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Visions on the Future and Prototypes
The Agropark Case

In chapter 1 we described that, since the beginning of this century, the Dutch agricultural policy focuses on changing the agricultural sector into a more sustainable sector. To realise such change, the Dutch government motivates actors within the agricultural sector to develop and implement novelties (i.e. new technologies, processes or products) in which sustainable features are inscribed. The idea is that the local implementation of such ‘sustainable’ novelties may trigger a cascade of change throughout the sector as such contributing to agricultural system innovation. However, technology studies and (system) innovation theory tells us that the development and implementation of novelties are dynamic (i.e. multi-directional) and thereby inherently uncertain processes. This raises questions such as; what happens to inscribed values over time in the development and implementation process of prototypes? And; which actors are involved? What role do they play? And which dynamics hamper and support the development and implementation of prototypes?

In this chapter\(^2\) we look into the interactions of actors who aimed to develop and implement a prototype of the novelty Agropark to provide further understanding into the process of prototyping. As such we address the following question in this chapter: What do the interactions of actants in innovation projects during prototyping disclose about the dynamics of shaping novelties? (i.e. research question 1.a table 1.1 page 33). This chapter is structured in the following way; first we explore two types of strategies that can be adopted for the development of novelties, namely; shaping visions of the future and supporting entrepreneurship (section 2.1). Next we elaborate on the theoretical principles behind these policies (2.2 section) and identify that the relationship between visioning on the one hand and entrepreneurship initiatives on the other hand is not well understood and requires more in-depth exploration. Section 2.3 clarifies the applied case study approach and in section 2.4 and 2.5 we investigate an Agropark visioning initiative and four Agropark innovation projects. Subsequently

\(^2\) A previous version of this chapter is in review as: Hoes, A.C, Regeer, B.J. and Zweekhorst, M.B.M. (In review) Sustainable Development of Agriculture: Exploring the relation between future visions and bottom-up entrepreneurship in the Agropark case. In: *Journal of Chain and Network Science*. 

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we compare these studied cases in section 2.6 to provide further understanding in how visions on the future influence innovation projects and which innovation strategies actors adopt to ensure both high levels of ambition and high degrees of commitment towards novelties. In the conclusion of this chapter (section 2.7) we relate the findings of this chapter to the research questions that we posed in chapter 1 corresponding to the phase of developing a prototype.

2.1 Introduction

Wijnands and Vogezezang (2009) note that the Dutch government adopted two types of strategies, on niche level, to trigger agricultural system innovations. The first type of strategy aims to stimulate agricultural system innovations by developing visions on a sustainable future. The second type of strategy supports agricultural system innovations by assisting innovators who develop and implement specific novelties (i.e. new products, processes and technologies).

Wijnands and Vogezezang (2009) participated in the development of visions and scenario’s for the future as well as in concrete innovative bottom-up entrepreneurial projects. They refer to these two types of strategies as two complementary transition pathways: pathway 1 follows a route from future to practice; pathway 2 follows a route from practice to future. These pathways can also be recognised in the agricultural system innovation approaches that are introduced in chapter 1 of this thesis. Transition management focuses primarily on pathway 1 as it emphasises the importance of the development of visions on the future in the policy domain in order to trigger system innovations. Strategic niche management, on the other hand, advocates pathway 2 and stresses the value of concrete demonstration projects. Wijnands and Vogezezang (2009) formulate the hypothesis that interaction between these two different pathways is important when aiming to achieve a more sustainable agricultural sector. They note, however, that the subject of how interactions occur in practice is not sufficiently studied. We recognise that system innovation studies pay little attention to the relation between visions of the future initiatives and entrepreneurship.

In this chapter we explore an initiative to develop a vision on the future of agriculture called ‘Agropark’ and the experiences of four Agropark innovation projects to gain further understanding in how visions on the future influence innovation projects in the context of agricultural system innovation developments. We are not suggesting that Agropark innovation projects relate to the pathway 2.
Pathway 2 project are bottom up initiatives whereas innovation projects can both be top-down and bottom-up initiatives.

2.2 Visioning Initiatives and Bottom-up Entrepreneurship

In the context of agricultural system innovations, the purpose and approach of formulating visions on the future on the one hand and designing concrete entrepreneurial projects on the other differ. The visioning initiatives undertaken in this context 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. Or, as Roelofsen summarises in her literature overview, such visions are ‘seen as generative in guiding actions, mobilising resources, and bridging between actor communities and organizational boundaries’ (2011, p.15, referring to Borup, et al. 2006; Robinson, et al. 2007).

Approaches building on visions on the future, such as sustainable technology development (STD: Aarts, 1998), interactive technology assessment (Grin and 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. They argue (Oudshoorn et al., 2004) that the I-methodology results in designs that inadequately address the variety of needs and desires of users, consumers and other stakeholders.

The Wijnands and Vogelezang (2009) study provides a case description of how they executed a pathway 1 initiative. First, 50 stakeholders were interviewed to obtain their views on agricultural problems, desirable directions and preferences. Secondly, workshops were organised to construct shared visions which were consolidated in artist impressions. Thirdly, obstacles were identified that hinder the realisation of this target vision through back casting. And fourthly, activities were initiated to tackle these barriers.

Other studies (Collingridge, 1981; Roelofsen, 2011) indicate that it is quite a challenge to develop broadly shared visions on the future. Recruiting participants (e.g. farmers) for the formulation of such visions is difficult as they do ‘not see a
short-term relevance for their own work’ (Roelofsen, et al., 2010, p.177). Several scholars within the field of science and technology question the underlying assumption that futuristic visions can motivate actors to change their ‘business as usual’. Williams (2006) criticises the determinate and imminent tone of many foresight studies. Brown, Rappert and Webster (2000) argue that the key problems with futuristic visions are that they are dominated by scenarios requiring new technologies and that they lack the voices and overlook the interests of the key actors.

Strategic niche management (SNM) scholars (Schot and Geels, 2008) also question to which extent visioning initiatives actually influence innovations in practice. They (Schot and Geels, 2008, p.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’”.

Wijnands and Vogelezang (2009) are less critical of future vision initiatives but do address a tension: when such visions are too radical (futuristic) they undermine support for further action. They suggest constructing more tangible visions by, for example, creating a regional perspective. Strategic niche management scholars, on the other hand, stress; “the importance of ‘hands-on’, real-life experiences in demonstration projects” (Schot and Geels, 2008, p.542). Wijnands and Vogelezang (2009) respond to this by noting that visions on the future are ‘not a blueprint for the future’ (Wijnands and Vogelezang, 2009, p.206). Rather, they provide images of a future with a broad support base, which can influence the direction of research and innovation. Thus, in system innovation research an ongoing debate is going on as to what precisely is gained with visioning initiatives and how they relate to practical change.

The second pathway (i.e. supporting entrepreneurship) aims to trigger agricultural system innovations by supporting entrepreneurs that aspire to innovate. Rogers (2003) articulates the reasoning behind this policy rather straightforwardly by stating that entrepreneurs ‘play a gate keeping role in the flow of new ideas into a social system’ (Rogers, 2003, p. 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 (1911). He argued that
entrepreneurs introduce ‘new combinations’ that create a new economic equilibrium (Schumpeter, 1911).

Wijnands and Vogelezang (2009) indicate that for the second pathway to work, networks of either pioneering entrepreneurs or early adopters should be organised to stimulate the implementation of more sustainable alternatives to current practices and to channel and cultivate a communal quest for change. Innovations that are considered to have the potential to trigger 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 pathway 2 is that pioneering entrepreneurs in the Agricultural sector do indeed need outside support when they develop and implement innovations. Without it, system 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. In their study, Wijnands and Vogelezang (2009, p.214) bring up this issue by stating that “high investments level and uncertain results are not an attractive proposition”.

Moreover, as farmers typically apply incremental bit-by-bit innovation strategies (Driessen, 2010) it can be anticipated that farmers will have the tendency to minimise the risk and investments needed, thereby minimising the value (i.e. ambition) of the innovation as well. From this contemplation a key dilemma for the second pathway emerges; how to stimulate commitment while at the same time maintaining high levels of ambition? In this chapter we will investigate how this tension played out in four Agropark innovation projects. More specifically, we investigate which specific types of innovation strategies actors within the four innovation project applied to ensure both high levels of ambition and high degrees of commitment towards the implementation of an Agropark.

2.3 Methodology: Exploring the Agropark Case

As indicated in chapter 1 of this thesis, we applied a multiple case study approach in which we focus on the interaction between actors and novelties in innovation projects. In this chapter this will lead to further understanding of 1) the relation between future visions and innovation projects, and 2) strategies for developing ambitious prototypes that will actually be implemented by entrepreneurs. It needs
to be noted that the studied projects differ, to some degree, from the description of the first and second pathway projects (Wijnands and Vogelezang, 2009). Innovation projects can both be developed from the top down (pathway 1) and from the bottom-up (pathway 2). In the studied projects not only pioneering entrepreneurs (i.e. prototypers) participated but also researchers, civil servants and actors from other domains. In addition, work was done on the development of local visions of prototypes and on the implementation of prototypes of novelties, as this was part of the innovation projects’ brief. In this chapter we use the phrase local vision to refer to feasible designs of prototypes of potential novelties (i.e. new products, processes, and technologies).

**Agroparks** were selected as case studies to provide further our understanding into these issues as **Agroparks** appear in both visioning initiatives and in innovation projects. 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 chapter 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.

The author of the present thesis was the appointed monitor of three Agropark innovation projects. As such the empirical data from case B, C and D were obtained through observation, interviews and participation (for detailed account of data collection see table 1.2). 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 et al., 2000; de Wilt and Dobbelaar, 2005), while secondary analyses were performed on documented Agropark cases (Grin and van Staveren, 2007; Horlings & Hinssen, 2010; Smeets, 2009; van Gendt et al., 2003; Termeer, Breeman, Leshout & Pot, 2009). As the first author of this chapter joined the Agropark network in 2006, the above documentations were especially needed to gain empirical insight in: (i) the
historical origin of Agroparks; (ii) the Dutch visioning initiative of Agroparks, and; (iii) the innovation projects Agrocentrum Westpoort (i.e. case A).

We used the empirical data of each of the four Agropark innovation projects to gain understanding of how the vision on the future of Agroparks influenced the development and implementation of Agroparks in practice and to gain insight into the specific innovation strategies applied by the innovation projects. These insights were obtained by answering the following questions: (i) who were the participants and stakeholders involved in the project?; (ii) which Agropark ambitions were inscribed onto the specific Agropark that the innovation project proposed?; and (iii) 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: (iv) To which extent were participating entrepreneurs willing to invest in the development and implementation of the Agropark?

2.4 The Agropark Cases

It is difficult, and maybe even undoable, to pinpoint a specific date of birth of a novelty. We chose as a starting point for the novelty 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 2.1 (on the next page) 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 in (2009).
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**Text box 2.1: 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 (2009) describes Agroparks as: ‘a spatial cluster of agrofunctions 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’ (2009, p.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 (d) 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, 2009).

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.

**Agroparks – a Vision**

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, p. 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).

An artist impression of Deltapark shows a huge silver coloured infrastructural complex with a size of 1,000 by 400 by 20 meters (Smeets, 2009). 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 CO\textsubscript{2} 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, 2009).

Public Opinion

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 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, 2009). 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
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‘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 fiercely antagonistic public response was not anticipated by the designers (Smeets, 2009).

2.5 Agropark Innovation Projects

Through the following years, the Agropark concept appeared in at least seven innovation projects. The following four Agropark innovation projects were located in the Netherlands: Agrocentrum Westpoort, New Mixed Farm, Biopark Terneuzen, and C2C Agropark Flevoland.

Below we explore these four innovation projects by answering the following study questions: (i) who were the involved project participants and stakeholders? (ii) Which Agropark ambitions were inscribed onto the specific Agropark that the innovation project proposed? (iii) Which specific opportunities and tensions played a crucial role in the continuation of the project? And to assess the level of commitment we pose the question: (iv) to which extent were participating entrepreneurs willing to invest in the development and implementation of the Agropark?

Subsequently, we compare the four innovation projects cases in section 2.6 to gain further understanding of the relationship between visions on the future and innovation projects and to distil innovation strategies which ensure both a high level of ambition and a high degree of commitment towards the implementation of a specific Agropark.

Again we want to note that it is difficult, and maybe even undoable, to pinpoint a specific date of origin of innovation projects. Ideas and proposals for specific types of change usually float around for years in different guises and different networks. Recognising that innovation projects have a rich history, we decided to not include these descriptions in the cases as our questions do not focus on the topic of origin of innovation projects.

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, such as seen in public aquaria, in the pig stables. 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, 2009).

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 Agro parks. Local politicians and civil servants were disinterested in Agrocentrum Westpoort; Smeets (2009) 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 Agropark 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 Agropark 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. (For more information see chapter 4.)

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 started 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. Hoes and Regeer (in review) extensively
discuss the New Mixed Farm case in relation to public acceptance in chapter 4.

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 boars taint. The choice not to castrate can be considered daring 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 chapter New Mixed Farm was applying for local permits.

Case C: Biopark Terneuzen Project

In 2006, TransForum, Zeeland Seaport, and Van de Bunt Consultants initiated the innovation project Biopark Terneuzen. Other project participants were the Municipality of Terneuzen, the Province of Zeeland and the industrial companies Yara (a chemical fertiliser plant), Nedalco (a bio-ethanol plant), 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 since the province of Zeeland was facing economic decline. 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), CO$_2$ inputs from a chemical fertiliser plant (Yara) and a bio-ethanol plant (Nedalco), 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 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 CO$_2$ streams from the neighbouring industries. Zeeland Seaport decided not to agree and formulated the condition that settling growers had to acquire their heat and CO$_2$ 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 chapter 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.

2.6 Comparing the Four Agropark Innovation Projects

Relation Between Visions of the Future and Innovation Projects

In the introduction of this chapter we questioned how visions on the future influence innovation projects during the phase of prototyping. The analysis of four Agropark innovation projects shows that published visions on the future influence the development and implementation of prototypes in both positive and negative ways.

Our case studies strengthen the notion that visions are valuable as they assist in niche formation (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 (i.e. momentum) is created that favours the adoption of a proposal on policy agendas (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 Deltapark concept encountered fierce public resistance. Apparently more is needed for wide social acceptance. We will elaborate on this issue in chapter 4. 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 prototypes 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 prototype design phase, the ambitions inscribed into the New Mixed Farm concept got increasingly diluted, as the local vision of the prototypes 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 vision of the prototype. 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 bold statement 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 shows that when an articulated vision on the future triggers public resistance, this hampers the development and implementation of concrete and locally adapted prototypes. 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 prototypes 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 prototype of New Mixed Farm 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.

**Innovation Strategies**

As each Agropark innovation project experimented with the development and implementation of an Agropark prototype, 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 prototype of the novelty 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 a prototype 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*.

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 of a prototype 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 of a prototype 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 of a prototype 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 a prototype. The New Mixed Farm project may serve to demonstrate that the departure of participants who are not willing to invest, tough painful, can have a positive effect on the commitment to the prototype 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 prototypes on the other. Therefore, these two types of projects should be managed differently.

Moreover, developing a local vision of a prototype 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 prototype.

Furthermore, the local vision of the New Mixed Farm prototype 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 prototype 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 prototype. The resulting local vision of a prototype 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 prototype, 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 \textit{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. It remains, therefore, questionable whether C2C Agropark Flevoland will eventually fulfil the ambition of regionally interconnecting the input and output streams of farms.

Table 2.1 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. As agricultural system 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 2.1: Overview of the four innovation strategies.

<table>
<thead>
<tr>
<th>Innovation Strategy</th>
<th>Industrial investment in future vision</th>
<th>Small-scale mutual adjustment</th>
<th>Industrial local branding</th>
<th>Regional connection</th>
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</thead>
<tbody>
<tr>
<td>Opportunities</td>
<td>- High ambition</td>
<td>- High commitment</td>
<td>- High commitment</td>
<td>- Many entrepre-</td>
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<td></td>
<td>- Access to resources</td>
<td>- Feasible local vision</td>
<td>- Feasible local vision</td>
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<tr>
<td></td>
<td>- Big leaps forward in wider transition</td>
<td>- Access to resources</td>
<td>- Access to resources</td>
<td>ticipate</td>
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<tr>
<td>Tensions</td>
<td>- Low commitment</td>
<td>- Incremental steps</td>
<td>- Farmers not commit-</td>
<td>- Inadequate</td>
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<tr>
<td></td>
<td>- Too futuristic</td>
<td>- Low resources</td>
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<td></td>
<td>- High opposition</td>
<td>- Protest against</td>
<td>- Minimal</td>
<td>ownership</td>
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<td>construction farms</td>
<td>integration of</td>
<td>- Incremental</td>
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<td>agricultural functions</td>
<td>step</td>
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<td>Lessons Learned</td>
<td>Address issues</td>
<td>Invest in communication</td>
<td>Involve users</td>
<td>Develop commit-</td>
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<td>of commitment</td>
<td>with community</td>
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<td>of participating</td>
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<td>tion trajectory</td>
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<td></td>
<td>actors</td>
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<td>which align with</td>
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<tr>
<td>Example</td>
<td>Agricentre Amsterdam</td>
<td>New Mixed Farm</td>
<td>Biopark Terneuzen</td>
<td>C2C Agropark</td>
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<td>Flevoland</td>
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</table>
2.7 Conclusion

So, which insights does the case study on an Agropark visioning initiative and four Agropark innovation projects provide on the theoretical understanding on the development and implementation of prototypes of novelties? In this section we address research question 1.a that we posed in chapter 1: What do the interactions of actants in innovation projects during prototyping disclose about the dynamics of shaping novelties?

The study that is presented in this chapter shows that novelties are dynamic during the phase of developing and implementing prototypes. Visions of future novelties differ to corresponding local visions of prototypes and to real-life manifestation of prototypes of novelties. Moreover, real-life manifestations of specific novelties do not necessarily fully correspond to each other. The analysis of four Agropark innovation projects illustrates that four specific shapes (i.e. four prototypes) of Agroparks emerged. Thus, a novelty is not static but changes over time.

The dynamic nature of novelties is a result of the occurrence of contextualisation. Contextualisation refers to the tailoring of novelties to specific contexts. In each of the studied Agropark innovation projects tangible local visions of prototypes were developed which suited local conditions and addressed the needs and preferences of participating actors.

Furthermore, we recognize that contextualisation may result in the de-scripting of valuable features that were initially in-scripted into the future vision. Our study shows that stakeholders and specific project participants play an important role in safeguarding valuable features to the novelty during the development and implementation phase. Moreover, actors within the broad network can inspire innovation project participants to add new valuable features during contextualisation.

Last we want to note that in chapter 1 we argued that a prototype is the first real-life manifestation of a novelty. From this thread of argumentation one could conclude that only Biopark Terneuzen is as an actual prototype. We recognise this inconsistency. Nonetheless we consider it fitting to refer to all four Agropark initiatives as prototypes as they differ in such a great manner that each Agropark
Chapter 2

initiative could not benefit much from the experiences of the priorly implemented Agropark.

This chapter looked at the development and implementation of the novelty Agropark. As such the analysis focussed less on the interaction of actors in innovation projects during the phase of developing a prototype. The next chapter (chapter 3) provides further understanding into the topic of interaction between actors within innovation projects during novelty development by comparing inter-institutional collaboration and learning between entrepreneurs and researchers within three innovation projects. In addition, the current chapter illustrates that efforts to implement a prototype of a novelty can run into public resistance. The topic of social acceptance of novelties will be explored in chapter 4 by further describing and analysing the New Mixed Farm case.