioning initiative of Agroparks; and (3) the innovation projects Agrocentrum Westpoort (i.e. case A).

We analysed the empirical data of each of the four Agropark innovation projects using the grounded theory approach (Strauss and Corbin, 1990) to gain understanding of how the vision on the future of Agroparks influenced the development and implementation of Agroparks in practice (research question 1) and to gain insight into the specific innovation strategies applied by the innovation projects (research question 2). These insights were obtained by answering the following questions:

1. who were the participants and stakeholders involved in the project?;
 2. which Agropark ambitions were inscribed into the specific Agropark that the innovation project proposed?; and
 3. which specific opportunities and tensions played a crucial role in the continuation of the project?
- Furthermore, to assess the level of commitment we pose the question:
4. to what extent were participating entrepreneurs willing to invest in the development and implementation of the Agropark?

We want to note that several strategies were applied to assure the quality regarding the interpretations and conclusions of the case studies. These are: (a) being precise and extensive in the collection of relevant empirical data by reordering and transcribing all interviews and work sessions; (b) inquiring and analysing these empirical data by extensively and intensively moving back and forth between empirical data, theory, and own reflections; (c) improving initial interpretation through organising dialogue with colleagues, peers, and practitioners; and (d) confirming accuracy of the presented data by asking participants of selected cases to check manuscripts.

4. Agroparks: a vision

It is difficult, and maybe even undoable, to pinpoint a specific date of birth of a new development such as Agroparks. We chose as a starting point for Agroparks a report of the Dutch Council of Agricultural Research (NRLO) which appeared in 1998. In this report the Agropark concept is briefly discussed as one of the twenty-two ideas for the future direction of agriculture. The 'agricultural production parks' (i.e. Agroparks) was one of these ideas (Engelbart and de Wilt, 1998). It was inspired by industrial ecology; the notion that we should transform our production methods in such a way that production is optimised and waste flows are minimised (Huber, 2000). An agricultural production park was portrayed as an area where different types of high-tech agricultural and industrial functions are clustered to create closed energy and nutrient cycles (Engelbart and De Wilt, 1998). The NRLO and the committee Technology Assessment of the Ministry of Agriculture requested researchers of Wageningen UR to further the idea of agricultural production parks by developing inspiring visions of the future (Grin and Staveren, 2007). These visions, it was hoped, would stimulate societal debate about the future direction of agriculture and would motivate the agribusiness and industry to explore potential collaborations (De Wilt *et al.*, 2000). Text box 1 explains the design principle of Agroparks as described by De Wilt *et al.*, (2000); De Wilt and Dobbelaar (2005); Grin and Van Staveren (2007) and Smeets (2011).

A vision: Deltapark

The end report of the Agropark visioning initiative (de Wilt *et al.*, 2000) explored the potentials and dilemmas for Agroparks and offered four provisional Agropark sketches: Deltapark, Agro-specialtypark, Greenpark, and Multipark. The director of the innovation programme 'InnovatieNetwerk' (a programme of NRLO) and the chair of the steering committee Technology Assessment of the Ministry of Agriculture indicated in the preface of the report: 'the presented example impressions function merely as a rough idea for a potential outcome' (De Wilt *et al.*, 2000: ii).

In October 2000, InnovatieNetwerk offered the end report of the Agropark visioning initiative to the Minister of Agriculture. The Minister responded favourably and expressed keen interest, praising especially the Deltapark impression (De Wilt and Dobbelaar, 2005), with a proposed location in the harbour of Rotterdam. These plans were developed by six researchers of Alterra, ATO, IMAG (Wageningen UR) and two landscape architects of the company BBOI (Broeze, *et al.*, 2000).

Text box 1. The Agropark design principle.

The core principle of the Agroparks concept is that by incorporating livestock breeding, crop production, slaughterhouses, and industry such as bio-power plants, diverse nutrient, waste, and logistics flows can be integrated (De Wilt *et al.*, 2000; Grin and van Staveren, 2007). Agricultural businesses that apply a more or less industrialised approach and do not require extensive areas of land (e.g. not arable farming) such as pig husbandry, poultry, and greenhouses, are considered well suited for Agroparks (De Wilt and Dobbelaar, 2005). Agroparks have a relatively large size to make the required infrastructural investments that are needed to connect waste flows and the integrated agricultural chain functions commercially viable. Smeets (2011) describes Agroparks as 'a spatial cluster of agrofuctions and the related economic activities. Agroparks bring together high productive plant and animal production and processing in industrial mode combined with the input of high levels of knowledge and technology' (2011: 21). Supporters of agroparks argue that such a more or less closed and clustered production system will in comparison to current farms: (a) lower polluting emissions; (b) lower (animal) transport; (c) lower risks of infectious diseases; (d) increase availability of land space in rural areas; and (e) create a better-controllable production situation. Therefore agropark designers perceive the concept as being more nutrient and spatially efficient, more environmentally and animal friendly, and more transparent than current husbandry farms (De Wilt *et al.*, 2000; Smeets, 2011). From the above description we can deduce three key design principles: (1) a large scale; (2) diverse agricultural and industrial functions that are (3) connected to one another to create a more or less closed system of input and output streams.

An artist impression of Deltapark shows a huge silver coloured infrastructural complex with a size of 1,000×400×20 meters (Smeets, 2011). The complex would house 300,000 pigs, 1,000,000 chickens for consumption, 250,000 hens for egg production, 0.5 ha salmon aquaculture, insects for consumption, 25 ha greenhouses, a fodder company (which produces food for animals), a slaughterhouse, a meat processing unit, and a bio-energy power plant. The proposed construction would be several storeys high. Patios and balconies were incorporated into the architectural design to create well lit stables and outdoor areas for the pigs. In addition, more space per animal was reserved than in conventional intensive pig farming. The harbour of Rotterdam was perceived as an ideal location in terms of transport, as products could be imported and

exported by ship, thus reducing CO₂ emissions and road traffic intensity.

Since the Minister was enthusiastic about the Deltapark idea and would visit the harbour of Rotterdam the next day, he indicated he would discuss the Deltapark idea with the director of the Port of Rotterdam. However, the harbour management disqualified the whole notion to establish agricultural production within the harbour area (Smeets, 2011).

Public response to the vision

The day after the presentation of the Agroparks report, a national quality newspaper published a front page article with the headliner: 'Minister wants trial of Pig Flat' (NRC-Handelsblad), thereby framing Deltapark as an actual Agropark 'blueprint' that was going to be implemented rather than as a futuristic vision meant to foster public debate. A fierce debate about the desirability of Agroparks emerged in the media. Opponents portrayed Deltapark as a pig tower or meat factory and labelled it a technocratic fiasco. They saw the proposal as a repulsive idea that could be seen as a caricature of the out of control direction of intensive high-tech agriculture (Smeets, 2011). A public discussion about 'what is desirable agriculture' did indeed emerge, in the course of which many publicly rejected the notion of Agroparks, to which they consistently referred as 'pig flat', 'meat factory' or 'Frankenstein building'. In Parliament, the Minister of Agriculture was called upon to answer questions about the departments' policy regarding Agroparks (De Wilt and Dobbelaar, 2005). This kind of fierce antagonistic public response was not anticipated by the designers (Smeets, 2011).

5. Agroparks: four innovation projects

Through the following years, the Agropark concept appeared in at least the following four Dutch innovation project: Agrocentrum Westpoort, New Mixed Farm, Biopark Terneuzen, and C2C Agropark Flevoland. Below we explore these innovation projects and answer the study questions that we posed in section 3.

Case A: Agrocentrum Westpoort

In 2002, researchers of Alterra and ATO (Wageningen UR), the management of the Port of Amsterdam, and employees of InnovatieNetwerk started the project Agrocentrum Westpoort (In Dutch: Agrocentrum Westpoort). In addition, the following organisations were involved during the design process: Cargill, Amfert, Nuon, Bellast Nedam and LTO

(Dutch Federation of Agriculture and Horticulture, the organisation of entrepreneurs and employers).

The design of Agrocentrum Westpoort shows a strong resemblance to the vision for Deltapark. Two key differences are that Agrocentrum Westpoort incorporates less diversity in the products produced and that a modular design approach was adopted in order to be able to divide the development process in steps. The minimum design would house around 100,000 pigs, with a slaughterhouse and a bio-energy power plant. This design could be expanded with an additional 12 modules which were each 315 by 168 meters, housing; 37,500 pigs, 5 ha aquaculture, and 5.3 ha greenhouses. The heat of the pigs, a waste incinerator and a power plant (Nuon) would heat the greenhouses, and the pigs' manure would be used by a nearby fertilizer plant (Amfert, who was, at the time, importing phosphates from Israel, thus causing unnecessary CO₂ emissions). Animal feed would be provided by the neighbouring food manufacturing company (Cargill) who was facing a growing waste management problem (De Wilt and Dobbelaar, 2005). To lower the risk of spreading infectious diseases, lock chambers were incorporated.

One idea envisaged a glass tunnel in the pig stables, such as seen in public aquaria. This way visitors would be able to see the pigs without the risk of infection (De Wilt and Dobbelaar, 2005). Fully completed, Agrocentrum Westpoort would accommodate 570,000 pigs, 83 ha aquaculture and 80 ha greenhouses.

The researchers who sketched the design proposed to apply a 'shopping mall' organisation strategy, in which a building contractor would construct the building and lease the stables and greenhouses to farmers. The contractor Bellast Nedam executed a feasibility study, which showed that Agrocentrum Westpoort was economically viable (Smeets, 2011).

Despite the positive results of the feasibility study of Agrocentrum Westpoort, none of the participating businesses or other potential investors was willing to invest. Breure *et al.* (2007) report that some participants indicated that the value that could be expected was too uncertain. They also observe that the issue of 'commitment' had not been explicitly discussed with the project's participants as the project coordinators feared it would divide the group of participants.

Furthermore, the response of the Ministry of Agriculture on the plan was somewhat reticent. With the public debate about pig towers (i.e. Deltapark) in mind, the Ministry was reviewing its stand on Agroparks. Local politicians and

civil servants were disinterested in Agrocentrum Westpoort; Smeets (2011) argues that the absence of pig farms in the agricultural areas surrounding Amsterdam contributed to this apparent lack of commitment. In addition, Breure *et al.* (2007) note that the actors dominating the current agricultural network, such as small scale farmers, truckers, and directors of meat processing businesses, feared the competition of Agrocentrum Westpoort.

At the end of the day, the degree of commitment of the involved parties and external stakeholders was too low and the project was ended in 2006.

Case B: New Mixed Farm

In 2004 TransForum gave financial support to KnowHouse to carry out an Agopark innovation project in the municipality of Horst aan de Maas (in the south-east of the Netherlands). KnowHouse is a local intermediary organisation that mediates between entrepreneurs and research institutes. In 2011, the main innovation project participants include two pig farmers, three brothers owning a poultry farm, a director of the processing company Christiaens Group, and employees of Knowhouse. Other stakeholders that participated include researchers, consultants, civil servants from the municipality and from the province, prominent politicians, members of staff of the Ministry of Agriculture and members of staff of TransForum.

In 2011, New Mixed Farm is an envisioned Agopark that connects a new large scale pig farm (35,000 pigs) and a new large scale broiler farm (1,100,000 chickens) with a new bio-energy power station. The proposed broiler farm incorporates the entire poultry production chain, from hatching to slaughtering. To minimise emissions, new improved biological air filters are included in the design. Furthermore, a landscape designer was employed to develop a visually appealing design.

In 2004 the design of New Mixed Farm was more ambitious than in 2011 in terms of size, diversity, and the interconnection of nutrient flows, as it also included a mushroom farm and a greenhouse complex. However, after an initial feasibility study in 2006, the mushroom grower and a director of a greenhouse complex decided to step out of the project. The remaining farmers wanted to continue, motivated by the fact that current governmental policy did not allow them to expand their current operational farms.

Having consciously and deliberately decided to carry on in spite of two partners pulling out, the remainder of the group felt more committed to the project then before. In

addition, trust between the continuing partners grew as they undertook an Agropark business trip to China to discuss potential Agropark in China. One of the farmers stated during an interview that only when he was confronted with presentations of large potential Agroparks during this trip did he fully start to identify their initiative as an Agropark project.

After the business trip, entrepreneurs and researchers fine-tuned the initial design. The entrepreneurs wanted the risks within the initial design to be clear and, where possible, lowered. In line with this reasoning, the entrepreneurs stated that each technical component had to have been applied previously in other businesses. Organisational preferences were also discussed: the entrepreneurs made explicit that dependency between the participating farms had to be minimised (i.e. loose connection of elements) since independence is an important principle for farmers.

From 2005 onward the engagement of the municipal authorities increased as the alderman with the portfolio of agribusiness committed himself to the project. The alderman indicated during an interview that he saw New Mixed Farm as a desirable initiative which would 'stimulate the agribusiness in the area'.

However, the local community was not as approving of the New Mixed Farm. Many were even fiercely opposed to it. In addition, New Mixed Farm encountered substantial opposition from national NGOs, such as Milieudefensie (Friends of the Earth Netherlands). Opponents criticised the claims of sustainability made by the New Mixed Farm supporters. The chair of Friends of the Earth Netherlands stated during an interview that the environmental profits of New Mixed Farm were far too small. Other opponents argued that if New Mixed Farm claimed to be an Agropark project it should have been designed in accordance with the design principles of the Agropark concept: it should have been situated on an industrial site such as the harbour, and not in a closely populated rural area, and furthermore animal fodder and other input streams should be local and green. Apparently, the futuristic image of Deltapark was now taken as a standard to which Agropark projects had to comply.

Lowering the ambitions for New Mixed Farm, as had been done during the design process, led several members of staff of the Ministry of Agriculture to question the 'innovativeness' and thus the value of the project. Consequently, broad public support became even more important for the project to continue.

The criticism of the Ministry and other stakeholders stimulated the entrepreneurs to again heighten the ambitions of New Mixed Farm. For example, the pig farmers decided to no longer castrate the pigs, thus making the farm more animal friendly. Castrating pigs is a common practice in the pig husbandry sector to prevent boar taint. The choice not to castrate can be considered daring (Hoes and Regeer, 2011) as meat from non-castrated pigs is not imported by many countries.

In 2011 New Mixed Farm is still continuing; during the writing of this article New Mixed Farm was applying for local permits.

Case C: Biopark Terneuzen project

In 2006, TransForum, the Province Zeeland, and Van de Bunt Consultants initiated the innovation project Biopark Terneuzen. Other project participants were Zeeland Seaport, the Municipality of Terneuzen, the Province of Zeeland and the industrial companies Yara (a chemical fertiliser plant), Cargill (a bio-ethanol plant formally named Nedalco), Heros (a water purification plant) and Rosendaal Energy (a bio-diesel plant). Knowledge institutes that executed applied research included the Radboud University, WUR (LEI, A&F, PPO), and VU University Amsterdam.

Zeeland Seaport is responsible for the development of the port and surrounding waterway area of Terneuzen. They perceived the establishment of an Agropark as a way to boost economic development within the area (through raising employment, among other things) and an opportunity to raise the level of sustainability of the industry in the area, thereby improving its public image as well. The framing of an Agropark as a way to trigger economic growth raised the attention of many local and provincial politicians and civil servants. For a while, political commitment towards the vision of an Agropark in the harbour of Zeeland grew, but it soon became clear that there was no political support for establishing intensive husbandry in the envisaged area. The construction of greenhouses, on the other hand, was open for discussion.

Researchers and civil servants developed three scenarios for Biopark Terneuzen, each different in time span, complexity and ambition. The most ambitious scenario is called Biopark Europe and incorporates aquaculture, new first-rate industries such as bio-plastic, enzymes and vitamin production, and is connected with the Belgian city of Ghent and the rural area between Terneuzen and Ghent (Timmer *et al.*, 2007). The most basic scenario entails the coupling of existing industry with a new 240 ha greenhouse complex.

The greenhouse complex would obtain its water input from a water purification plant (Heros), CO₂ inputs from a chemical fertiliser plant (Yara) and a bio-ethanol plant (Cargill), while the chemical fertiliser plant (Yara) would provide 60% of the heat input, heat that had previously been disposed of in the waterway Westerschelde. The basic scenario proposed that waste water from the greenhouse would be exported to the water purification plant and biomass waste to the bio-energy plant (Biomassa Unie). The bio-energy plant would also receive waste flows from the water purification plant, the bio-ethanol plant, a bio-diesel plant (Rosendaal Energy), and manure from farms in the region. The third, intermediate, scenario is a hybrid of the basic and the ambitious scenario.

After a feasibility study, project participants decided to develop the basic scenario of Biopark Terneuzen and set out to find farmers willing to settle. The first growers that showed keen interest in establishing their businesses in the greenhouse complex of Biopark Terneuzen formulated the precondition of being allowed to generate their own power through cogeneration (CHP). Allowing cogeneration would entail giving up the ambition to use heat and CO₂ streams from the neighbouring industries. Zeeland Seaport decided not to agree and formulated the condition that settling growers had to acquire their heat and CO₂ from the industries. From a business perspective this condition is quite bold as it is a common trend within Dutch horticulture to install CHP. It was questionable whether Dutch growers would be willing to give up this preference, especially since CHP is subsidised.

In 2010, 60 ha of greenhouses were sold (mainly to Belgium growers) of which 23 ha were operational in 2010 (Van Altvorst *et al.*, 2010). The contracting firm that has developed the greenhouse complex states on the website that the greenhouses are 'sustainable, affordable and carefree'. The chemical fertiliser plant Yara has invested over 80 million to connect its heat and CO₂ flows to the greenhouse complex. The break-even point for these investments will be made when 125 ha of greenhouses is operational (Van Altvorst *et al.*, 2010).

Case D: C2C Agropark Flevoland

In 2008 TransForum initiated a project to investigate the feasibility for the development of an Agropark in the the Noordoostpolder region. A researcher from PPO (Wageningen UR) and a consultant (Origon) were the project coordinators for C2C Agropark Flevoland. They employed their extensive network within the region to engage a variety of participants. Ten farmers who operated

greenhouses, dairy farms, arable farms, a flower bulb farm and a sowing-seed company joined the project (De Wolf, 2011). The local and regional government were interested in the idea to develop an Agropark in Flevoland and supported the project; however no local public funds were allocated to the project.

The Noordoostpolder region comprises 480 km² of new land, reclaimed from the sea (impoldered) in 1942. Of this land, 87% is used for agriculture, mainly arable farming (potatoes and onions). In the last decade there is a trend towards the development of greenhouses and dairy farms in the area.

C2C Agropark Flevoland went for a different approach: instead of designing a new Agropark on a specific site, they investigated how input and output streams of currently operational farms could be interconnected. An initial idea was to develop biogas (or heat) for the greenhouses from the manure of the dairy farms. This plan was rejected as the demand was too large to be fulfilled in this way, while the manure could be better used to fulfill the local demand for fertiliser. The second proposal, a gas powered plant running on other organic materials, was deemed to better suit the local waste-supply. This plan, however, was rejected by the farmers when a feasibility study showed that the investments would rise to € 70 million while the complexity of the installation would bring on higher risks. Furthermore, the task of being a gas producer did not align with their core business. The greenhouse growers were, however, interested in the less ambitious plan to directly transform the bio-gas into heat and 'green' energy through cogeneration. One of the growers was already using cogeneration installations. The growers wanted an external contractor to develop the installation and exploit it, which would entail an investment of € 16 million. When writing this article in 2011, such partners were being sought and no public funds were being invested in the project.

The agricultural firms involved also investigated the opportunity to develop a shared employment agency. As each of the crop growers had a specific seasonal peak in the demand for labour, agreements could conceivably be made to transfer skilled staff. This way, employees would be offered job security throughout the year while farmers were ensured of an experienced workforce.

Meanwhile, a regional businessman, several politicians and civil servants who were concerned with the economical development in the region joined the C2C Agropark Flevoland and started the development of a long-term vision for the region. The group expressed a need for a

multifunctional logistic centre. However, the participating farmers were not committed to the long-term vision to develop a multifunctional logistic centre as they did not perceive a problem with the distribution of their products and were not interested in marketing their product differently.

6. Comparing the four agropark innovation projects

So far we argued that there is an ongoing debate in innovation studies as to what precisely is gained with visioning initiatives and how they relate to practical change. In addition it was questioned how to ensure high commitment for the realisation of ambitious innovations. In this section we address these questions by reflecting upon the above presented Agropark case.

Relation between visions of the future and innovation projects

In the introduction of this article we questioned how visions on the future influence innovation projects. The analysis of four Agropark innovation projects shows that visions on the future influence innovation projects in both positive and negative ways.

Our case studies strengthen the notion that visions are valuable as they assist in niche formation (Beers *et al.*, 2010; Loorbach, 2007). The vision of Agroparks created momentum in the policy domain as actors had been successful in creating a proposal (i.e. Deltapark) that promised to contribute to the solution of several publicly perceived problems (e.g. polluting emissions) and aligned well with current policies (e.g. 'reconstruction policy'). The practice that proposals are actively linked by lobbyist to policies, perceived problems and political hypes has been conceptualised by Kingdon (1984). He argues that through the practice of coupling, a window of opportunity is created that favours the adoption of a proposal on policy agendas, and hence creates momentum (Kingdon, 1984).

However, we want to note that our study also shows that it is a challenge to create a broadly supported vision, even when the proposal aligns to the discourse of the policy domain, as the fierce public resistance to the Deltapark concept demonstrates. Apparently more is needed for wide social acceptance. At the same time, despite public opposition, the vision of Agroparks created momentum in the agricultural policy domain, resulting in the mobilisation of public resources to boost the Agropark niche. Innovators profited from this momentum and applied for public resources for

the development and implementation of Agroparks. This led to the emergence of several Agropark innovation projects.

In addition, our case studies reveal that if an innovation project associates itself with a futuristic vision, this may positively influence the level of ambition of innovation projects. We will discuss these dynamics using the New Mixed Farm case as an example. In the course of the design phase, the ambitions inscribed into the New Mixed Farm concept got increasingly diluted, as the local vision of New Mixed Farm drifted further and further away from the initial vision. This, however, provoked critical commentaries from several public actors who initially supported or at least accepted New Mixed Farm, as it promised a more sustainable practice of livestock production. Public questions concerning the degree of sustainability urged the farmers to increase the ambitions of their local (i.e. New Mixed Farm) vision. Specifically, the pig farmers decided not to castrate pigs in the proposed New Mixed Farm, thereby addressing the public appeal for more animal friendly farming practices. The choice not to castrate pigs can be considered a brave action as meat from non-castrated pigs is not imported by many countries. Also, this description of the function castrating pigs surprised many as not castrating pigs is not mentioned in the future vision of Agroparks.

Furthermore, our study strengthens Beers *et al.* (2010) notion that when an articulated vision of the future triggers public resistance (i.e. negative societal image), this hampers the development and implementation of concrete and locally adapted visions in innovation projects. Our case descriptions illustrate how the public resistance against the visionary concept of Deltapark was picked-up on by several NGOs, who put it high on their political agenda. The NGOs course of action against Agroparks was, among others, preventing the development and implementation of Agropark in innovation projects. In the New Mixed Farm case, Friends of the Earth Netherlands fuelled and organised local and national opposition against the New Mixed Farm idea. This resulted in local and national action committees submitting numerous official appeals opposing the granting of permits for New Mixed Farm. In addition, opponents used the perceived discrepancy between the Agropark concept as a futuristic vision and the 'watered down' local vision of the New Mixed Farm Agropark in their rhetoric to denigrate New Mixed Farm. In their discourse, opponents consolidated the Agropark as a blueprint or even a standard to which New Mixed Farm had to comply. This observation supports Beers *et al.* (2010: 723) statement that 'simple images can cause a disregard of complexity' which hampers innovation projects as they are inherently working on complex and uncertain issues.

Innovation strategies

As each of the studied innovation project experimented with the development and implementation of an Agropark, we were provided with the opportunity to investigate which specific types of innovation strategies actors within the networks of four innovation projects applied to ensure both high levels of ambition and high degrees of commitment towards the intended Agropark.

When comparing the experiences of four Agropark innovation projects, we see that all the initiators of the innovation project started out with a search for a conducive breeding ground and for potential adopters of an Agropark. When a group of potential adopters was formed, project coordinators focused on developing a local vision of the proposed innovation that to a more or lesser degree suited local conditions and opportunities (environment, infrastructure, available resources, and laws) and addressed the needs and preferences of the anticipated adopters and other stakeholders. We will refer to this tailoring process as *contextualisation* (Hoes *et al.*, 2012).

Each Agropark innovation project had a distinct context and network of actors; this resulted in the development of four innovation strategies. Below we typify the applied innovation strategies and explore their strengths and weaknesses in terms of ambition and commitment.

We observe that Agrocentrum Westpoort developed a local vision that shows strong resemblance with the vision of Deltapark. It seems as if project participants steered towards developing a local design that would optimally match with the design principles of Agroparks. As a result, the local vision of Agrocentrum Westpoort can be considered as most ambitious of the four Agropark innovation projects in terms of in-scripting sustainability features. Furthermore, Agrocentrum Westpoort applied a distinct strategy to bypass the issue of limited recourses of farmers to invest in the implementation of Agroparks. Instead of involving farmers, Agrocentrum Westpoort developed a business proposition together with neighbouring industries, in which the industries themselves, or even venture capitalists, could invest. This observation challenges the assumption that agricultural innovation projects necessarily imply farmers as entrepreneurs. When taking into consideration that construction of Agroparks requires high investments to connect the various input and output streams, and that farmers do not dispose of the resources necessary to make such investments, the Agrocentrum Westpoort strategy could be considered quite sensible. We typify the innovations

strategy of Agrocentrum Westpoort as: 'industrial investment in future vision'.

On the downside, Agrocentrum Westpoort developed a local vision in which none of the participating industries wanted to invest the required capital. Apparently the innovative project did not adequately steer towards the development of a local vision that aligns with the needs and wishes of the potential adopters. Moreover, in Agrocentrum Westpoort the issue of commitment was not even explicitly put on the table. The project coordinators did not discuss commitment with the project participants as they wanted to keep all initial project participants on board. Keeping all project participants involved is understandable when developing a broad futuristic vision such as Deltapark. For the development of broad visions of the future designers want to incorporate the knowledge and values of as many stakeholders as possible to develop an attractive 'example' that represents shared values. However, such a strategy seems less suitable for prototyping, if only because it is unrealistic to expect that all initial participants are willing to invest in the realisation of an ambitious innovation. The New Mixed Farm project may serve to demonstrate that the departure of participants who are not willing to invest, though painful, can have a positive effect on the commitment to the proposed innovation of the remaining parties. We note that the role played by project participants is different for projects aiming to sketch a broad vision of the future on the one hand and innovation projects set up to develop real life manifestation on the other. Therefore, these two types of projects should be managed differently.

Moreover, developing a local vision of a proposed innovation may be especially tough in Agropark cases as clustering industries and farms implies a high degree of collaboration, while the agricultural sector is dominated by entrepreneurs in small and medium sized enterprises who value their independence. Farmers are not experienced in articulating and integrating visions. Project coordinators of New Mixed Farm addressed the 'wait to see which way the cat jumps' attitude of farmers by initially focussing on getting acquainted with each other and building up mutual trust. Once some degree of mutual trust was established, it facilitated in-depth articulation of personal visions and assisted the integration of visions. This observation fine-tunes the message of strategic niche management that visions should be development during the start-up of innovation projects. Rather, (at least in) agricultural settings, trust needs to be build before initiating the development of a local vision of a proposed innovation.

Furthermore, the local vision of the New Mixed Farm was continually adjusted as the participants became increasingly articulate, as participants dropped out and as new actors entered the sphere of influence of the project. Finally, New Mixed Farm developed a local vision of an Agropark that was shaped by the alignment of the visions of four entrepreneurs who wanted to innovate. We label this in innovation strategy 'small-scale mutual adjustment'.

Biopark Terneuzen applied a strategy that is in part similar to Agrocentrum Westpoort in that they sought the collaboration of industrial multinational enterprises. A key difference between Biopark Terneuzen and Agrocentrum Westpoort, however, is that project coordinators of Biopark Terneuzen focused more on inscripting the wishes and needs of the local industry and the local government into the local vision. The resulting proposal aligns with the objectives of business to enhance their 'green' image while still securing a profit. In addition, it aligned with the local-government's aspiration to stimulate (preferably sustainable) economical activities in the region. We label this approach "industrial local branding'.

In the Biopark Terneuzen case the local government was highly committed to the Agropark proposal, as were the partaking enterprises, who went ahead, built an Agropark infrastructure and strated attracting farmers to settle there. However, at the moment of writing it remains questionable if Biopark Terneuzen will become commercially viable, since the interest of farmers willing to purchase greenhouse properties of Biopark Terneuzen falls behind expectations.

Moreover, Biopark Terneuzen made more concessions than Agrocentrum Westpoort when they let go of several desirable features that were initially inscripted into the vision of Agroparks. Although this may be seen as a let-down, Biopark Terneuzen was actually constructed, while Agrocentrum Westpoort never left the drawing board.

C2C Agropark opted for a different approach altogether. Instead of developing new livestock production farms (e.g. New Mixed Farm) or greenhouses (e.g. Biopark Terneuzen), C2C Agropark Flevoland focused on interconnecting farms that were already operational. Therefore we refer to this strategy as 'regional connection'. This approach resulted in a highly accessible innovation project in which many farmers participated. On the downside, it provided little focus for researchers who wanted to design a local vision of an Agropark and it created minimal sense of ownership with the participating farmers during the time of our research. It remains, therefore, questionable whether C2C Agropark Flevoland will eventually fulfil the ambition of regionally interconnecting the input and output streams of farms.

Table 1 provides an overview of the four innovation strategies that the innovation projects applied and summarises the opportunities they provide and the tensions they bring along from a system innovation perspective. As far-reaching agricultural innovations are inherently dynamic and complicated, actors within innovation projects have the difficult task of recognising tensions and opportunities in their different guises and making them a natural part of their innovation strategy.

Table 1. Overview of the four innovation strategies.

Innovation strategy	Industrial investment in future vision	Small-scale mutual adjustment	Industrial local branding	Regional connection
Opportunities	• high ambition • access to resources • big leaps forward in wider transition	• high commitment • feasible local vision	• high commitment • feasible local vision • access to resources	• many entrepreneurs can participate • no investments needed for new farm
Tensions	• low commitment • too futuristic • high opposition	• incremental steps • low resources • protest against construction farms	• farmers not committed • minimal integration of agricultural functions	• inadequate degrees of ownership • incremental step
Lessons learned	address issues of commitment of participating actors	invest in communication with community members	involve users during innovation trajectory	develop commitment by creating propositions which align with farms
Example	Agricentre Amsterdam	New Mixed Farm	Biopark Terneuzen	C2C Agropark Flevoland

7. Concluding remarks

The analysis of an Agropark visioning initiative on the one hand and four Agropark innovation projects on the other hand shows that published visions of the future influence projects in both positive and negative ways. Visions of the future benefit innovation projects as they assist in niche formation and motivate actors to become more ambitious. Visions of the future may hamper innovation projects when actors consolidate the futuristic vision as a standard with which these innovation projects have to comply.

In addition, the analysis shows that each of the Agropark innovation projects contextualised the Agropark vision as initially developed. Tangible local visions were developed which suited local conditions and addressed the needs and preferences of participating actors. These visions provided direction for implementation and assisted pioneers in their decision making as they included feasible technical designs, practical architectural plans, expected investments, business plans and risk analyses.

Furthermore, contextualisation of the vision of the future resulted in four specific configurations of Agroparks. This outcome strengthens the idea that innovations are highly adaptive. This adaptive capacity is valuable in the sense that it diminishes path dependency and makes proposed innovations appropriate for multiple contexts. On the downside, contextualisation may result in the removal of valuable features that were initially incorporated in the future vision. We want to note that stakeholders and project participants play an important role in safeguarding valuable features of the innovation during the development and implementation phase. Moreover, this article reveals that actors within the broad network can inspire innovation project participants to add new features of value during contextualisation.

References

- Beers, P.J., A. Veldkamp, F. Hermans, D. van Apeldoorn, J.M. Vervoort and K. Kok, 2010. Future sustainability and images. *Futures*, 42(7): 723-732.
- Beekman, V., 2008. Consumer rights to informed choice on the food market. *Ethical Theory and Moral Practice*, 11(1): 61-72.
- Borup, M., N. Brown, K. Konrad and H. Van Lente, 2006. The sociology of expectations in science and technology. *Technology Analysis and Strategic Management*, 18(3-4): 285-298.
- Breure, A.S.H., P.J.A.M. Smeets and J. Broeze, 2007. Agrocenrum Westpoort: utopie of innovatie? Reflecties en leerpunten rond een systeeminnovatief project. Alterra, Wageningen. Available at: <http://edepot.wur.nl/33722>.
- Broeze, J., A.E. Simons, P.J.A.M. Smeets, J.K.M. te Boekhorst, J.H.M. Metz, P.W.G. Groot Koerkamp, T. van Oosten-Snoek and N. Dielemans, 2000. Deltapark: een havengebonden agroproductiepark. In: De Wilt, J.G., H.J. van Oosten en L. Sterrenberg (eds.) *Agroproductieparken perspectieven en dilemma's*. Innovatienetwerk Groene Ruimte en Agrocluster, Den Haag. Available at: <http://www.innovatienetwerk.org/nl/bibliotheek/rapporten/83/AgroproductionParkspectivesanddilemmas>.
- De Wilt, J.G., H.J. van Oosten and L. Sterrenberg, 2000. *Agroproductieparken perspectieven en dilemma's*. Innovatienetwerk Groen Ruimte en Agrocluster, Den Haag. Available at: <http://www.innovatienetwerk.org/nl/bibliotheek/rapporten/83/AgroproductionParkspectivesanddilemmas>.
- De Wilt, J.G. and T. Dobbelaar, 2005. Agroparks. the concept, the responses the practice. *InnovatieNetwerk Groene Ruimte en Agrocluster*, Utrecht. Available at: <http://www.innovatienetwerk.org/en/bibliotheek/rapporten/24/Agroparkstheconcepttheresponsesthepractice.html>.
- De Wolf, P., 2011. Samenwerken aan duurzame regionale ontwikkeling in de Noordoostpolder: rapportage C2C Agropark Flevoland. Research report Praktijkonderzoek Plant & Omgeving, Lelystad. Available at: <http://edepot.wur.nl/175641>.
- Driessen, C., 2012. Farmers engaged in deliberative practices; An ethnographic exploration of the mosaic of concerns in livestock agriculture. *Journal of Agricultural and Environmental Ethics*, 25(2): 163-179.
- Engelbart, F and J. de Wilt, 1998. Initiatief Duurzame Voedselvoorziening (IDV). Ontwerp voor een businessplan. (Research Report NRLO No. 98/27). Available at: <http://www.agro.nl/nrlo/achtergrondstudies/pdf/9827.pdf>.
- Freeman, C., C. Perez, 1988. Structural crisis of adjustment, business cycles and investment behaviour. In: Dosi, G., C. Freeman, R. Nelson, G. Silverberg and L. Soete (eds.) *Technical change and economic theory*. Pinter, London, UK, pp. 38-66.
- Geels, F.W., 2002. Technological transitions as evolutionary reconfiguration processes a multi-level perspective and a case-study. *Research Policy*, 31(8-9): 1257-1274.
- Grin, J., 2008. The multi-level perspective and the design of system innovations. In: Van den Bergh, J.C.J.M. and F. Bruinsma (eds.) *Managing the transition to renewable energy: theory and macro-regional practice*, Edward Elgar Publishing, Cheltenham, UK, pp. 47-80.
- Grin, J. and A. van Staveren, 2007. *Werken aan systeeminnovaties, lessen uit de praktijk van InnovatieNetwerk*. Van Gorcum, Assen, the Netherlands, 264 pp.
- Grin, J., F. Felix, B. Bos and S. Spoelstra, 2004. Practices for reflexive design: lessons from a Dutch programme on sustainable agriculture. *International Journal of Foresight and Innovation Policy*, 1(1): 126-149.
- Grin, J. and H. van De Graaf, 1996. Technology assessment as learning. *Science Technology Human Values*, 21(1): 72-99.

- Hoes, A.-C., 2011. Inside the black box of agricultural innovation projects. Exploring the interactions between farmers, greenhouses, scientists, pigs & neighbours. Uitgeverij Boxpress, Oisterwijk, the Netherlands, 215 pp.
- Hoes, A.C., V. Beekman, B.J. Regeer, J.F.G. Bunders, 2012. Unravelling the dynamics of adopting novel technologies: an account of how the closed greenhouse opened-up. *International Journal of Foresight and Innovation Policy*, 8(1): 37-59.
- Hoes, A.-C. and B.J. Regeer, 2011. Adoption of new land use facilities in a normative diverse society: exploring the new mixed farm case. *Journal of Environmental Policy and Planning*, 9(3-4): 333-350.
- Huber, J., 2000. Towards industrial ecology: sustainable development as a concept of ecological modernization. *Journal of Environmental Policy and Planning*, 2(4): 269-285.
- Kemp, R., and J. Rotmans, 2004. Managing the transition to sustainable mobility, In: Elzen, B., F. Geels and K. Green (eds.) *System innovation and the transition to sustainability: theory, evidence and policy*. Edgar Elgar, Cheltenham, UK, pp. 137-167.
- Kingdon, J. W., 1984. *Agendas, alternatives, and public policies*. HarperCollins, New York, NY, USA, 280 pp.
- Loorbach, D., 2007. *Transition management, new mode of governance for sustainable development*. Erasmus International Books, Utrecht, the Netherlands, 327 pp.
- Meijer, I., 2008. Uncertainty and entrepreneurial action. The role of uncertainty in the development of emerging energy technologies. A-D Druk, Zeist, the Netherlands, 220 pp.
- Mommaas, H and R. Eweg, 2010. Organizing innovations and transitions. In: Van Latesteijn, H. and K. Andeweg (eds.) *Toward a more sustainable fit between innovation strategies and the institutional environment*. Springer, Dordrecht, the Netherlands, pp. 41-58.
- Oudshoorn, N., E. Rommes and M. Stienstra, 2004. Configuring the user as everybody: gender and design cultures in information and communication technologies. *Science, Technology and Human Values*, 29(1): 30-63.
- Peterson, C. and Mager, S., 2010. From motivating assumptions to a practical innovation model. In: Van Latesteijn, H. and K. Andeweg (eds.) *Toward a more sustainable fit between innovation strategies and the institutional environment*. Springer, Dordrecht, the Netherlands, pp. 97-130.
- Regeer, B.J., 2009. Making the invisible visible: analysing the development of strategies and changes in knowledge production to deal with persistent problems in sustainable development. Uitgeverij Boxpress, Oisterwijk, the Netherlands, 267 pp.
- Regeer, B., A.-C. Hoes, M.V. Amstel-Van Saane, F. Caron-Flinterman and J.F.G. Bunders, 2009. Six guiding principles for monitoring and evaluating mode-2 strategies for sustainable development. *American Journal of Evaluation*, 30(4): 515-537.
- Robinson, D.K.R., M. Ruivenkamp and A. Rip, 2007. Tracking the evolution of new and emerging S and T via statement linkages: vision assessment in molecular machines. *Scientometrics*, 70(3): 831-858.
- Roelofsen, A., 2011. Exploring the future of ecogenomics, constructive technology assessment and emerging technologies. Uitgeverij Boxpress, Oisterwijk, the Netherlands, 217 pp.
- Rogers, E. M., 2003. *Diffusion of innovations* (5th ed.). Free Press, New York, NY, USA, 512 pp.
- Schot, J. and F.W. Geels, 2008. Strategic niche management and sustainable innovation journeys: Theory, findings, research agenda, and policy. *Technology Analysis and Strategic Management*, 20(5): 537-554.
- Schumpeter, J., 1982. *The theory of economic development: an inquiry into profits, capital, credit, interest, and the business cycle*. Transaction Publishers, UK, 244 pp.
- Smeets, P.J.A.M., 2011. Expedition agroparks. Research by design into sustainable development and agriculture in the network society. Wageningen Academic Publisher, the Netherlands, 320 pp.
- Strauss, A. and J. Corbin, 1990. *Basics of qualitative research: Grounded theory procedures and techniques*. Sage, Newbury Park, USA, 312 pp.
- Termeer, C.J.A.M., M. van Lieshout, G.E. Breeman and W.D. Pot, 2009. Politieke besluitvorming over het Landbouwontwikkelingsgebied Witveldweg in de Gemeente Horst aan de Maas. Research Report Wageningen University Public Administration and Policy Group. Available at: <http://library.wur.nl/WebQuery/wurpubs/lang/383549>.
- Timmer, F., M. Gijzen, J. Dagevos and F. Boekema, 2007. Kanaalzone: Broedplaats van de biobased economy. Faculteit der Management-wetenschappen. Sectie Geografie, Planologie and Milieu. Radboud Universiteit, Nijmegen. Available at: <http://www.transforum.nl/projecten/innovatieve-praktijkprojecten/item/41-biopark-gent-terneuzen>.
- Van Altvorst, A., H. van Latesteijn, L. Spaans, R. Eweg and S. Mager, 2010. Duurzaam agrarisch ondernemen. Het stedelijk gebied als motor voor nieuwe bedrijvigheid. De zes gedaanten van de succesvolle agrarische ondernemer toegelicht aan de hand van negen projecten. Drukkerij Groen, Hoofddorp, the Netherlands, 178 pp.
- Van der Helm, R., 2009. The vision phenomenon: towards a theoretical underpinning of visions of the future and the process of envisioning. *Futures*, 41(2): 96-104.
- Van Gendt, S., G. de Groot and C. Boendermaker, 2003. Globaal Businessplan van een Agro-center. InnovatieNetwerk Groene Ruimte en Agrocluster, Den Haag. Available at: <http://www.innovatienetwerk.org/sitemanager/downloadattachment.php?id=3laSk ZTuaTHK1pq7Abofzl>.
- Van Latesteijn, H. and K. Andeweg (eds.), 2010. *Toward a more sustainable fit between innovation strategies and the institutional environment*. Springer, Dordrecht, the Netherlands. 41-58 pp.

- Van Mierlo, B., B.J. Regeer, M. van Amstel, M. Arkesteijn, V. Beekman, J.G.F. Bunders, J.T. de Cock Buning, B. Elzen, A.-C. Hoes, C. Leeuwis, 2010. Reflexieve monitoring in actie. Handvatten voor de monitoring van systeeminnovatieprojecten. Boxpress, Oisterwijk, the Netherlands. 104 pp.
- Veldkamp, A., A.C. van Altvorst, R. Eweg, E. Jacobsen, A. van Kleef, H. van Latesteijn, S. Mager, H. Mommaas, P.J.A.M. Smeets, L. Spaans and J.C.M. van Trijp, 2009. Triggering transitions towards sustainable development of the Dutch agricultural sector: TransForum's approach. *Agronomy for Sustainable Development*, 29(1): 87-96.
- Wijnands, F. and J. Vogelesang, 2009. Two complementary transition pathways: supporting strategies for innovation towards sustainable development in Dutch agriculture. In: Poppe, K., C. Termeer and M. Slingerland (eds.) *Transitions towards sustainable agriculture and food chains in peri-urban areas*. Wageningen Academic Publishers, Wageningen, the Netherlands, pp. 201-217.
- Yin, R., 2009. *Case study research: Design and methods*. Sage, Los Angeles, CA, USA, 219 pp.