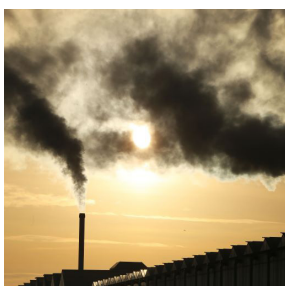
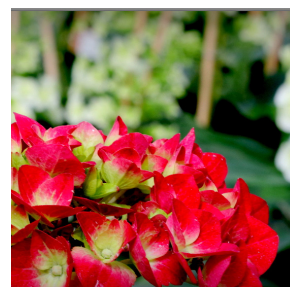
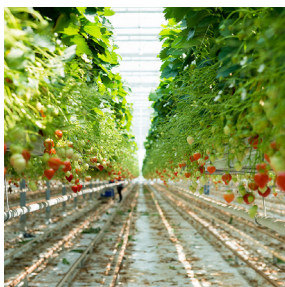


The multiple dimensions of greenhouse clusters in The Netherlands

Martijn Barendse





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MSc Thesis Land Use Planning

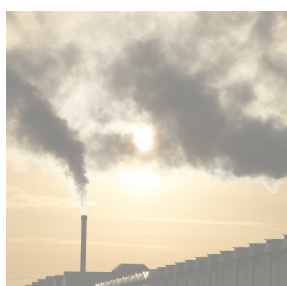
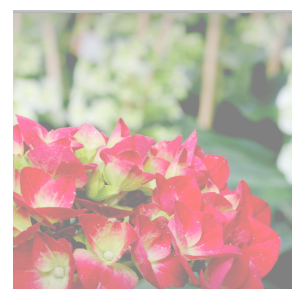
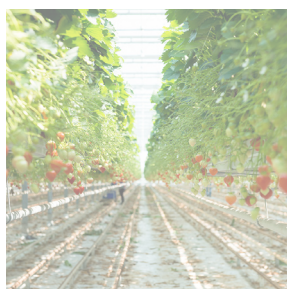
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Preface

As being grown-up in greenhouse area Westland, greenhouses are a familiar appearance in the landscape for me. Due to my side jobs and my interest in the horticultural sector, I made myself familiar with the ins and outs of the sector. The future perspective for my home region and the spread of greenhouse companies through the country have always been fascinating me. Performing a research in greenhouse planning was therefore logical step to take.

This research has been accomplished under supervision of Gerrit-Jan Carsjens. His capability to always give me a positive feeling and good motivation after our supervision meetings, helped me to finish this research. I would like to thank him for giving me the structure I needed to fulfil a scientific research and for showing me his interest in the research topic.

I would like to thank all the interviewees for taking time to exchange information and to share their view of the greenhouse development with me. Their contribution has been very important for the realisation of this thesis research and the interesting insights have certainly contributed to the outcomes.

Furthermore, I would like to thank my friends from 'JC Stratos' for keeping me motivated during the countless lunches and for being there to celebrate important milestones with me. My fellow students, who were working in the Gaia building, celebrating 'Koffietijd' every day, also earn a mention. Special thanks are going to Wouter and my parents for providing me a car to visit the polder of North Holland to conduct interviews.

I hope you enjoy reading this report,

Martijn Barendse

Wageningen, 2017

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Abstract

The horticultural sector in the Netherlands is spatially concentrated in clusters. While some of these new clusters are developing successfully, others are stagnating. The objective of this research is to identify the characteristics of greenhouse clusters that explain the differences in development of greenhouse clusters in the Netherlands, with special emphasis on those characteristics that can be addressed by land use planning. The research takes the multidimensional approach developed by Bathelt (2005a) as analytical framework. The multidimensional approach is based on the concept of a cluster as a coherence of five dimensions, which need to be analysed separately: the horizontal, vertical, institutional, power and external dimension. Two greenhouse clusters were selected as a case study, the rapidly growing cluster Agriport in the northwest of the Netherlands and the stagnating cluster Bergerden in the east of the Netherlands. The main research methods were document study and interviews with policymakers and greenhouse growers in both areas. This thesis research presents and discusses the results of the assessment and comparison of the two Dutch greenhouse clusters. The results aim to support land use policy and planning of horticultural clusters.

Keywords: land use planning, horticulture, clusters, multidimensional approach, the Netherlands, Agriport, Bergerden

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Summary

The horticultural sector in the Netherlands is spatially concentrated in clusters, which emerged because of several advantages, such as increased transport efficiency and concentration of knowledge supporting innovation. Due to the lack of expansion opportunities in the existing greenhouse clusters, the Dutch government assigned several new locations for greenhouse development in different parts of the country. While some of these new clusters are developing successfully, others are stagnating. The objective of this research is to identify the characteristics of greenhouse clusters that explain the differences in development of greenhouse clusters in the Netherlands, with special emphasis on those characteristics that can be addressed by land use planning. The results aim to support land use policy and planning of horticultural clusters.

Which characteristics of the Dutch greenhouse clusters explain why some greenhouse clusters grow, while others stagnate over time and which of these characteristics can be improved by spatial planning?

The research takes the multidimensional approach developed by Bathelt (2005a) as analytical framework. The multidimensional approach is based on the concept of a cluster as a coherence of five dimensions, which need to be analysed separately: the horizontal, vertical, institutional, power and external dimension. The vertical dimension consist of complementary firms, which are all part of a chain. Understanding the vertical dimension gives insight in how an established cluster can continue to grow. The horizontal dimension is composed of relations between comparable companies, which are competitors in the chain. The institutional dimension is important for the insurance of growth and knowledge in the future. The power dimension is formed by power relations that have impact on the region's horizontal and vertical relations. These four dimensions are stimulated by spatial proximity between the different actors in the network. The external dimension, however, is a different kind of dimension, based on the assumption that clusters do not exist without connections to markets and knowledge pools outside the cluster itself.

Two greenhouse clusters were selected as a case study, the rapidly growing cluster Agriport in the northwest of the Netherlands and the stagnating cluster Bergerden in the east of the Netherlands. The main research methods were document study and interviews with policymakers and greenhouse growers in both areas. Furthermore, an field analysis of satellite images is done to create an overview of the spatial characteristics of the areas and its historical development.

Comparing the results of the studies in Agriport and Bergerden, differences in the characteristics are found. The collaboration among direct competitors in Agriport is seen as constructive and is on a large scale. The energy cooperative ECW is professionally executing an important part of these collaborations. The Municipality of Hollands Kroon is taking a facilitating role and says not to be initiating. The land use plan is developed in cooperation between the municipality and developer Agriport A7 and is designated with the desires from the market in mind. Besides that, it seems that the growers of Agriport have better connections with the traditional greenhouse clusters in the Netherlands than Bergerden. Entrepreneurs in Agriport are trying to strengthen the external contacts by themselves. Furthermore, the documents of Agriport highlight the existing societal support for the development of the greenhouse cluster. However, in Bergerden, it seems

that horizontal collaboration is not optimised. There are pleas for strengthening of the collaboration, from both governmental and private parties. The role of the Municipality of Lingewaard is pro-active in stimulating, facilitating, initiating and investing. The government assigned the locations for the development of greenhouses and consultation of private actors in the designation phase of the land use plan is not crossing the interviews. Companies in Bergerden do not explicitly mention to have very intensive contacts with external companies, but the government is initiating the development of external connections. Governmental documents indicate that societal support still has to be enlarged.

For Agriport, the most important actors are the Municipality of Hollands Kroon, the property developer Agriport A7, energy cooperative ECW, the Province of North Holland, Greenport NHN and nine greenhouse companies. For Bergerden, the most important actors are the Municipality of Lingewaard, the Province of Gelderland and thirteen greenhouse companies. Most remarkable difference is the fact the cluster Agriport has a private company, which actively facilitates the development of the greenhouse cluster.

In Agriport, the growers have set clear reasons to work together. In Bergerden, the reasons behind the horizontal collaboration seem to be more on the background. When the reasons for collaboration are set by the collaborating actors themselves, the collaboration could probably become stronger. For optimal collaboration between institutions and the greenhouse companies in the area, it seems that there should be an agreement about the role of the local government. When there is an agreement about the role to be taken by the growers and the government, it is easier to implement measures, instruments and regulations that are demand-driven and in line with the desires of the greenhouse growers. The constructive collaboration between public and private actors in Agriport led to the joint designation of the first land use plan for Agriport. When the land use plan is not able to facilitate the desires from the market mechanism, this could be seen as a weakness from the perspective of the greenhouse cluster. Besides the internal collaboration, the greenhouse companies in Agriport all have connections with the traditional cluster Westland. In Bergerden, the external connections are weaker, which means that the external sources of knowledge are limited. The awareness of the importance of external connections could probably grow for the stimulation of the cluster. Local government can probably carry out this awareness to the established growers. When there is a mismatch of the interpretation of the need for measures between the municipality and the growers, the municipal government and the established growers should together come closer to each other in terms of what are the necessary measures that have to be taken to support growth of the area. When the municipal government is giving the growers active participation in drawing up an agenda, participation of growers in the stimulation measures for the greenhouse area is probably growing. The municipal officers in the less-developed greenhouse clusters could probably fulfil this role and try to search for common interests between municipality, greenhouse growers and other actors before defining and implementing stimulation measures. In the process of creating common interests, the designation of the land use plan can be executed in collaboration with growers that are established and growers that are willing to establish within the area. In this way, the desires of the market can be included in the land use plan. The influence of growers on the content of the land use plan is an advanced form of horizontal

collaboration, which is used to reach common goals for designing the greenhouse area in a desirable way.

This case study research showed that the characteristics of the well-developed greenhouse cluster differ from the characteristics of the less-developed cluster. The analysis of the multiple dimensions provides a basis for area-specific measures. Constructive collaboration between public and private actors provides faster developments and makes it easier to provide growth of the cluster. The growers could be involved in plan-making and could be stimulated to invent measures for the development of the area. Local governments of less-developed greenhouse clusters could strive for a good division of tasks between public and private actors, an inclusion of common interests in the measures for the stimulation of the greenhouse cluster development and a collaboratively designated land use plan to cover the common interests in the development.

1 Introduction

The majority of Dutch greenhouse companies are spatially concentrated in greenhouse clusters. These emerged because of several advantages, such as increased transport efficiency, concentration of knowledge and strong infrastructure (Breukers et al., 2008). Examples of greenhouse clusters in The Netherlands are the traditional clusters Westland-Oostland in the province of South Holland and Aalsmeer in the province of North Holland. Currently, these traditional greenhouse areas are facing lack of expansion opportunities because of urbanisation. Furthermore, the congestion on surrounding infrastructure is disadvantaging for the horticultural sector in international competition (Nijkamp et al., 2010). The location of horticultural clusters near urban areas facilitates advantages of the presence of labour and the proximity of the selling market, but results in a land pressure between urban development and the horticultural sector (Breukers et al., 2008, Korthals Altes and Van Rij, 2013). This competition results in a decrease of horticultural land in the traditional greenhouse clusters. Under pressure of other land uses, in the greenhouse cluster Westland, the land surface of horticultural land decreased with 11% between 2001 and 2006 (Wetzels et al., 2007, CBS, 2007). The National Office for Statistics of The Netherlands (CBS) is mentioning a trend of moving greenhouse companies from the traditional clusters to other regions in the country (CBS, 2007). The continuation of this trend is confirmed by the Rabobank (West, 2012) and Algemeen Dagblad (Lelieveld, 2016).

Despite the decrease of horticultural land in the traditional clusters, the total area of greenhouses in The Netherlands is quite stable (Lelieveld, 2016). While the surface of horticultural land in traditional clusters is decreasing, other locations are developing new greenhouses. Because of the lack of expansion opportunities in the traditional greenhouse areas, the Dutch government assigned several satellite locations (Ministerie van VROM, 2006). In these areas, land is available for the establishment of new greenhouse companies and the expansion of existing companies. These locations are Zuidplaspolder (could be seen as part of Westland-Oostland), Berlikum, Luttelgeest, Californië/Siberië (Venlo), Terneuzen, Bergerden, Emmen, Moerdijkse Hoek, Grootslag and IJsselmuiden. The clustering of diffusively located companies should take place in these new locations as well. The size of the satellite locations will be dependent on the demand for land, which is related to the availability of land in the traditional clusters (Ministerie van VROM, 2006). Berkhout et al. (2011) describe the expansion of the satellite locations as a developing strategy for the position of the Dutch horticultural sector. The traditional greenhouse clusters are areas where a lot of innovation is taking place. Nijkamp et al. (2010) indicate that the satellite locations are appointed for the expansion of production surface. They should according to Nijkamp et al. (2010) function purely as a production location, while other activities as auctions and trade companies, but also knowledge and innovation, remain located in the traditional greenhouse clusters. Apart from these appointed locations, the private initiative Agriport in the Wieringermeer emerged as another greenhouse development area. This area faced a yearly growth of 4,0% between 2008 and 2012, which could be seen in Table 1. Northern North Holland, of which greenhouse area Agriport is part, has even acquired the title of 'greenport' in March 2012, eight years after the allocation of the satellite locations (Agriholland.nl, 2015). On the other hand, the appointed satellite locations were not developing as successful as

expected (Agriholland.nl, 2015, Gelderlander, 2015a, Verheul, 2016b). This could also be derived from Table 1, in which could be seen that the satellite locations do not have a yearly growth. Zuidplaspolder is an exception, because it can profit from the proximity of Westland-Oostland (Visser and de Rooij, 2011). Therefore, it is included in Greenport Westland-Oostland in Table 1, which also explains the growth of this greenhouse area. Breukers et al. (2008) describe several reasons why companies are not moving to the relatively remote satellite locations. Firstly, producers and traders “*consider the proximity of supplying, trading and transporting agribusiness, as well as knowledge, to be a competitive advantage*” (Breukers et al., 2008, p.84). Furthermore, Pannekoek et al. (2005) conclude that the clustering of greenhouse companies leads to more successful innovation. This makes these companies more competitive in comparison with non-clustered companies. Less important, but playing a role, is the fact that horticultural producers often feel emotionally attached to their roots (Breukers et al., 2008). The result of this is that the clustering is still taking place in the traditional – and densely populated – greenhouse areas. The share of Dutch greenhouse surface in the satellite locations decreased from 13% in 2008 to 12% in 2012.

Greenhouse area	2008 (ha)	2012 (ha)	2008 (%)	2012 (%)	Growth per year (%)
Greenport Westland-Oostland	4.128	4.281	41	43	0.9
Greenport Venlo	1.101	1.077	11	11	-0.5
Greenport Aalsmeer	412	356	4	4	-3.6
Agriport	402	471	4	5	4.0
Satellite locations	1.289	1.222	13	12	-1.3
Other greenhouses	2.834	2.554	28	26	-2.6
Total Netherlands	10.166	9.961	100	100	-0.5

Table 1 Change in greenhouse area 2008-2012 (CBS, 2014)

The reasons mentioned by Breukers et al. (2008) and Pannekoek et al. (2005) make that locations are competing in attracting new companies to become a larger cluster. Most important reasons for greenhouse companies to move the company are cost reduction and improvement of efficiency. For cut-flowers and pot plants, the distance to the flower auction and traders is important (Wetzels et al., 2007). Locations which are not developing as successful as expected are trying to attract new growers by offering all parts of the chain from producer to consumer, but also offering renewable and cheap energy and a position for innovation (WeLoveTheCity, 2016). However, in the starting phase of a satellite location, when there are not a lot of production companies established yet, the establishment of chain activities and renewable energy does not emerge easily. Several locations are therefore struggling with the attraction of new companies.

It was the intention of the Dutch Ministry of VROM (Housing, Spatial Planning and the Environment) to create new greenhouse areas in the less-densely populated part of The Netherlands (Ministerie van VROM, 2006). However, it turned out to be difficult for the national government to steer the establishment location for individual entrepreneurs

(Rotteveel and Koeckhoven, 2009). As could be seen in Table 1, the appointed satellite locations do not face growth during the period 2008-2012. Currently, there is no national spatial policy anymore and further development of the satellite locations became the responsibility of local governments. The restructuring of the traditional clusters is stagnating because of lack of financial resources and expensive plot adjustments (Verheul, 2016c). The magazine for vegetable growers is mentioning that growers are only able to expand their businesses in peripheral areas (Verheul, 2016a). However, the provincial and municipal governments of the assigned greenhouse locations face problems with their own regional policies. Among others, the greenhouse clusters Berlikum, Bergerden and Emmen are suffering from problems with the attraction of new companies (Agriholland.nl, 2015, Gelderlander, 2015a, Gelderlander, 2015b), while the clusters Wieringermeer and Terneuzen were able to extensively develop its facilities and has less problems in attracting companies (Agriholland.nl, 2015, Vilt, 2015). It is not clear which factors are important in the attraction of new companies and which characteristics of the greenhouse cluster are influencing the success of the clustering.

Buurma and Ruijs (2011), who earlier investigated the different greenhouse clusters in the Netherlands, state that there is no complete theoretical explanation of the differences in the development of greenhouse areas yet. They made clear that the *“transformation of the agricultural landscape requires a more substantive effort to modify rules and institutions”* (Buurma and Ruijs, 2011, p.111). This thesis research could be seen as a follow-up of the research of Buurma and Ruijs (2011), in trying to deepen the theoretical understanding with the help of the multidimensional approach of Bathelt (2004) as a more in-depth theoretical approach. The characteristics of clusters could be explained by separating the cluster in five different dimensions, which are introduced by Bathelt (2005a). The distinction of the characteristics of economic clusters in a horizontal, vertical, institutional, external and power dimension makes it easier to explain the development of clusters. This so-called multidimensional concept is used by Bathelt in clusters in the media industry (Bathelt, 2005a), but is in this research implemented on greenhouse clusters.

1.1 Problem description

1.1.1 Societal problem

Recently, the Dutch national government decentralised spatial planning to the provincial and municipal governmental levels. That makes that the local governments have more responsibility in Dutch spatial planning (BNA, 2009). The clustering of greenhouses is an issue which was started on national level by assigning satellite locations for development, but now left responsible for the lower levels of government. The local government is given responsibility to a very complex task, which was originally planned from a generalised concept of traditional greenhouse clusters and land for further development in satellite locations. The local government is searching for leads or starting points for the support of the greenhouse cluster development. The cluster development is not equally successful in every greenhouse location. The municipal and provincial governments in the different greenhouse areas are trying to attract companies to establish in the area, but it does not seem to be easy to attract individual companies (Agriholland.nl, 2015, Gelderlander, 2015a, Gelderlander, 2015b). It is not clear why some new clusters are well-developing and others are not. A better understanding of which characteristics explain these differences could give the local government a starting point to develop their land use policy regarding the greenhouse area.

1.1.2 Scientific problem

Buurma and Ruijs (2011) earlier investigated the different greenhouse clusters in the Netherlands and state that there is no complete theoretical explanation of the differences in the development of greenhouse areas yet. They investigated the two greenhouse clusters Agriport and Bergerden and composed an historical reconstruction of the events and the actors that tried to control the transitions. Afterwards, they tried to analyse and explain the developments in both greenhouse areas with the help of six different social theories¹. The first theory is of institutional economics from North and Aoki, which is focusing on the tactical and strategic behaviour of agents. The second theory is from Luhmann and says that social systems are self-reproducing networks of communication. The third theory is from Granovetter and is used to explain the differences between Agriport and Bergerden by the existence of strong and weak ties between actors in the exchange of information and the diffusion of innovation. The fourth theory comes from Weick, who says that *“lack of sound doubt obstructs progress of thought.”* The fifth theory comes from Foucault, who distinguishes four mechanisms: disciplining, subjection, exclusion and evasion. The sixth and last theory is from Benton, which is about the connection between social and biological domains and is used to highlight the climatological advantages of Agriport above Bergerden.

According to Buurma and Ruijs (2011), a more in-depth theoretical explanation is necessary to deepen the understanding of the observed differences. Because the multidimensional approach is unravelling the complexity of clusters, this conceptualisation is used to contribute to an understanding of which characteristics explain the complex development of the Dutch greenhouse clusters. The multidimensional concept is a tool which is introduced to analyse clusters, but is not applied on the greenhouse sector earlier. The application of the multidimensional concept

¹ Buurma and Ruijs (2011) do not properly refer to the scientific articles of these theories in the research report that is published in the bundle of Wageningen Academic Publishers.

on the Dutch greenhouse clusters could give extra scientific casuistic insights in the multidimensional conceptualisation of clusters and give new insights in the added value of the multidimensional concept for the spatial planning of greenhouse clustering. As mentioned in the introduction, the satellite locations for greenhouse clustering are assigned from a top-down level by the Dutch Ministry of Housing, Spatial Planning and the Environment (Ministerie van VROM, 2006). However, top-down approaches of the cluster concept are not sufficient to understand the existence and the emergence of spatial clustering (Bathelt, 2005b). The multidimensional approach is – parallel to the new Dutch spatial planning regime – not approaching from a top-down perspective and could, according to Bathelt (2005a), give a clear understanding of why certain clusters are performing well and others stagnate.

1.2 Objective and research questions

The objective of the research is to identify which characteristics of greenhouse clusters explain the differences in development of greenhouse clusters in The Netherlands, with special emphasis on those characteristics that can be addressed by spatial planning.

1.2.1 Main Research Question

Which characteristics of the Dutch greenhouse clusters explain why some greenhouse clusters grow, while others stagnate over time and which of these characteristics can be improved by spatial planning?

1.2.2 Sub Research Questions

- What are the firms and actors in the greenhouse clusters?
- Which horizontal, vertical, institutional, power and external relationships do exist between the firms and actors in the greenhouse clusters?
- Which characteristics can be influenced by spatial planning in order to improve the development of greenhouse clusters?

1.3 Structure of this thesis

Chapter two contains the theoretical exploration of this research and describes the approach which is used during the thesis research. The methods are described in chapter three. Chapter four and five contain the analysis of the results of the two conducted case studies, which are compared to each other in chapter six. Chapter seven is the discussion, in which the sub research questions are answered and the methods are reflected. Chapter eight is used to answer the main research question and do recommendations.

2 Theoretical exploration: the greenhouse cluster and its multiple dimensions

This chapter describes the theoretical perspective of this research. To investigate which characteristics of a cluster are influencing the success of a greenhouse location, a clear working definition of the cluster is provided. The concept of the cluster is perceived through the theoretical concept of Bathelt (2004), who developed the multidimensional approach for economic network clusters. After describing the multidimensional approach, this chapter elaborates on earlier research in the different dimensions. Several earlier researches are connected to every dimension, to develop a theoretical understanding and to explore the connection between the multiple dimensions and the greenhouse cluster.

2.1 Cluster definition

It is difficult to describe the concept cluster, since there is no generally accepted spatial definition for a cluster. Depending on the perspective which is used for the research, the concept cluster could be defined (Bathelt, 2005b). Weterings (2006), who investigated the economic aspects of the cluster, by analysing the spatial pattern of the Dutch software sector, gives an economic definition of the concept cluster. Weterings (2006) defines the cluster as an ‘agglomeration economy’, which is the economy from which a firm can benefit by being located near one or more other firms. Her research is distinguishing localisation economies and urbanisation economies. In localisation economies, spatial concentration of similar or related firms is the most important principle for emergence of clustering. This is derived from early research of Marshall (1890), who introduced the causes of clustering as labour market pooling, specialisation of suppliers and spill-over of knowledge between firms involved in similar activities (Weterings, 2006). The second variant of an economic cluster, is based on the urbanisation economy. This type of cluster does not owe its existence to a certain sector. Main characteristics of this type of cluster are urban density and size. Because the analysis of the spatial structure of the greenhouse sector is a sector-specific research, the urbanisation economy cluster variant is not relevant for this research. Greenhouse clusters are sector-specific and make use of specified labour markets and knowledge exchange (Pannekoek et al., 2005), and thus typically cope with the characteristics of a localisation economy.

According to Porter (2000b), clusters can exist at all different scale levels but are in principal bundles of interrelated industries within a nation. According to Porter, “[a] cluster is a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities.” (Porter, 2000b, p.254). A cluster cannot be restricted to a certain scale and clusters are easily including actors which are outside the region (Bathelt et al., 2004). Porter’s definition is not including the internal mechanisms which are important for the spatial relationships and boundaries of the cluster (Bathelt, 2005b). These mechanisms seem to be important for analysing the Dutch greenhouse sector and should thus be added to Porter’s definition. The German geographer Bathelt investigated several sectors in Germany, among which the media sector in the cluster around Leipzig (Bathelt, 2004). Bathelt (2005b) is mentioning the lack of clarity in the conceptualisation of clusters. He

supports the regional perspective on clusters, where the term ‘cluster’ represents a local or regional concentration of firms of the same sector and its infrastructure which is interrelated through traded and untraded dependencies (Bathelt, 2004, 2005b). For the analysis of the media cluster of Leipzig, Bathelt (2004) introduced the multidimensional concept of clusters.

2.2 Multiple dimensions of clusters

Bathelt (2005b) argues for a multidimensional conceptualisation of clusters as a tool to *“understand why some clusters continue to grow and reproduce themselves while others stagnate and disappear over time”* (Bathelt, 2005b, p.205). Bathelt (2005b) used the definition of the cluster as a local or regional concentration of companies in a certain sector and their support infrastructure. This definition is closely linked with the definition of Porter (2000b) and the localisation economy of Weterings (2006). Using this definition, the concentrations of firms can be identified by analysing their horizontal, vertical, institutional, external and power dimensions (Bathelt, 2005b). From Porter (2000b) could be added that the geographic scope of the cluster can vary and that mostly end-product and service companies are included. Furthermore, clusters often include specialized infrastructure providers, producers of complementary products and knowledge institutions (Porter, 2000b).

For the analysis of the media cluster of Leipzig, Bathelt (2004) introduced the multidimensional concept of clusters. The concept is based on the cluster as a coherence of dimensions, which could all be analysed separately. The horizontal, vertical, institutional, external and power dimensions were used to identify the characteristics of the Leipzig media cluster and to analyse its genesis and growth (Bathelt, 2004). Bathelt (2004) did this by conducting more than 100 interviews with media firms in the cluster and 20 additional interviews with local planners, policymakers and representatives.

The *horizontal dimension* is composed of relations between comparable companies, which are competitors in the chain. The horizontal dimension is sometimes overlooked, but equally important as the vertical dimension. The rivalry is causing a stimulation of product differentiation and increased efficiency. Firms benefit from co-location by monitoring their direct competitors (Bathelt, 2005a). This continuous, spontaneous observation is also mentioned by Malmberg and Maskell (2002). They are declaring this systematic monitoring with the fact that *“business firms often have remarkably good knowledge of the undertakings of nearby firms”* (Malmberg and Maskell, 2002, p.439). The competition in the horizontal dimension will result in watching, discussing and comparing solutions from everyday practices. In this way, firms have insights in product quality and cost of the production of their competitors and could adjust their own production line to this (Bathelt, 2005a). Maskell (2001) states that the learning advantages in the horizontal dimension are originated from the variation between co-localised firms with similar capabilities. Firms, which are executing the same economic activities by parallel performances, develop a variety of solutions by operating their day-to-day businesses. The firms will engage with this constantly monitoring, since its survival will depend on it. Maskell (2001) is even making the equation with Darwin’s evolution theory, referring to the survival of the most efficient solution due to the firms in the cluster which are – after monitoring their competitors – ‘mutating’ towards the most

efficient solution. This process could take place without any close contact between the companies within the horizontal dimension (Maskell, 2001). The cooperation between competitive companies in the horizontal dimension is defined by Bergman and Feser (1999) as 'cooperative competition'. This cooperation takes place if the competitive position could be maximised by solving problems or exchanging information.

The *vertical dimension* consists of complementary firms, which are all part of a chain. Understanding the vertical dimension gives insight in how an established cluster can continue to grow. Complex innovation issues are taking place in the supplier-producer-user chain and are thus part of the vertical dimension. According to Maskell (2001), the vertical dimension could emerge by the attraction of specialised suppliers and critical customers to the cluster, when the cluster is already well-established. Furthermore, the vertical dimension could arise from firms which will gradually move from the horizontal to the vertical dimension by means of specialisation in a particular part of the chain. This vertical dimension will also enlarge the amount of knowledge within the cluster: "*As the cluster's vertical dimension develops and firms become more specialised, they often find solutions to problems otherwise overlooked and bypassed*" (Maskell, 2001, p.931). Examples of companies in the vertical dimension of the greenhouse cluster are companies regarding handling, marketing, transport, IT services, agronomic counselling, greenhouse constructing, plastics, irrigation, packing, seed development, biological production, machinery and agrochemicals (Aznar-Sánchez and Galdeano-Gómez, 2011).

The *institutional dimension* is important for the insurance of growth and knowledge creation in the future. Collective learning and the creation of norms, rules and habits are supported by the institutional framework of the cluster.

The *power dimension* is formed by power relations that have impact on the region's horizontal and vertical relations. Power in relationships within the cluster can create dominance and hierarchy within the cluster network. Dominance of certain companies can fasten decision-making processes.

The four dimensions mentioned above are stimulated by spatial proximity between the different actors in the network. However, the *external dimension* is a different kind of dimension, which is based on the assumption that clusters do not exist without connections to markets and knowledge pools outside the cluster itself. To support the analysis of the external dimension of clusters, Bathelt et al. (2004) are using the model of external pipelines and local information flows (see figure 1). Spatial proximity is according to their theory beneficial, but it is also dependent on the amount and the quality of external connections. Bathelt et al. (2004) is calling these external connections pipelines. Spatial proximity makes the knowledge from external connections available for all companies on the local level, which means that companies which are co-located could benefit from each other's external connections.

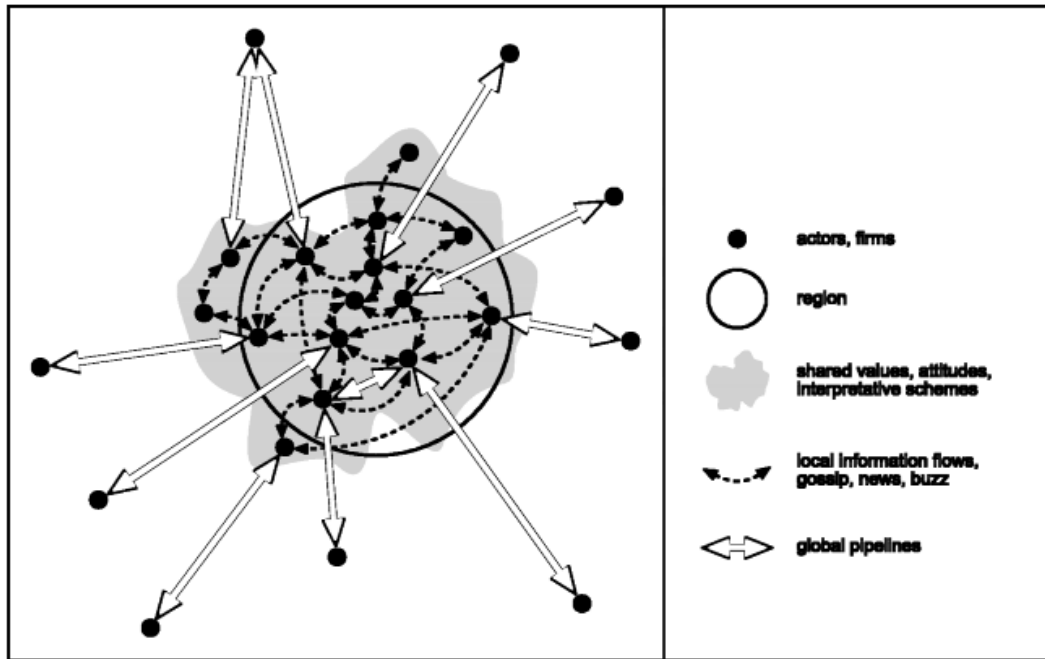


Figure 1 The structure and dynamics of local networking and external pipelines (Bathelt et al., 2004, p.46)

According to Bathelt et al. (2004), the firm's connectedness with other firms outside of the cluster, increases the competitiveness of the total cluster. The external connection – the so-called 'pipeline' – is increasing the knowledge of the individual firm. By the interconnectedness of all firms in the cluster on the local level, this new external knowledge will increase the cluster's total knowledge. The more developed the connections between the cluster firms and other sites of knowledge, the higher is the benefit from clustering on the local level. Spatial proximity stimulates the circulation of information on the local level. This is expressed in the model shown in figure 1. Bathelt et al. (2004) are giving a schematic reproduction of the dependency between the external relations in the cluster and the internal relations in the cluster. A cluster can benefit from a high amount of external relations, when the internal relations are more developed. The benefits of spatial proximity can increase when developing the external relations. One of the basic principles of the model is that *"[t]he more firms of a cluster engage in the build-up of trans-local pipelines the more information and news about markets and technologies are 'pumped' into internal networks and the more dynamic the buzz from which local actors benefit."* (Bathelt et al., 2004, p.41)



Figure 2 The multiple dimensions of clusters (Bathelt, 2004, 2005a, 2005b, Bathelt et al., 2004)

2.3 Scientific contributions to the multiple dimensions

2.3.1 Horizontal dimension

Part of the research of Maskell (2001) is focused on the competitiveness of co-located firms and is therefore related with the horizontal dimension of clusters. Maskell (2001) is mentioning three processes of growth for a cluster. The first, is the relocation of already existing companies which might improve their access to the local knowledge, the suppliers or the customers which are already present in the cluster. The second process is the attraction of entrepreneurs with ambitions to start a company in the particular industry, which is in this case the greenhouse industry. In this way, individuals could immigrate to the area and are able to give the cluster a spectacular growth. Third, new firms could emerge when business opportunities are caught up by former employees by founding a new business and decide to become entrepreneurs themselves.

Maskell (2001) highlights the contemporary turn towards a knowledge-based economy, which makes it more interesting to understand the process of knowledge creation in clusters. Therefore questions concerning the relation between economic performance, localised knowledge creation and space in general are rising (Maskell, 2001). Geographical proximity is beneficial in situations in which the growth of knowledge requires face-to-face interaction (Boschma and Frenken, 2010). Establishment in a cluster can give companies a risk reduction, because their business do not significantly differ from the businesses which are already established. New companies will get the free advantages of a business environment which is specified on their needs. This is even valid when the management of the new company is not aware of what those needs are (Maskell, 2001).

Research of Reid and Carroll (2006) shows that collaboration among the established companies is important for the economic growth of the cluster. Reid and Carroll (2006) investigated the collaboration of greenhouse growers to cope with external competition in

the greenhouse cluster in northwest Ohio. They show that greenhouse growers in Ohio undertook several joint actions to increase their external competitiveness and to stimulate the economic growth of the cluster. To accomplish this joint action, trust, norms and coordinated networks are prerequisites (Reid and Carroll, 2006). Reid and Carroll (2006) state that competitors from the horizontal dimension are motivated to start common actions to solve shared problems, especially when external competition of the cluster becomes important. However, as a critical factor for the success of the cluster, the companies for whom the new common strategy would be applicable, should be involved in the decision-making. A challenge for the cluster collaboration is the engagement of all greenhouse growers (Reid and Carroll, 2006). In earlier research, Reid and Carroll (2005) state that a larger numbers of growers need to participate in the cluster initiatives in the greenhouse cluster of Northwest Ohio. Therefore, branding and marketing of the cluster among growers is used to increase the awareness of the cluster benefits and the participation of growers in the cluster initiatives (Reid and Carroll, 2005).

2.3.2 Vertical dimension

Breukers et al. (2008) state that the concentration of all functions related to greenhouse horticulture in one area stimulates chain integration, which adds value to the whole sector. This is a confirmation of the theories of Maskell (2001) and Bathelt (2004) in which they stress the importance of the vertical dimension of a cluster. Economic strategies of small Dutch greenhouse growers in the cut flower sector transformed the chain governance from buyer-driven to producer-driven, by organising themselves into grower-led cooperative auctions. Therewith, the growers exercise more power over the vertical chain of the cluster (Patel-Campillo, 2011).

Aznar-Sánchez and Galdeano-Gómez (2011), who analysed the sources of cluster advantages of the Spanish horticultural region Almería, interpret the development of the cluster with the theory of endogenous development, in which the cluster has an internal origin. Initial advantages as the presence of natural resources are the first incentives for the emergence of a cluster. Within this approach, the spatial organisation of the cluster is based on the production and is steered by development policies from local governments. Successful functioning of growth mechanisms as the organisation of the systems of production, the diffusion of innovation, urban development and institutional changes will result in further economic growth of the cluster. These improvements are not part of the initial development phase based on natural resources, but the start of a new phase generating more cluster advantages. This further growth is partly stimulated by the governments and settled institutions – which could in the multidimensional approach of Bathelt (2004) be seen as the power dimension and the institutional dimension. Aznar-Sánchez and Galdeano-Gómez (2011) show this distinction within cluster development with their case study of Almería, the largest vegetable production area in Spain. Almería emerged due to the available natural resources of the territory – climatological circumstances, availability of ground water resources and the absence of surface relief. Once the cluster was established, other systematic and dynamic competitive advantages had to be developed. Based on the cluster theory of Porter (1998), highlighting the system of interrelated firms, industries and institutions, Aznar-Sánchez and Galdeano-Gómez (2011) legitimise the current existence of the cluster. Activities related to horticulture rose, mainly due to local initiatives, and efficiency, specialisation, improvement and innovation improved. Together with the initial advantages based on natural resources,

these advantages currently form the competitive position of the horticultural cluster Almería (Aznar-Sánchez and Galdeano-Gómez, 2011).

Steekelenburg et al. (2005) did a quick scan of 70 agribusiness complexes and give several prerequisites for successful development of agribusiness complexes. Agribusiness complexes differ in some aspects from the greenhouse clusters in this research, because the combination of agro and non-agro businesses is stimulated in agribusiness complexes. De Wilt et al. (2000) even see the combination of agricultural businesses and industrial processing as a stimulus for the cluster. However, the key element of both agribusiness complexes and greenhouse clusters is the spatial clustering of agriculture-related activities (De Wilt et al., 2000, Steekelenburg et al., 2005). Therefore, the prerequisites could be useful for the stimulation of greenhouse clusters as well. One of these prerequisites is a high level of knowledge among growers and entrepreneurs in the agro-chains (Steekelenburg et al., 2005). Combining this with the multidimensional approach of Bathelt (2005a), this requires knowledge of the vertical dimension. Furthermore, a well-developed infrastructure network and the presence of logistics and chain management are necessary for the development of the complex. Companies in the investigated agribusiness complexes are not only stimulated by measurements of the governments, but also rely on the cost savings of being part of an agribusiness complex. Steekelenburg et al. (2005) is not answering the question how the knowledge exchange between the actors could be stimulated.

2.3.3 Institutional dimension

According to Priemus (2007), it is the responsibility of the regional and local government to safeguard the logic of the network. Governmental bodies need to stimulate the growth of the cluster (Steekelenburg et al., 2005, Aznar-Sánchez and Galdeano-Gómez, 2011) and facilitate the necessary interventions in local spatial structures (De Wilt et al., 2000). Support for these stimulation measures can be created by touching upon the economic competitiveness (Healey, 2005). This aspect of economic competitiveness was used by the Dutch national government to develop the concept 'greenport'. The competitiveness of greenhouse areas is investigated by Patel-Campillo (2011), who focuses on this exchange of policies among the different governmental scales. Patel-Campillo (2011) investigated the role of planning policy to improve the position of the Dutch and Colombian cut flower industries. The research stresses the importance of effective coordination of activities across governmental scales when framing a competitiveness agenda. The research of Patel-Campillo (2011) could be connected with the institutional and the power dimension of clusters. States often rely on the creation of concepts and ideas. In the analysis of supply chains, Patel-Campillo (2011) emphasizes the role of state-led efforts to create conditions to generate competitiveness. Innovation and upgrading of the sector are the domain of the firm and its supplier networks, while the state is mostly involved in macro-economic and trade policy (Gereffi, 1995, Gereffi et al., 2005, in Patel-Campillo, 2011a). According to Patel-Campillo (2011), the implementation of ideas of competitiveness relies on national planning systems, but depends on the subnational scales of governance. The active role of the Dutch municipalities has traditionally been focused on the acquisition of land and the provision of infrastructure, municipal zoning and land use plans. Hajer and Zonneveld (2000) suggest a more active involvement on the process level and connection of legally binding land use plans with the institutional way of plan-making. De Wilt et al. (2000) state that

extensive interventions are necessary in local spatial structures to realise the development of agro production parks. However, in the domain of economic development projects, the coordination of provincial governments became more influential (Korthals Altes, 2006, Patel-Campillo, 2011). Patel-Campillo (2011) explains that the horticultural sector is of national interest because of the economic significance of the sector for The Netherlands. By giving the horticultural sector the status of being of national interest, the national government justified the national coordination of spatial restructuring of the sector. *“The central state lays out a plan to strengthen the competitiveness of the horticultural sector through spatioeconomic competitive strategy based on the expansion, relocation and clustering of horticultural production, to be carried out by provincial and municipal governments.”* (Patel-Campillo, 2011, p.2521) This is accomplished by introducing the greenport, a framing spatial concept which is bringing all economic interests together. The fact that the concept greenport is critical in the formation of policy agendas, the ordering of space (Albrechts et al., 2003, in Patel-Campillo, 2011) and the merger of interests, emphasizes the relation between spatial policy and economics. This relation between spatial policy and economics is discussed by Yang et al. (2015). By using planning concepts, the interaction between economic and spatial policies could be strengthened. The importance of interaction between economic and spatial policies is demonstrated by Yang et al. (2015). Their case study in Beijing shows that spatial concerns may include the function of the economic cluster and the role in the spatial structure of a region. Cluster development can influence land use, traffic flows, property values, environment and the image of an area. Concentration of economic activities stimulates population growth in the area, on which should also be anticipated in the spatial policy (Yang et al., 2015).

Breukers et al. (2008) state that the spatial organisation of the greenhouse horticulture has received much more attendance in the institutional framework than in the past. Spatial policies are focused on concentration of greenhouse horticulture and offering space for the development of future-oriented companies in satellite locations. Furthermore, implementation of the national government’s vision in the development of regional spatial policies is one of the objectives of the national government. According to Breukers et al. (2008), the most important topics in spatial planning of greenhouse horticulture are the competition for space, clustering, the role of the government and infrastructure. Breukers et al. (2008) evaluated the experiences of stakeholders with the developments and the related institutional framework in Dutch greenhouse horticulture through the conduction of interviews. The interviews were focused on the greenhouse clusters Westland and Venlo, which are both labelled as greenport by the national government. Breukers et al. (2008) used three stakeholder groups, which are the primary producers, traders and policymakers. The spatial concept greenport is favoured by almost all respondents and is seen as a positive example of joint initiatives of the greenhouse sector and the government. The assignment of the greenports and satellite locations by the national government has put greenhouse clustering on the agenda of local and regional governments, which are responsible for the implementation of spatial planning policies. The spatial plan of the government to develop the Dutch greenhouse sector was introduced in 2000. The concept of satellite locations for the expansion of greenhouse locations was proposed in January 2000 (Veerman, 2005) and the Spatial Report highlights the preservation of the internationally competitive position of the greenports, which could be strengthened with the concept of the satellite location (Ministerie van

VROM, 2006). However, Hajer and Zonneveld (2000) express a critical tone towards spatial concepts that are drawn on a national level. Also, the respondents in the research of Breukers et al. (2008) did not have a unified opinion about the national spatial policy to develop satellite locations in other regions in The Netherlands. Hajer and Zonneveld (2000) state that nearly all planning concepts from national policies are generally applicable. This generalisation creates problems with the application of the concept at the lower scale. The spatial strategic thinking has been dominated in the 1990s by the idea that the competitive position of The Netherlands should be preserved (Hajer and Zonneveld, 2000). Following the thoughts of Hajer and Zonneveld (2000), the greenhouse clusters should create more individually-oriented plans for the specific cluster. The decentralisation of the Dutch planning system resulted in this individually development.

2.3.4 Power dimension

Not only the economical network is important when analysing the greenhouse clusters. In every planning process, the network of involved stakeholders is important. Besides knowing about the existence of the stakeholders, the relationships between the stakeholders are important. All different stakeholders are different in terms of power (Spit and Zoete, 2006). Buurma and Ruijs (2011) used the discourse conceptualisation of Foucault to display the power relationships in their research of greenhouse clusters. The four mechanisms disciplining, subjection, exclusion and evasion could be traced in events that are happening in greenhouse clusters to show the power relationships. Buurma and Ruijs (2011) mention several examples regarding to the investigated greenhouse clusters. A positive application of the mechanism subjection is observed in the greenhouse cluster Agriport, where the word 'neighbour' is used to suggest equality among actors in the area. Exclusion is observed in Bergerden, where the characterisation of the project of being *"a modern location in an attractive landscape and with collective facilities"* made that all other possibilities were outside the scope of the project (Buurma and Ruijs, 2011).

According to Booher and Innes (2002) network power can exist if all stakeholders involved in the process are diverse and are covering the full range of interests and knowledge. Network power emerges when certain measurements have individual and shared advantages for all stakeholders. The network power increases when these stakeholders use their interdependencies to create new potential. Besides the diverse range of interests, the awareness of interdependency among stakeholders and trust between participants during communication. This means that the covering of all interests during the planning process is an indicator for the success. Policymakers and planners can fulfil a role as a node in the network and be the builders of the network by stimulating relationships and communication. This role of network builder corresponds with the vision of Spit and Zoete (2006) that local government could organise business contact events. One of the preconditions of network power is that actions are taking place in a limited physical space within localised social and political context (Booher and Innes, 2002).

The spatial design of an agro production park should fit within the specific region, by supporting the specific qualities and dynamics of the area as much as possible (De Wilt et al., 2000). In regions where greenhouse horticulture does not have a prominent position for already a longer period, the local government has to find a balance between the sector's interest and the citizens' interests. On the regional and national government level,

interests of different sectors and interest groups may conflict with each other (Breukers et al., 2008).

2.3.5 External dimension

Bathelt et al. (2004) are explaining that the external dimension is based on knowledge exchange beyond the spatial boundaries of the cluster itself. This knowledge exchange can be generated by both horizontal and vertical relationships that are crossing the boundaries of the cluster. According to Maskell and Malmberg (2007), it is important that at least some of the companies in the cluster are investing in pipelines to external sources of knowledge. These so-called ‘absorptive’ local firms can “*ensure variety and create fresh impulses for horizontal learning*” (Maskell and Malmberg, 2007, p.613), to prevent becoming locked-in if the existing knowledge pool is aging and companies are more focused on specialisation than differentiation (Maskell and Malmberg, 2007).

2.4 Indicators used in this research

This research uses the conceptualisation of multiple dimensions (Bathelt, 2004) to apply on the Dutch greenhouse sector, with particular focus on spatial planning. By adding a local or regional perspective to clusters, the conceptualisations of clusters are not ‘spaceless’ anymore. By integrating the spatial perspective from the beginning of the analysis, the analysis can support the development of local or regional policy programmes (Bathelt, 2005b).

For this spatial planning research, the multidimensional concept is used as a framework, which is complemented with indicators to measure the development of each dimension. These indicators are used for the analysis of spatial clustering in the Dutch greenhouse clusters, to identify which characteristics of greenhouse clusters explain the differences and similarities in development of greenhouse clusters in The Netherlands. The importance of the combination of economic and spatial policies is already stressed by Yang et al. (2015). This research could make the connection between spatial and economic policies in greenhouse clusters more visible by using the model of Bathelt. In the following paragraphs, the indicators are explained for every dimension. This explanation is a clarification of the table of indicators (Table 2).

2.4.1 Horizontal dimension

In the context of this research in greenhouse clusters, the horizontal dimension will be limited to the production layer of greenhouse growers, which is the most important horizontal layer in the greenhouse cluster. The greenhouse companies are the primary producers of the clusters and are all part of the horizontal production layer as direct competitors. The horizontal layer of producers is the most important horizontal layer, because it is the basis of the vertical chain and thus the basis of the greenhouse cluster. According to Reid and Carroll (2006) horizontal collaboration encourages economic growth and increases competitiveness of the area. The collaboration between direct competitors is called ‘cooperative competition’ by Bergman and Feser (1999) and is based on the maximisation of competitiveness by solving problems collaboratively. The strength of the horizontal dimension of the cluster is measured by the degree of collaboration between competitors within the greenhouse cluster and the degree of observation and comparison of these competitors (Malmberg and Maskell, 2002).

2.4.2 Vertical dimension

The vertical dimension is a very extensive dimension within a developed greenhouse cluster. As earlier mentioned, the vertical dimension in the greenhouse clusters could, besides the greenhouse growers, also include companies regarding trading, marketing, transport, IT services, agronomic counselling, greenhouse constructing, plastics, irrigation, packing, seed development, biological production, machinery and agrochemicals (Aznar-Sánchez and Galdeano-Gómez, 2011). The vertical relations between greenhouse growers in the cluster and these companies are the object for the investigation of the vertical dimension. Only vertical relations of the primary production layer are measured to avoid complexity. The strength of the vertical dimension of the cluster is measured by the need for vertical relations among greenhouse growers and the degree of collaboration in the vertical chain within the cluster (Malmberg and Maskell, 2002).

2.4.3 Institutional dimension

In this research, the investigation of the institutional dimension is limited to the municipal and provincial government and its relationship with the greenhouse growers in the primary production layer of the cluster. These local governments have been given more responsibility in spatial planning issues from national government (BNA, 2009) and their relationship with the greenhouse cluster is thus interesting in the context of this research. Spatial policies that are used by the local governments could be focused on concentration of greenhouse horticulture and offering space for the development of future-oriented companies in satellite locations (Breukers et al., 2008). Breukers et al. (2008) mentions the role of the government as an important topic in spatial planning of greenhouse clusters. The strength of the institutional dimension of the cluster is measured by the role of the local government and the way in which they use (spatial planning) instruments. These instruments could be regulations, planning concepts, financial stimulations and others.

2.4.4 Power dimension

The vertical and horizontal dimensions are influenced by the existence of power relations between actors in the cluster. Power could solve conflicts between firms and speed up decision-making processes (Bathelt, 2005a). Again, the greenhouse growers and the municipality are chosen as objects to investigate this dimension. The strength of the power dimension of the cluster is measured by the existence of unequal relationships between actor groups within the cluster. Booher and Innes (2002) indicate that the stimulation of relationships can result into a powerful network, in which communication between actors is based on trust. When the existence of unequal relationships is having positive impact on the ability to act collectively, the power dimension is contributing to the development of the cluster.

2.4.5 External dimension

Essential in the external dimension is knowledge creation, which depends on the external relations of the cluster (Bathelt, 2005a). Therefore, the strength of the external dimension of the cluster is measured by the degree of collaboration with companies outside the cluster (Bathelt et al., 2004). These collaborations could be both vertical or horizontal relationships.

Dimension	Aspect	Indicator
Horizontal	<ul style="list-style-type: none"> Relations between firms and its direct competitors (Bathelt, 2005a) 	<ul style="list-style-type: none"> Degree of collaboration among direct competitors Degree of observation and comparison (Malmberg and Maskell, 2002)
Vertical	<ul style="list-style-type: none"> Complementary firms such as network of supplier, service and customer relations (Bathelt, 2005a) 	<ul style="list-style-type: none"> Need for vertical relations among greenhouse growers Degree of collaboration in the vertical chain (Malmberg and Maskell, 2002)
Institutional	<ul style="list-style-type: none"> The use of institutional arrangements; norms, rules, shared habits and conventions (Bathelt, 2005a) 	<ul style="list-style-type: none"> Role of the local government in the development of the greenhouse cluster Usage of instruments by local government, formal institutions <ul style="list-style-type: none"> Regulations, land use plans and planning concepts Financial instruments (Breukers et al., 2008)
Power	<ul style="list-style-type: none"> Power relations that have impact on the ability to act collectively (Bathelt, 2005a) 	<ul style="list-style-type: none"> Unequal relationships within the cluster (Bathelt, 2005a)
External	<ul style="list-style-type: none"> Connections to markets and knowledge pools in different regional and national settings (Bathelt, 2005a) 	<ul style="list-style-type: none"> Degree of collaboration with companies outside the cluster (Bathelt et al., 2004)

Table 2 Indicators of the multiple dimensions of Bathelt

3 Methods

This chapter describes which methods are used to conduct this research. To identify which characteristics of greenhouse clusters explain the differences in development between different greenhouse clusters, the greenhouse clusters in the Netherlands are object of this research. As is shown in the previous chapter, the development of clusters is complex and cannot easily be explained by a singular cause. This research has been conducted using qualitative research methods, to ensure that the multiple dimensions of Bathelt could be analysed thoroughly for every researched cluster.

3.1 Case study research

To answer the main research question and to investigate whether the multidimensional concept of Bathelt explains the development of the greenhouse cluster, the Dutch greenhouse sector cannot be studied in its entirety. The Dutch greenhouse sector is a very complex system, but consists of spatial entities which could individually be studied with the help of case studies. In this research, the spatial entities are defined as separate greenhouse clusters, which are distinguished in traditional core clusters and developing satellite locations (Nijkamp et al., 2010). Because time is limited, not all spatial entities within The Netherlands can be studied. Therefore this research contains two case studies, which collectively form an analysis of a deliberate selection of greenhouse clusters. The use of case studies provided the opportunity to collect detailed information using a variety of data collection procedures (Creswell, 2014). This research gave in-depth insights in the complexity of the two selected greenhouse clusters and provided the opportunity to explore the characteristics of these two individual greenhouse clusters and its multiple dimensions thoroughly. The substantial selection of the cases is discussed below.

3.2 Case selection

To identify which characteristics explain the differences in development of greenhouse clusters, the two selected case study areas should have a different degree of development. Therefore, this case study research contains one well-developed greenhouse cluster and one less-developed greenhouse cluster. The greenhouse clusters in the Netherlands can be divided in traditional clusters and new developing greenhouse locations. In 2000, the national government assigned the satellite locations: Zuidplaspolder, Berlikum, Luttelgeest, Californië/Siberië (Venlo), Terneuzen, Bergerden, Emmen, Moerdijkse Hoek, Grootslag and IJsselmuiden (Ministerie van VROM, 2006). The cluster Agriport was started in 1999 by a private initiative (Blijdorp, 2012).

Greenhouse areas with significant dependency of other proximate greenhouse clusters are no part of this research. The development of these locations is mainly dependent on the relationship with the proximate cluster. A study of these greenhouse areas would not have been resulted in an indication of which characteristics of the individual greenhouse area could be related to the degree of development. Zuidplaspolder and Californië/Siberië are two locations which are very close to traditional greenhouse clusters. Zuidplaspolder is close to the traditional cluster Westland-Oostland and Californië/Siberië is bordering on Greenport Venlo. This means that these satellite locations could not be seen as independent clusters. Therefore these clusters are no object of this research. Furthermore, the cluster Grootslag was not selected due to its proximity to the larger cluster Agriport.

3.2.1 Agriport

The location Agriport in the northern part of the province of North Holland was selected as the first case of this research, being the most developed new cluster. For the choice of Agriport as study area, there are several reasons. The location Agriport has developed rapidly. In 2006, the construction of Agriport started with the first 50 hectares of greenhouses (Mulder and Bel, 2007) and after a short period this expanded to 450 hectares in 2015 (Agriholland.nl, 2015). Furthermore, an agribusiness and logistics area of 100 hectares is being developed (Agriholland.nl, 2015, Blijdorp, 2012).

The idea of Agriport as a greenhouse cluster emerged in 1999 by a private initiative and gained support of the local government (Blijdorp, 2012). Agriport is located in the Wieringermeer polder, which is reclaimed land that used to be the bottom of the sea before 1930. The construction of the polder was necessary after World War I to ensure the national food supply (Wieringermeer, 2016). This resulted in the major land use of intensive agriculture on enormous land plots, which is giving the Wieringermeer its open landscape characteristics and its economic and social focus on the agricultural sector. In 1999, a lettuce grower and processor needed a new large business location for the processing of lettuce. The entrepreneur tried to locate his company in the southern part of the Wieringermeer, next to the highway A7. The former Municipality of Wieringermeer would accept the plans, providing that other companies could also establish to create an area for agribusiness. At the same time, the Province of North Holland was searching for a new greenhouse area and asked for the inclusion of greenhouses before accepting the plans. The entrepreneur gathered several greenhouse companies and the cluster Agriport was born (Blijdorp, 2012). The open landscape of the Wieringermeer gave greenhouse companies the opportunity to expand on plots with an average of 60 hectares (Mulder and Bel, 2007). In 2012, the Municipality of Wieringermeer merged together with three rural municipalities to the larger Municipality of Hollands Kroon.

Within this research, a distinction is made between Agriport A7, which is the developing company, founded by the initiating lettuce entrepreneur, and Agriport, which is the name of the area itself. Because of the absence of an high-voltage electricity net, the growers had to make large investments for their own high-voltage power lines. These large investments could only be done with the cooperation of all growers in the area. Therefore the developer Agriport A7 established the energy cooperative Energy Combination Wieringermeer (ECW), of which every buyer of land in Agriport became a member.

In 2012, when Agriport had already gone through the first years of development, the northern part of North Holland has acquired the title of greenport within the National Strategy – as Greenport Northern North Holland (Agriholland.nl, 2015). Greenhouse cluster Agriport is located within this greenport. This proves the success of the area and the support of the National Government for the development of the area. The satellite location Grootslag is also included in Greenport Northern North Holland (NHN), because of its close location to greenhouse area Agriport (Lucas et al., 2013). According to Breukers et al. (2008), not only greenhouse companies, but also market organisations have been established in Agriport.

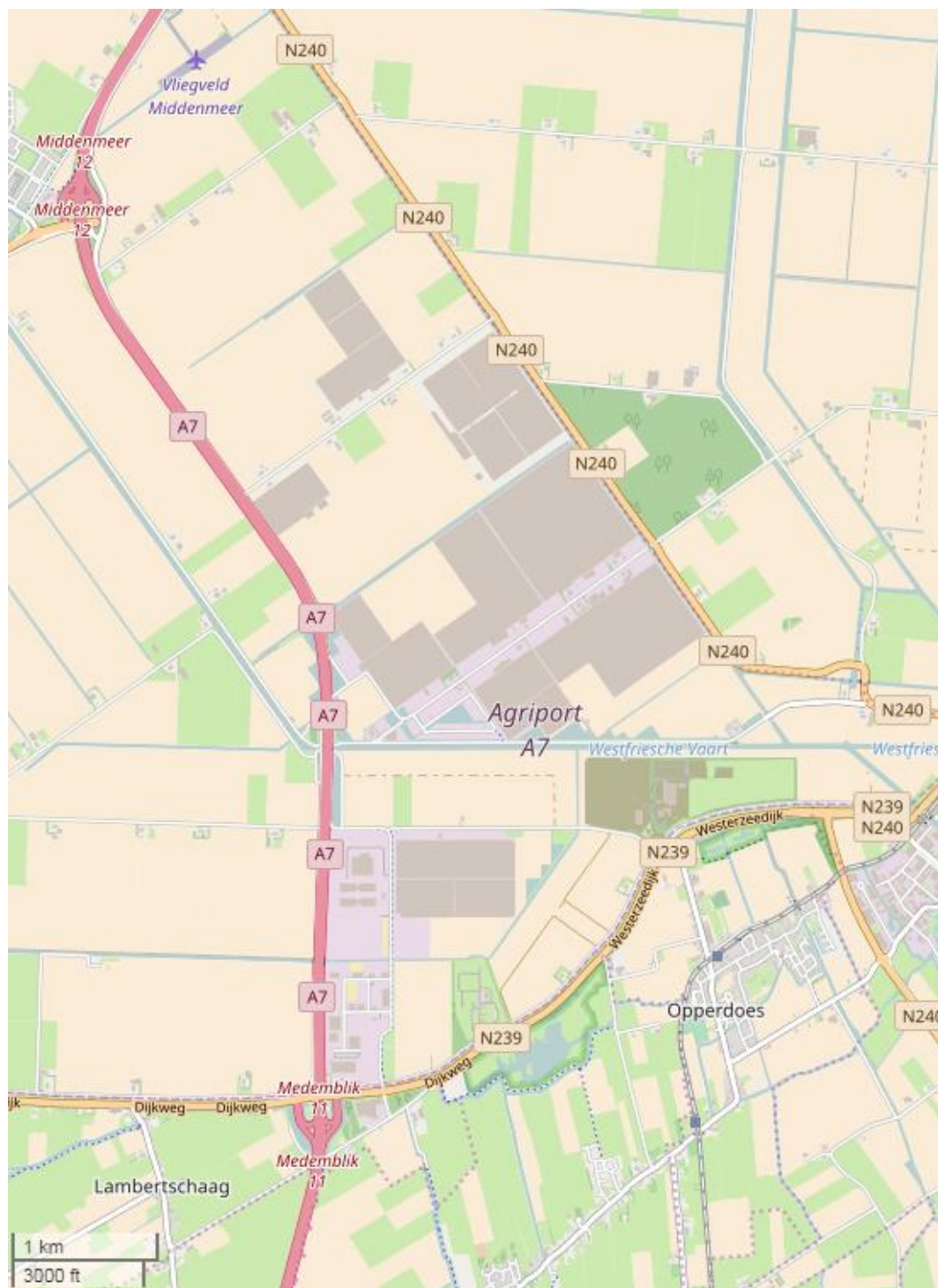


Figure 3 Topographic map of greenhouse location Agriport

Province:	North Holland
Municipality:	Hollands Kroon
Area 2015:	450 hectares
Planned area:	900 hectares
(Agriholland.nl, 2015)	

3.2.2 Bergerden

The cluster Bergerden in the province of Gelderland was selected as the second case of this research, being a less developed cluster. This greenhouse cluster, which is a governmental initiative of the municipalities of Nijmegen and Lingewaard, is not developing as expeditiously as expected (Buurma, 2011). The area deals with financial problems and a lot of parcels are not developed yet (Gelderlander, 2015a, 2015b). Initial goals which are set in the development plans for the area are not realised yet.

Bergerden is located in the Municipality of Lingewaard, in between two of the major cities in the province of Gelderland: Arnhem and Nijmegen. Because of this geographical location, the area is part of the city region Arnhem-Nijmegen. The area of Lingewaard is traditionally an horticultural area, but the area consists of a lot of outdated greenhouses and inefficient infrastructure (Gelderland, 2012). Besides the fact that the greenhouse area was aging, greenhouses in the surroundings of Lent has to be relocated because of new residential developments of Nijmegen on the north side of the river Waal. In a more open agricultural area between Bemmelen and Huissen – the relatively open ‘komgronden’ in the Dutch river landscape –, the municipalities of Nijmegen, Bemmelen and Huissen saw the opportunity for the expansion for greenhouses. The initial purpose of the development of greenhouse location Bergerden was the establishment of companies which has to be replaced because of governmental spatial policies, companies which would like to use the scale and location advantages of the new greenhouse location and companies which are coming from other regions (KPMG, 1999). The Municipalities of Nijmegen, Huissen and Bemmelen founded GR Bergerden to carry out the greenhouse project Bergerden. GR Bergerden was a governmental ‘joint-venture’ structure of the Municipality of Nijmegen, the former Municipality of Huissen and the former Municipality of Bemmelen. Huissen and Bemmelen merged in 2001 together with Gendst into the Municipality of Lingewaard. In 1999, the GR Bergerden, bought the land of Bergerden from STOL, which is a foundation for the stimulation of the horticultural sector in the area (KPMG, 1999). The initial agreement included that STOL would facilitate the knowledge and that the municipalities in GR Bergerden would finance the project (Van Dijk, 2006). In 2000, Bergerden is assigned as one of the satellite locations for the development of greenhouses by the Dutch national government (Ministerie van VROM, 2006). This means that the national government appointed the area for the establishment of companies from the traditional greenhouse clusters in the western part of the country. The decentralisation of spatial planning from national to lower levels of government made the municipalities responsible for the development of the greenhouse cluster. The Municipalities had high ambitions for the area, with collective energy and water supply (Van Dijk, 2006). Due to disappointing demand for land, the municipalities had to accept financial losses for the rents on this land exploitation (Gelderlander, 2015b, 2015c). In 2015, 120 hectares of greenhouses were developed, while the planned area contains 340 hectares of greenhouses (Agriholland.nl, 2015). Since 2016, Bergerden and the older greenhouse area around Huissen and Angeren are together promoted as greenhouse area NEXT Garden, which is a trademark of the municipality of Lingewaard as greenhouse establishment location for new companies (WeLoveTheCity, 2016). Near the greenhouse cluster, the business area Agropark is situated. In this area agribusiness related companies are concentrated (Bruckwilder and Luggenhorst, 2011).

Furthermore, there are several organisations active which could be seen as platforms where all stakeholders in the area are coming together. The most important is Betuwse Bloem, which is supported by the province and consists of five pacts, each with a specific focus, on fruit, mushrooms, trees and two pacts for greenhouse horticulture. One of these pacts is including companies and stakeholders for greenhouse area the Bommelerwaard and the other pact is serving the greenhouse cluster NEXT Garden of which Bergerden is a part. The last pact is called the ‘glaspact’ by all the stakeholders in Bergerden and is sometimes mentioned as Greenport Arnhem-Nijmegen.

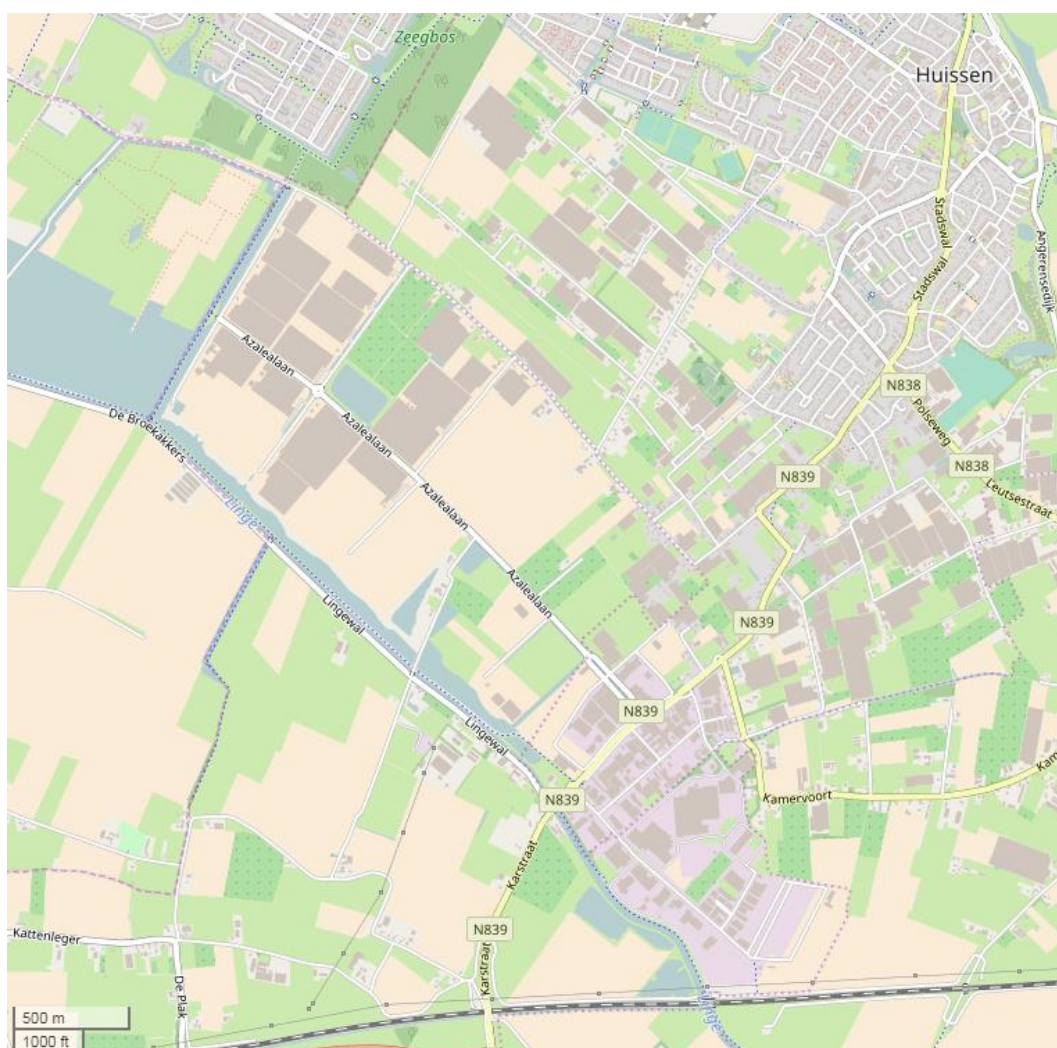


Figure 4 Topographic map of greenhouse location Bergerden

Province:	Gelderland
Municipality:	Lingewaard
Area 2015:	120 hectares
Planned area:	340 hectares
(Agriholland.nl, 2015)	

3.3 Data collection methods

The use of case studies provides the opportunity to collect detailed information using a variety of data collection procedures (Creswell, 2014). The two cases of Agriport and Bergerden are investigated on the indicators that are shown in Table 2. These indicators are studied by three different methods, being a field analysis on the spatial characteristics of the area, the conduction of in-depth interviews among stakeholders in the greenhouse clusters and the study of documents.

3.3.1 Field analysis

First, for both case study areas, an overview of basic statistics is produced, to gain knowledge about the spatial characteristics of the area. The situations of the two clusters in 2005 and 2015 have been analysed using aerial photos from Google Earth. Aerial photos of Agriport that are more recently taken were not suitable to perform this analysis. To make a comparison between the two case study areas and to cover a significant interval, aerial photos of 2005 and 2015 are chosen. The surfaces of the companies in 2005 and 2015 are measured with the polygon measure tool in Google Earth. This surface is the area that is used for primary production and does not include other buildings, as the engine house and the logistics area. The primary production surface has been displayed in a table to show the progress in development of both clusters. With the help of land use plans, the register of the Chamber of Commerce and contact details at websites of the greenhouse companies, the production surface has been linked to the specific company.

3.3.2 Interviews

Qualitative interviews are part of the case study to identify the different characteristics of the greenhouse clusters. The interviewees consist of two groups. For every group, the interview questions are different. The first group consists of greenhouse growers. The questions that are asked to the greenhouse growers are more related to the business, the business relations and their experience with the government. Especially the business related questions are not relevant for the other interviewees. All other interviewees form the second group of interviewees. For this group of interviewees, the second list of interview questions is used. An important advantage for this research is that the conduction of interviews can provide historical information as well (Creswell, 2014).

For both clusters, two greenhouse growers are interviewed. Other interviewees are municipal or provincial policymakers, who were involved in the creation of the specific development plans which are investigated or other important stakeholders in the greenhouse clusters. These are LTO Noord for Bergerden and Agriport A7, Greenport NHN/ONHN and ECW for Agriport. The complete list of interviewees could be found in Table 3 and Table 4. The interviews are semi-structured with open-ended questions, with the intention to reveal the participant's view upon the process of development with regard to the characteristics of the greenhouse cluster (Creswell, 2014).

Interviewee	Organisation	Function	Group of interviewees
1.	Province of North Holland	Senior policy advisor	Other
2.	Municipality Hollands Kroon ²	Spatial policy specialist Spatial policy specialist	Other
3.	Greenport NHN ³ ONHN	Director Program Manager	Other
4.	ECW Netwerk	Energy manager	Other
5.	Agriport A7	Commercial Director	Other
6.	Paprika nursery	Grower / owner	Growers
7.	Tomato nursery	Grower / owner	Growers

Table 3 Interviewees Agriport

Interviewee	Organisation	Function	Group of interviewees
8.	Province of Gelderland	Account holder horticulture	Other
9.	Municipality Lingewaard	Acquisition specialist	Other
10.	Municipality Lingewaard	Connector / Policy officer horticulture	Other
11.	LTO Noord	Projects / acquisition	Other
12.	Pot plants nursery	Grower / owner	Growers
13.	Pot plants nursery	Grower / owner	Growers

Table 4 Interviewees Bergerden

The interviews start with a few introduction questions. First, all interviewees are asked what they think is the additional value of the greenhouse cluster for the area. The growers are asked what was their reason to establish their greenhouse company in the specific cluster. Thereafter, the questions are based on the indicators of the multiple dimensions from Table 2 (chapter 2.4). To complete the interview, all interviewees are asked about their view towards the future of the case study area. In Table 5 could be found which interview questions are based on which of the indicators. The interview questions for the growers could be found in Appendix I. The interview questions for the other interviewees could be found in Appendix II.

² This interview is conducted with two interviewees, who could supplement each other.

³ This interview is conducted with two interviewees, who could supplement each other.

Dimension	Indicator	Interview questions
Horizontal	Degree of collaboration among direct competitors	1, 1a, 1b, 1c, 1d 10, 10a, 10b
	Degree of observation and comparison	1b, 1c, 1d
Vertical	Need for vertical relations among greenhouse growers	2c, 2d, 2e, 2f 11, 11a, 11b
	Degree of collaboration in the vertical chain	2, 2a
Institutional	Role of the local government in the development of the greenhouse cluster	3, 3a, 3b 6, 6a, 7, 8, 8d, 8e, 12, 14
	Usage of instruments by local government, formal institutions	3c, 3e, 3f 9, 10, 10a, 10b, 10c, 11, 11a, 11b, 11c
	Regulations, land use plans and planning concepts	3c, 3d, 3e 6, 6a, 7, 9a
	Financial instruments	3c, 3e 9b
Power	Unequal relationships within the cluster	4a, 4b, 4c, 4d, 4e, 4f, 4g 13, 13a
External	Degree of collaboration with companies outside the cluster	1e, 1f, 1g, 1h, 2b, 2f 8a, 8b, 8c, 10c, 11c

Table 5 Interview questions categorised per indicator

3.3.3 Document study

The document study has been used to complement and confirm the findings of the conducted interviews. The documents can give information about the strategy choices of governments with regard to the horizontal, vertical, institutional, power and external dimension. Most of the documents that are analysed are official documents from governmental bodies, but also documents of other institutions as the greenport organisations have been analysed. The researched documents for Agriport are the land use plans for Agriport, three municipal documents, three provincial policy documents, the position paper and implementation agenda of Greenport NHN, a research report from LTO Noord and an implementation agenda of a local governmental collaboration. For Bergerden, this research explores the land use plan for Bergerden and the visions of the municipality, the province and the Rabobank. The agendas of Greenport Gelderland, Greenport Arnhem-Nijmegen and Greenport Betuwse Bloem are used to supplement the list of stimulating measures that are taken to develop the greenhouse cluster. Moreover, the market proposition NEXT Garden, which is mentioned by several interviewees as a useful document, is explored to show the direction in which the area should develop according to the municipality. The reference details of the documents that have been investigated are shown in Table 8 for Agriport and Table 11 for Bergerden. For the readability of the result chapters, these tables could be found in chapter 4.3 for Agriport and 5.3 for Bergerden.

The documents have been studied to extract information about the five dimensions of Bathelt. To identify the dimensions within the documents, catchwords have been used. The catchwords that have been used are based on the indicators from Table 2 (chapter 2.4). In Table 6, you can find which catchwords have been used for the different indicators. General catchwords have been used to give an indication of the relevance of

the documents and to analyse in which degree the documents are focused on the specific greenhouse area. All documents related to the greenhouse areas Agriport and Bergerden are written in Dutch. Therefore, the documents are searched through with Dutch catchwords. The English translation of these catchwords could be found in Table 9 (4.3) and Table 12 (5.3).

To investigate the collaboration in the horizontal, vertical and external dimension, the documents has been searched for the word ‘collaboration’. The context of these words has been researched to determine whether collaboration in the horizontal, vertical or external dimension is indicated.

Dimension	Indicator	Catchwords
General	-	kassen*, tuinbouw*, Agriport, Bergerden
Horizontal	Degree of collaboration among direct competitors	samenw*, verenig*
	Degree of observation and comparison	observ*, vergelijk*
Vertical	Need for vertical relations among greenhouse growers	samenw*, keten, transport, logist*, handel, markt
	Degree of collaboration in the vertical chain	samenw*, keten, transport, logist*, handel, markt
Institutional	Role of the local government in the development of the greenhouse cluster	rol*, actief+actiev*, passief+passiev*, stimul*, facilit*
	Usage of instruments by local government, formal institutions	maatregel, stimul*, facilit*, versterk*
	Regulations, land use plans and planning concepts	plan, regel*
	Financial instruments	subsid*, fonds, financ*
Power	Unequal relationships within the cluster	relatie, ongelijk, dominant, draagvlak
External	Degree of collaboration with companies outside the cluster	samenw*, extern*, buiten, internationa*

Table 6 Catchwords used in the document study

3.4 Data analysis

After conducting the interviews, the recordings of the interviews were completely transcribed. The transcribed interviews are used for an intensive analysis. The data collection phase and the data analysis phase were not strictly separated, but has been executed parallel to ensure the progress of the research. After conducting interviews in greenhouse area Bergerden, these interviews were transcribed and the analysis of these interviews was started. In the same period, interviews have been conducted in Agriport. The interviews from this case study were transcribed after the data collection phase. The analysis of the transcribed interviews is first executed using coding software Atlas.ti. For the coding, the indicators from Table 2 were used. When the coding resulted in an abundance of quotes, without a clear pattern, the interviews are scanned again using different colours of markers. This means that the most important part of the coding is executed without using software. The focus of the coding has been on the analysis of themes which are connected to the multidimensional approach of Bathelt (2005a) and the research questions. Distinguishing the different dimensions of the cluster during the coding made it possible to do a cross-case analysis and compare the cluster Agriport with the cluster Bergerden.

The analysis of the documents has entirely been executed after the analysis of the interviews. The quantitative data of the catchwords has been used to identify in which documents the different aspects of the dimensions could be found. All indicators are analysed individually and the most important findings have been reported.

3.5 Verification and validity

With the knowledge that every research method has its limitations, the use of multiple research methods improves the validity of this research (Creswell, 2014). Data source triangulation is used to strengthen the validity of this resource by using interviews with experts and growers in combination with a document study. The results from the document study were compared with the interview results to verify the outcomes.

4 Case study Agriport

The case study of Agriport has been conducted to identify the characteristics of a greenhouse cluster that is well-developed. Paragraph 4.1 contains the results of the field analysis. Thereafter, paragraph 4.2 contains the results of the interviews and 4.3 is showing the results of the document study.



Figure 5 The entrance of Agriport

4.1 Field analysis

In the following table, the configuration of the greenhouse area Agriport and its development between 2005 and 2015 is displayed.

Company	Crop	Place of origin	Surface 2005 (ha)	Surface 2015 (ha)
AgroCare	Tomato	Rilland / De Lier	0,0	58,9 (AgroCare) 37,9 (Kesgro)
Barendse-DC	Bell pepper	Poeldijk	0,0	20,0
CombiVliet	Tomato	Maasdijk	0,0	37,0
GreenCo Wieringermeer ⁴	Snack tomato	Honselersdijk	0,0	0,0
Helderman	Bell pepper	's-Gravenzande	0,0	23,8
Kwekerij Wieringermeer	Bell pepper	's-Gravenzande	0,0	41,2
Red Harvest B.V.	Tomato	De Lier	0,0	31,8
Royal Pride	Tomato	Maasdijk	0,0	52,5
Sweet Point	Sweet bell pepper	Honselersdijk	0,0	12,8
Total area			0,0	315,9
Average per company			0,0	39,5

Table 7 Greenhouse companies in Agriport

The established companies in Agriport are all vegetable growers and all have their origin in the traditional greenhouse cluster Westland. All companies that are located in Agriport established after 2005 and started with an empty land plot. The large-scale land plots are a characteristic for the area. The difference with the statistics from CBS in Table 1 (chapter 1) is probably because this field analysis is only measuring the surface that is used for primary production. All land surface that is used for water storage, energy supply, logistics and offices is not included in the measurements of this research.

⁴ GreenCo Wieringermeer built its 10,0 hectares greenhouse in 2016.



Figure 6 One of the large scale greenhouses in Agriport

4.2 Interview results

The interviews in Agriport are conducted with the Municipality of Hollands Kroon, the Province of North Holland, two greenhouse growers, the commercial director of developing company Agriport A7, a project leader of the collective energy supply ECW and a program director of Greenport Northern North Holland (NHN) together with a developer of ONHN, the developing agency of the province.

Introduction of the interviews

Before asking questions which are related to the different dimensions of greenhouse clusters, the interviewees were asked about the additional value of the greenhouse sector for the area. The growers were asked for their reason to establish in the cluster.

Additional value for the area

The Municipality of Hollands Kroon (interviewee 2) states that the cluster Agriport is important for the area, because of employment opportunities, sustainability and innovations. Besides the greenhouse horticulture, the business area for agro-logistics is important in the economical spin-off for the area. From all interviews can be concluded that the economic activities in Agriport are important for the region. In the interview, the developer Agriport A7 referred to an article in the *Volkskrant* from the year 2000 in which the author was talking about “*the Siberia of the Netherlands, where no economic activities will ever happen anymore.*” A lot of government programmes were investing money to stimulate the economic structure of the northern part of North Holland to avert this trend. According to Agriport A7 these measures were not successful at all. The developments in Agriport were no government initiatives and did not receive any governmental funding. However, these developments are, according to Agriport A7, offering 4000 to 5000 jobs in the area.

Reasons to establish in Agriport

The companies are asked about their reasons of establishment in the cluster Agriport. The growers are all coming from the traditional greenhouse area Westland, in which it is not possible to construct large scale greenhouses. The fact that the upscaling process in Westland is not fast enough and stuck in the old traditional structure could be seen as one drivers of greenhouse growers to move out of Westland.

One of the growers has gone through an interesting path before it decided to establish in Agriport. This grower was one of the initiators of Agriport and has already built large greenhouses in a greenhouse area in Made, in Noord-Brabant. In Made, the company is using the rest warmth of an electricity power plant in the surrounding environment. The company had experiences with investing in relatively large greenhouses and the usage of energy in a sustainable way. In 2003, the company was looking forward to the future, to search for a new location where they were able build a greenhouse which could guarantee them to stay a modern and efficient greenhouse company for at least 20 years. The company searched through the Netherlands along several greenhouse areas to find the most suitable establishment location. In Terneuzen the form of the land parcels was not efficient enough to build a large scale greenhouse. In Bergerden, the company would like to build a greenhouse of 80 hectares, which was larger than all other greenhouses in the area and larger than the initial parcel structure. The grower proposed to restructure the road and parcel system and to make a new land parcel of 80 hectares for one large vegetable greenhouse. Initially, the Municipality of Lingewaard would like to do business with this entrepreneur, but later they rejected the plan, because it did not match with their ideas for the area and the plans for an energy cluster in Bergerden. The planned greenhouse was too large compared to the other businesses. Then, the grower joined a project to develop a greenhouse area in the Municipality of Eemshaven, in northern part of Groningen, near to the harbour of Eemshaven. This government initiative of the Municipality of Eemshaven and the Province of Groningen was intended to attract companies from Westland, but the grower did not become enthusiast of the parcels with a surface between 5 and 10 hectares. The grower said that this plan was not able to attract growers from Westland, because parcels with these dimensions are still available in Westland. Furthermore, the designed green and water structure was not desirable. He initiated a new parcel structure with seven large greenhouse parcels of between 28 and 35 hectares and a business area for agro-logistics. In the meanwhile, an entrepreneur – a lettuce grower and processor and the founder of developing company Agriport A7 – started with the initiative to develop a greenhouse area of 70 hectares, with 40 hectares of business area for agro logistics, in the Wieringermeer. The Wieringermeer is located exactly in between the development location in Groningen and Westland and the grower saw the developments in the Wieringermeer as a threat for the developments in Groningen. He chose to let the lettuce grower in the Wieringermeer reconsider his investments, because his plans seemed to have a lack of scale to become successful. According to the greenhouse grower, the plan should at least have a size of 500 hectares, otherwise it would never become successful. The proposed small parcels did, according to the grower, not meet the requirements for modern greenhouses. The grower thought he succeeded in making the lettuce grower abandon his development plans. In Groningen, the plans were almost turned into contracts, however, the Province of Groningen had to leave the option open for other companies, to avoid the semblance of state aid. Before the plans in Groningen were contracted, the lettuce grower from the Wieringermeer called

that he upgraded is plan to 500 hectares and that the grower could come to sign for the purchase of a parcel of 80 hectares. This resulted in an establishment of this grower in the new greenhouse area Agriport. From this moment on, this grower puts a lot of effort in the attraction of growers to the area and the cooperation of growers within Agriport. The grower succeeded in attracting greenhouse companies with ambition. The other interviewed grower is one of the growers, who became interested in Agriport, after he was told which other companies were also interesting in the area. This company preferred an expansion location outside Westland, but was not looking forward to start a greenhouse business in a desolate polder without any neighbours. According to this grower was the collaboration of a small group of powerful growers and an ambitious developer, with good connections at the municipal and provincial government, the success factor of the start of Agriport.

4.2.1 Horizontal dimension

Degree of collaboration among direct competitors

In general, the interviewees indicate that the collaboration between direct competitors within Agriport is constructive. The growers are working together in several ways and therewith accomplish advantages. One of the growers (interviewee 7) mentions that the company had no collaboration with any of the other companies of Agriport before they established in the area, but emphasizes that the establishment in the area led to conversations with the other growers. The absence of a high-voltage electricity network brought the growers together to do large investments, which could not have been realised individually. These investments were done via the energy cooperative ECW. Besides the energy cooperative, there are a lot of collaborations between the growers of Agriport. This is confirmed by Agriport A7 and both of the interviewed growers (interviewee 5, 6 and 7). Some companies are doing the cooling, packaging and sorting of the products together. Furthermore, there are companies which have a collective employment agency. Currently, five companies together have a packaging cooperative.

Two companies in Agriport had a collaboration that became so close, that they merged in 2016. The two companies were located on parcels next to each other. One of the companies became larger and built their land already full with greenhouses, while the neighbour was smaller and had 20 hectares of open land left for the construction of new greenhouses. Together, they built a new greenhouse and became one company.

The Municipality of Hollands Kroon does not have supporting measures to stimulate the collaboration between greenhouse growers, because collaboration is already taking place without governmental interference. Agriport A7 is also not stimulating the collaboration between greenhouse growers in the cluster. Currently, most companies are established in Agriport for more than 10 years and they do not need Agriport A7 anymore to find each other for mutual collaborations. In the establishment period of Agriport, developer Agriport A7 invited all growers to think about the future of the area and its development direction. This was in the period that they were also collectively developing a land use plan for the area (see 4.2.3). Agriport A7 explains that the company is not a cooperative of greenhouse growers. They are an independent company, with a business model to make money with the sales of land. They stimulate the greenhouse cluster, because a

successful cluster will lead to better sales of land. For example, the most important collaboration between the growers, the energy cooperative ECW, is founded by Agriport A7 to make the area more attractive. Agriport A7 says that did not establish ECW because they would like to own an energy company, but because they would like to make the cluster Agriport more attractive for potential newcomers. There were several parcels which were not sold yet and all growers needed high-voltage electricity to power their large installations. This required large investments that the growers could not afford individually. Agriport A7 founded Energy Combination Wieringermeer (ECW) and gave every company which bought a parcel of land in Agriport a share in ECW. Currently, Agriport A7 has no share in ECW anymore. ECW became a cooperative and thus a collaboration between all growers in the cluster. All activities of ECW could be seen as collaborative activities of direct competitors.

ECW is – commissioned by the growers of Agriport – trying to make the area more flexible towards the future by creating an optimal energy mix. For the production of vegetables in greenhouses, the resources electricity, heat and CO₂ are needed. Currently, these are produced in the CHP-installations which are running on natural gas. ECW is trying to optimise the running of CHP-installations, which are located in every single greenhouse of Agriport. The ‘smart grid’ makes it able to exchange the electricity, heat and CO₂ between companies. Also extra electricity can be produced in CHP-installations at moments when electricity from the external net is expensive. The collaboration between the CHP-installations, which is automatically controlled, makes it possible to turn several installations off. This is making the energy costs in Agriport very low, which is an advantage for all growers. *“We are making everybody crazy with our low energy costs,”* says one of the interviewed growers (interviewee 7). ECW is trying to make these costs even lower, but is also trying to become more flexible towards new innovations in the energy sector. In the smart grid, there is always a so-called ‘must-run’ for one of the three resources for the CHP-installations in Agriport. ECW is currently constructing geothermal energy wells, which will be used when there is a must-run for heat. This could be used until a certain level, because the CHP-installations are also running for CO₂ and electricity. To become less dependent of natural gas and creating an optimal mix of resources, ECW is also searching for external sources of CO₂. They are thinking about road transport of liquid CO₂, the construction of a pipeline to Agriport from CO₂-producing plants or attracting a CO₂-producing company to agribusiness area. However, it is currently still very cheap and easy to produce CO₂ in the CHP-installations.

ECW indicates that the arrival of a large data centre results in lower costs for the maintenance of the electricity grid. The data centre is an extra user of the private net and thus an extra actor to carry the costs for the network. All interviewees are positive about the arrival of the datacentre. To make the energy balance of Agriport more efficient, ECW is searching for the possibilities to harvest the heat that is produced in the data centre and to use it to heat the greenhouses. The energy manager of ECW explains that they are sometimes performing some extra collective activities. ECW says they also arrange the licenses for collective underground water storage and control the internet network for all the companies. *“Everything that they cannot arrange in isolation and is an advantage for the area, for all the participants together, is coming to us.”*

Agriport A7 indicates the existence and the importance of collaborations between the greenhouse companies in the area, but emphasizes that collaboration is not a goal on its

own. The companies are doing everything individually, except for the things that have to be done collectively. Collaboration is taking place, but only when the companies will acquire significant advantages from collaboration. Agriport A7 highlights that they will immediately do things individually when that is better for the company. Agriport A7 stresses the fact that the companies are competitors in principle.

Degree of observation and comparison

The growers in Agriport do observe and compare each other on a regular basis in a structural and formal way. According to the grower this stimulates to produce better and get a higher efficiency per square metre. The grower relates this to Westland, where monitoring the neighbouring growers also has been an effective stimulation to become a successful greenhouse area. Both of the interviewed greenhouse growers are member of a growers association. One of these growers associations is very large and most of the growers in Agriport are a member. One of the growers (interviewee 7) emphasizes that this was not the case before the establishment in Agriport. After gathering several times, some companies were asked to join the same growers association. Within the growers association, all growers know each other's production figures per square metre over the last 15 years.

One of the growers (interviewee 6) says that he became interested in Agriport after hearing which other companies were interested in the area. The direct competitors are observed and in this situation the companies followed each other to establish in Agriport.

4.2.2 Vertical dimension

Need for vertical relations among greenhouse growers

The growers indicate that they need vertical relations, but these vertical relations do not necessarily need to be located in Agriport itself. Both interviewed growers highlight their strong vertical relations with the traditional greenhouse area Westland and indicate that a stronger vertical dimension in Agriport is not necessary for their business. However, according to the province and the greenport, the vertical dimension in Agriport could be improved.

One of the growers (interviewee 6) mentions that the vertical relations were located very close, when the company used to be located in Westland ten years ago. Currently, the vertical relations are located further away, because they are not located in Agriport. It seems that the growers are able to find solutions for the distance to their vertical relations themselves: *"The arrival times are sometimes longer and flexibility is sometimes a little less. Therefore, we have more technical employees than an average greenhouse company. We have our own service now, so we created our own solution."* Greenport NHN (interviewee 3) says the enlargement of collaboration in the vertical chain is necessary. According to the greenport, transport and innovation could not become more efficient without intensive collaboration in the chain. Also the Province of North Holland says that Agriport can enlarge its value by becoming the logistical hub within the area of Greenport Northern North Holland.

Degree of collaboration in the vertical chain

In general, the vertical relations of the companies in Agriport are well-developed, but not geographically concentrated in the area of Agriport. Both interviewed growers say that they do not have vertical collaborations within the close environment of Agriport that are noteworthy. Furthermore, Greenport NHN and both of the interviewed growers indicate that there is a trend of chain integration.

One of the interviewed growers (interviewee 7) says that the company does not have vertical relations within the area of Agriport. *“Agriport is purely a production location. For the rest, Westland is, according to us, the logistical hub and should remain it.”* The other grower (interviewee 6) says some of the vertical relations are more closely located. The company’s growers association has connections with a transport company from Wervershoof and a trading and processing company from Zwaagdijk, both located near greenhouse area Grootslag. The trading company is part of a larger trading group, of which the headquarters is located in Westland. Also Greenport NHN says that most of the vertical activities are connected with Westland. There is a large transport movement to this region, because the packaging and distribution are located in this area. One of the growers (interviewee 7) mentions that the Netherlands could be seen as one large greenhouse cluster and that competitors are not located in other areas within the country, but in foreign areas as for example southern Spain.

The Municipality of Hollands Kroon (interviewee 2) underlines the importance of vertical collaboration, but has no stimulation measures, because the collaboration occurs without the interference of the government. The municipal officers explain that the collaboration is mostly stimulated by the developing company Agriport A7. However, Agriport A7 (interviewee 5) says they do not stimulate collaboration between growers and suppliers, transport companies and traders. The Province of North Holland (interviewee 1) mentions that Greenport NHN is an important organisation when it comes to collaboration in the vertical chain. They are for example collaborating with vegetable processors to increase the durability of bell peppers. Greenport NHN and ONHN see that there is a trend of chain integration in which companies are starting to do parts of the chain by themselves. This is confirmed by one of the growers (interviewee 7) who says that the growers association Harvest House has its own trading companies. In these trading companies, the growers try to sell most of their products. *“In this way, the margins are coming back to us and that is what we would like to see.”*

4.2.3 Institutional dimension

Role of the local government in the development of the greenhouse cluster

In the development of the greenhouse cluster, the Municipality of Hollands Kroon is taking a facilitating role. The municipality is clear that they will not take the role as initiator. The interviewed municipal officers (interviewee 2) say that the market mechanism should be the initiator in the development of the greenhouse area, because the market is better able to respond to changes and the desires from the sector than the local government. The local government is saving the common interest in Agriport and is facilitating opportunities for the entrepreneurs to develop their businesses. The Province

of North Holland also sees its role as facilitator and says that their most important task in the creation of Agriport was the facilitation of the spatial planning of the area.

The Municipality of Hollands Kroon says that they are preparing land use plans together with the entrepreneurs. From the beginning of Agriport, the land use plans are made in collaboration with developer Agriport A7. The municipality is open for suggestions from the property developer. Both Agriport A7 and the municipality are interested in the success of the greenhouse cluster. Finally, the municipality has the decisive power. The municipal officers say that they are confident with their role as facilitator. *“We can think about a new greenhouse area of 40 hectares from behind our desk, but when there is no demand for it, you can ask yourself: where are you doing it for?”* An example of a demand-driven development is the construction of large parcels in the greenhouse area. The large scale of the parcels was no governmental requirement, but a demand-driven interference, initiated by one of the first establishing greenhouse growers.

The governments – both the province and the municipality – facilitated the developments from the market, but had some small requirements which generated further economic activities in the area. The Municipality of Hollands Kroon approved the initial plan of a lettuce grower – the later founder of Agriport A7 – to establish a processing location along the highway A7, provided that other companies could establish as well. This resulted in the idea for the development of an agribusiness area. Thereafter, the Province of North Holland had to bend over the plan for the agribusiness area. The province approved the plan with the requirement that an area for the development of greenhouses should be included. According to one of the interviewed growers (interviewee 7), the province did this to solve their own problem of relocation of greenhouse companies from the Alton area, which was intended to become an industry area. The relocation of greenhouse companies and the transformation of Alton into an industry area never happened, but the plans of Agriport met the requirements of the province. A greenhouse area was included in the plans, and the initiating lettuce entrepreneur, who founded Agriport A7, became the driving force to guide it to a success. In this way, the requirements of the municipality and the province to develop greenhouses for approving the construction of the agribusiness area, led to the development of Agriport, without a lot of governmental interference.

Guiding vision or strategy for the area

In the interviews, the organisations (interviewees 1, 2, 3, 4 and 5) are asked whether they have a guiding vision or a strategy for the development of the area Agriport. The general characteristics of the different visions for Agriport are flexibility and adaptability. Especially the municipality, Agriport A7 and ECW mention that flexibility is the core element in their way of thinking. The importance of being demand-driven is highlighted by the municipality, Agriport A7 and Greenport NHN. The Province of North Holland is a little bit more

The Municipality of Hollands Kroon (interviewee 2) is following the ‘yes, unless’ principle. This means that, following the principle, every development is possible, except when the municipality is able to explain why something should not be realised. Everything that has an added value for Agriport, should be possible in the area. When, for example, a certain development fits in the principle of the circular economy, it should be possible as well. This is why the municipality decided to agree with the arrival of data

centres in Agriport. The municipality thinks that the combinations between companies are very important, for example to stimulate the chain and to increase transport efficiency.

The Province of North Holland (interviewee 1) says that they have a strategic greenport vision, with an implementation agenda. This vision is not specifically focused on Agriport, but affects the whole greenhouse sector in the province. Part of this vision is the spatial planning of greenhouses, in which the concentration policy of the province is explained. Within the Province of North Holland, greenhouse areas are assigned, which are Agriport, Aalsmeer, Alton, Grootslag and Heemskerkduin. The province is limiting greenhouse development to these areas. The provincial policy advisor says that the market mechanism has been important for the development of these areas, because Agriport was not even mentioned as expansion location by the national government (see satellite locations, chapter 1). Furthermore, sustainability is an important theme in the vision of the province. The policy advisor of the Province of North Holland says that the growers of Agriport have a very good vision themselves, because they are better looking forward to the future in comparison to growers in other greenhouse areas in the province.

Developer Agriport A7 (interviewee 5) is also having a flexible way of working. The company is in principle demand-driven and not per definition holding on their long-term future perspective. Agriport A7 explains that they did not intend to make parcels of 100 hectares, but that this was a demand from the interested greenhouse growers. Agriport A7 says that *“there is a kind of future perspective, but this is based on the developments on the market and we are moving when the market starts to move.”* Agriport started with the idea of a logistical centre for agribusiness, but during the process other developments came on its path. Greenhouses were included in the plan and became very large. Therefore, high-voltage electricity was necessary. After the construction of the high-voltage grid, the presence of energy infrastructure has made the area attractive for data centres as well. According to the developer, Agriport could only become successful because of the adaptability to changes. Agriport A7 thinks that policymakers are inclined to develop a very detailed policy. According to Agriport A7, the dynamics of the area are very important and a policy that only consist of mainlines should be part of this.

Greenport NHN (interviewee 3) highlights that they do not develop policies themselves, but that they are mainly working with policies of the Province of North Holland. However, they have their own vision on this policy and say they are working from the demand of the entrepreneurs. For example, the concentration policy of the province is not always desired from the company's perspective.

Also the energy cooperative ECW (interviewee 3) is trying to be as flexible as possible to create an optimal energy mix for the future. Their vision is directed towards the change of energy sources and the development of new energy sources as geothermal energy and external CO₂ supply.

Usage of instruments by local government, formal institutions

The instruments that are mentioned to stimulate the development of the greenhouse cluster are mainly following the visions that are explained above.

The most important instrument that is used by the Municipality of Hollands Kroon is the flexibility of the fixed frameworks in the land use plans. The ‘yes, unless’ principle is mentioned again by the municipal officers, when discussing instruments. The

municipality does not see reasons to put effort in other stimulation measures. According to the municipality, there is no demand for stimulation measures. Greenport NHN confirms this by saying that the companies are large enough to care for themselves.

Developer Agriport A7 has a business model that is based on the sales of land, but thinks that this could be stimulated by creating a good competitive position in comparison to other areas. Agriport A7 is therefore facilitating in the prerequisites for this competitive position. The developer looks how to plan the area to get the costs for the greenhouse companies as low as possible. Agriport A7 is facilitating the growers were possible. For example, growers can use the network and the experience of the developer to go through planning and license procedures. According to the developer Agriport A7, this is different in other greenhouse areas, where third parties would like to earn money from the development of the greenhouse cluster, which is not per definition good for the greenhouse horticulture.

The Province of North Holland mentions connecting parties as one of the most important provincial instruments. For example, the province brings stakeholders together to talk about the so-called Green Deal CO₂. In this collaboration between the province, the greenports in North Holland, municipalities and other stakeholders are investigating the possibilities to realise external CO₂ facilities. The aim is to capture the rest product CO₂ at large industry plants and use it in greenhouses. Therefore, CO₂ should be brought to the greenhouses, for example by pipelines, but this is not profitable yet.

ONHN, which has the aim to stimulate the economy and employment opportunities in northern North Holland, brought the initial idea for the establishment of a large data centre in Agriport and says to be searching for opportunities to establish a second data centre in Agriport. The Municipality of Hollands Kroon thinks that the arrival of data centres should be facilitated, because they can contribute to the development of a circular economy, when rest heat will be used in the greenhouses. Developer Agriport A7 says that flexibility of the area has to be guaranteed in a way that they are also able to facilitate the establishment of several new data centres. The Province of North Holland is more careful and says that the possible limits of data centres should be investigated.

Regulations, land use plans and planning concepts

The most remarkable finding regarding the land use plans is that the developments in Agriport are a co-creation of the municipality and the developer Agriport A7. The first land use plan is made by Agriport A7 and approved by the municipality in 2006 (Bergstra and Veldhuizen, 2006). The small former Municipality of Wieringermeer did not have the expertise and the money to set up a land use plan and asked Agriport A7 to arrange it themselves. Currently, land use plans are made in cooperation. It is easy for the municipality to become aware of the desires from the market, because there is intensive contact with the developer. This contact is making the process easier and more efficient and makes direct contact between municipality and growers unnecessary. Besides the European CO₂ emission regulation, the use of regulations seem to be aimed to become more flexible in the generation of new developments.

Agriport A7 declares that the contact between municipality and the developer is good and emphasizes that the municipality also sees the importance of the developments. In the initial phase, the municipality was not investing in it and did not want to take any risk, so

Agriport A7 had to develop the land use plans and the environmental impact report (m.e.r.) by themselves. The municipality is watching over the public interest, but says that Agriport A7 has to pay for the research and the developments in infrastructure. Agriport A7 asked the first interested growers to help with the designation of the land use plan, to make sure that the land use plan is matching with the developments of the coming 20 years and not of the past 5 years. One of the interviewed growers (interviewee 7) was the first grower who established in Agriport. He says that it has been good for the development of Agriport that everything could be determined beforehand. He is a strong supporter of the co-creation with the growers in the land use plan. The growers were collectively able to choose what is the best for the whole area, so that all growers in the area have to follow the same regulations. For example, the strict light pollution regulations were initiated by this grower (interviewee 7), because he thinks the people in the environment and their attitude towards the greenhouse horticulture in Agriport are very important to keep on doing business without restraint. If all growers have to follow the same regulations, the light pollution measures do not have competitive disadvantages for the growers. According to this grower, the co-development of the land use plan makes it possible to take away competitive disadvantages and to reach the desirable result for the surrounding environment. According to Agriport A7, it is unique that there were so little objections against the land use plans. During the designation of the land use plans there was a lot of communication with neighbours and the municipality. Agriport A7 says that the growers see the advantages of the strict regulations, because that makes it possible to develop their greenhouses very fast. However, the Province of North Holland indicates that the involvement of Agriport A7 in the creation of the land use plans was doubtful and that this created later discussions with the financial settlement of the local infrastructure (see 4.2.4).

The Municipality of Hollands Kroon explains that the land use plans for the greenhouses are relatively simple, because the greenhouses are built on large parcels with a single land use. Usually, contact with the municipality is only necessary when there is a wish to develop something unusual for a greenhouse company, like for example a bio gas power plant. The municipality says that they are making these developments possible by facilitating the land use plans according to their 'yes, unless' principle. For example, the municipality took effort to facilitate the inclusion of a data centre in the land use plan. The municipality tries to make the land use plans as wide as possible, in a way that most developments do not require a revision of the land use plan. This gives a signal of trust towards developer Agriport A7 and the growers. One of the few requirements of the municipality is that developments in the business area for agro-logistics should have an added value for the area. Otherwise, the business should take place in the other local business area in the Wieringermeer.

The Province of North Holland says that it is their role to save spatial quality in the area. They set the requirements that the greenhouses should have the same height and the same position with respect to the sun. Contradictory, the Municipality says that they put all the requirements for spatial quality aside, because they think that the united companies are able to arrange these qualities themselves.

The municipality mentions that Agriport is assigned as pilot case in the National Crisis and Recovery Act (Dutch: *crisis- en herstelwet*) to practice with the new Environmental Plan. The introduction of an Environmental Plan for the Municipality of Hollands Kroon

means that more flexibility will be added to the land use plan and the regulations, in a way that developments could take place without going to the whole process for every new initiative.

The European legislation is not in favour of the large growers, because they have CHP-installations above 10 MW. These installations are falling under European legislation about CO₂ emissions, while small companies are not obliged to fulfil the European requirements. However, the small companies seem to produce in a less efficient way and are thus less sustainable than the large growers. According to both growers, the European regulations are causing unfair competition between greenhouse companies.

Financial instruments

In general, the interviewees mention that there are no large subsidies to stimulate the growth of the greenhouse cluster (interviewee 2, 3 and 4) except for subsidies to develop geothermal energy. The province says to have some stimulation funds, but indicate that the growers in Agriport have a lot of investment power by themselves.

Agriport A7 is financially supporting the growers with funding beyond the bank. In this way, Agriport A7 actively stimulates investments and expansion plans of greenhouse growers. This is in their own interest, because the expansion of the greenhouse cluster means that land will be bought as well. However, this is no governmental financial funding, because Agriport A7 is a private corporation. ECW says the national government provides them subsidies for the construction of geothermal wells. The cluster Agriport is thus stimulated with national financial funds to become more sustainable and more flexible with regard to possible developments on the energy market. The province also supports sustainability and says to have stimulation funds to contribute to these developments.

Decentralisation of governmental policy

It is difficult to say whether the decentralisation of governmental policy has effects on the development of Agriport. The Municipality of Hollands Kroon says that it is not clear whether the decentralisation changed the collaboration and the responsibilities in the development of Agriport. The local government is working together with the developer Agriport A7 since the start from the developments. According to the Province of North Holland, the new Environmental Vision will foster the further decentralisation of governmental policy. The Province of North Holland says that the decentralisation of governmental policy should not become a permit to develop all kinds of undesirable developments. The role of the province should therefore include the limitation of the development of greenhouse horticulture to certain areas. This could be included in the new Environmental Vision.

Collaboration between governments

There is a structural collaboration between the Province of North Holland, the Municipality of Hollands Kroon and the Water Board of Hollands Noorderkwartier. The Province says that this collaboration makes it easier to project the possibilities for the area and that its making the process faster. The collaboration could benefit the developments of Agriport, by making clear what future developments could be expected in the total area. The Municipality of Hollands Kroon says that the most important product from this collaboration is the fact that the organisations understand each other and know each

other's activities. The good collaboration between the three governmental organisations is making procedures for developments in Agriport faster, because the governments are quickly adjusting to each other.

The province, municipality and water board are together designating an integrated vision for the total area of the Wieringermeer polder. For Agriport this vision is about to what extent the greenhouse area could expand and how many extra data centres can be developed in the future. The Province of North Holland indicates that this conversation makes clear what are the possibilities and wishes for the area. Examples of topics of discussion are the establishment of labour migrants and the vitality of the villages in the municipality.

However, the province is using more regulations and frameworks than the municipality, to cover certainty in the developments. The municipality would like to see the Province of North Holland to be more flexible as well (see 4.2.4). Usefulness and necessity of developments in an agricultural area have to be proven, before the province agrees with it. There is a list of requirements from the province, while the municipality usually agrees with the ideas, when there is a desire for development from the market mechanism.

4.2.4 Power dimension

Unequal relationships within the cluster

The most dominant actor within the area of Agriport is Agriport A7. Agriport has a large impact on the plan-making process and is having the contact with the established companies in the area. The position of the Municipality is limited to the final decision-making. The first grower who decided to establish in Agriport (interviewee 7) has had a significant impact on the approach of interested growers for establishment in Agriport and on the content of the land use plans. This influence has been very important for the emergence of the collective activities between growers. The municipality, Agriport A7 and both of the interviewed growers say that they appreciate the division of tasks and the fast communication between the actors.

According to Agriport A7, the Municipality of Hollands Kroon has an important position in the development of the cluster. On the field of spatial planning, the municipality has a big role. However, Agriport A7 claims that it has a more dominant role itself within the cluster. Agriport A7 and the Municipality of Hollands Kroon both have their own roles, which is highlighted as a positive characteristic of the collaboration by both the developer and the municipality. Agriport A7 is willing to invest in the area and the municipality is facilitating and guarding the public interest, which is according to the developer a good division of tasks. *"The municipality is thinking with us and we are thinking with them. That is why the collaboration is going faster,"* says Agriport A7's commercial director. However, he still thinks that governmental procedures take too long.

The growers confirm the dominant role of Agriport A7 and see this position as positive, because of the interest of Agriport in the welfare of the cluster. Greenport NHN says that Agriport A7 and a group of large entrepreneurs together have a significant input in the decision-making at municipal level. *"The dominant influence of the cluster and the economic relevance for the regional economy is affecting the decision-making. This is*

strengthened by collaboration, because now they have a larger voice.” Greenport NHN sees the collaboration of the entrepreneurs as a positive characteristic of the cluster, which is making them powerful and better able to make joint decisions about investments. The Province of North Holland confirms this thought. One of the growers mentions that one of the most important factors of the success of Agriport, is the fact that the decisions that are made, are always made in the perspective of what is the best for the whole area of Agriport. In this way, every decision is giving the best result for the area.

According to Agriport A7, the dominant position of the municipality can have negative impacts on the economic developments as well. There has been a period, in which political conflict within the municipal council had an impact. Currently, there are, according to Agriport A7, no negative impacts of the dominant position of the municipality. The dominant position of the municipality is limited to final decisions on the field of spatial planning and the expansion of the cluster. Within the area of Agriport, the municipality does not have a large influence on decisions.

The Province of North Holland says that the municipality is, during the planmaking for Agriport, much feeded by the developer Agriport A7. The municipality has, according to the province, had a double role in the creation of the plans, which is a doubtful situation. In their opinion, the intensive collaboration between the municipality and the developer created a situation which was not integer. Later, this caused discussions about the financing of new access roads to Agriport. The province would let the developer pay for the roads. One of the growers (interviewee 7) and the developer itself do not appreciate the attitude of the Spatial Department of the province. Agriport A7 mentions that the idea dominates that Amsterdam is the place for business and the rest of the province is nice for tourism and recreation. One of the growers (interviewee 7) mentions that sometimes *“there is a civil servant who would like to arrange something over the back of Agriport.”* However, he mentions that *“when the developer is going to talk with the right people, it will be fixed anyway.”* This grower (interviewee 7) and the municipality say that the Spatial Department of the province could be less reserved towards the development in the cluster. The municipality indicates that this could add extra flexibility in the spatial planning process. However, according to the grower (interviewee 7) and the developer (interviewee 5), the province has two faces. The Economic Department is seen as positive and stimulating. The other grower (interviewee 6) is mentioning the positive relation with the province and says that they have high ambitions.

Relation with the environment and citizens

The growers that established in Agriport have a lot of experience with issues in the close surroundings of the greenhouse area. With these experiences in mind, the growers see the importance of a good relationship with the citizens in the environment. Therefore, the growers in Agriport always try to meet the wishes of their neighbours.

During the search for a new establishment location, growers faced protests against the arrival of new greenhouses in potential greenhouse locations in the Netherlands. These protests were a reason to search for another establishment location. One of the growers is mentioning the protests in greenhouse area Dinteloord as one of the reasons to renounce establishment in that area. *“In Agriport we were welcomed, by the government, by the*

municipality and even the citizens that we met were enthusiastic.” The other grower experienced the same in Made, where his company could not expand because of the resistance of local residents and the municipal council. One of the growers mentions that the fact that they searched in different areas in the Netherlands for an establishment location, gave them experience in dealing with the surrounding environment. The experience with protests against greenhouse horticulture in other areas is the main reason to handle with two principles for the surrounding environment in Agriport.

The two principles, initiated by one of the growers, are to make sure that the environment is positive about the plans of Agriport. The first principle is that you have to make sure that the environment is profiting from the developments as well in economic sense, to enlarge the group of people that is benefitting from the company's success. The second principle is that you do not hinder the other citizens in the area. This prevents the phenomenon that citizens of which the opinion is not heard, are searching for other people to share their opinion and try to become a powerful block against greenhouse developments. According to the initiating grower, a good relationship with citizens in the environment is one of the most important factors to get desirable developments realised. Entrepreneurs should, according to him, never neglect the wishes of neighbouring citizens and always try to meet their desires and come closer to each other. Light pollution is minimised by regulations in the land use plans of Agriport, because of these two principles that are initiated by this grower. The Municipality of Hollands Kroon shares the opinion of the growers that light pollution should be minimised. In the land use plan is defined that the side walls should block 100 percent of the light. Furthermore, the growers did concessions with their neighbours by constructing a road on a different place and moving a transformation station in the plans.

One of the growers says that the local environment in the Wieringermeer is a small community. That means that the mayor and the aldermen know most of the citizens. Via short lines in the local community, the college is able to know all arguments against the developments, so the growers know that they have to maintain a positive general opinion for the greenhouse horticulture. One of the growers started a weblog from the beginning of the construction of Agriport, to inform the local environment about the developments and to bring a good image of the greenhouse horticulture to the citizens.

4.2.5 External dimension

Collaboration with greenhouse growers from outside Agriport

The growers in Agriport have strong connections with greenhouse growers from outside Agriport. Most intensive connections are associated with one of the large grower associations, of which most of the growers in Agriport are a member. The most external connections are with growers in the greenhouse area Westland, but there are other connections with among others Grootslag, Aalsmeer and Venlo. The connections between Agriport and other Dutch greenhouse areas are interwoven in such a way, that one of the growers (interviewee 7) says that The Netherlands as a whole could be seen as the cluster. This grower also says that exchange of knowledge provides the most important added value of the collaboration with greenhouse companies from other areas.

The growers association of which several growers of Agriport are member, has a lot of members in different greenhouse areas through the Netherlands, for example in Westland, Zeeland and Limburg. The growers from the growers association are collaborating in the representation of interests at the national level, for example in energy legislation. According to one of the growers (interviewee 7), the most important added value of collaboration with growers from other greenhouse clusters is the transfer of knowledge. Moreover, it gives a more powerful voice at the national government.

One of the growers (interviewee 7) says that the Netherlands as a country could be seen as the greenhouse cluster and that the competitors of this cluster are located in for example southern Spain. Connections with other greenhouse areas in the Netherlands are so strong, that they say that the cluster is not geographically limited to the borders of Agriport. Because of the idea of the country as a greenhouse cluster, the growers are involved in the success of the other greenhouse areas in the Netherlands. The grower tries to make other growers aware of the fact that collaboration and sharing knowledge are competitive advantages to compete against the 'real competitors', which are the greenhouse companies in foreign areas. The grower also thinks that it is therefore important to think about the Netherlands as a greenhouse cluster and how to preserve the Netherlands as a modern greenhouse area. Therefore, he initiated Coalition HOT. This coalition is a collaboration of different stakeholders to direct the restructuring of the traditional greenhouse clusters. In Coalition HOT, six growers associations, a bank, the flower auction, the Province of South Holland, the Ministry of Economic Affairs and the Municipality of Westland are trying to preserve the Netherlands as a modern greenhouse area. This is done with several measures, among which the facilitation of the restructuring of Westland, Aalsmeer and Bommelerwaard. According to the initiating grower from Agriport, the most important focal point of Coalition HOT is to facilitate entrepreneurs. When an entrepreneur would like to do an investment, all governments should do everything to facilitate the investment as soon as possible.

Greenport NHN indicates that the growers from Agriport are a source of information for the greenport. For example, they can use knowledge about energy infrastructure and the existence of an energy cooperative in the development of one of the other greenhouse areas in North Holland, the Alton area. In several fields, the growers have implemented inspiring innovations, which could be useful for other greenhouse growers as well. Greenport NHN tries to link the growers of Agriport to other growers, by for example inviting them for conferences. Greenport NHN is also asking the growers for information when it is about larger long-term visions for the Greenport and the connection with the harbours of Rotterdam and Amsterdam and Schiphol Airport. In this way, the knowledge of growers is via Greenport NHN used in national issues as the issue of MIRT Greenport Mainport.

The Province of North Holland indicates that development of Grootslag and Alton, the two greenhouse areas that are relatively close to Agriport, has been raised by the presence of Agriport. The presence of Agriport increased the speed of the development and the upscaling in the two smaller greenhouse areas. The province also mentions the relationship between Agriport and the closely located Seed Valley.

The Municipality of Hollands Kroon does not have supporting measures for the stimulation of collaboration with companies outside Agriport.

Collaboration with governments from other greenhouse areas

The governmental organisations from Agriport have structural contact with governments from other greenhouse areas, however, it seems that this is not functioning very well. There is contact with other operators of geothermal energy in the Netherlands, which is more fruitful, mostly by exchanging technical innovations.

The Municipality of Hollands Kroon mentions that they are member of the Greenport Northern North Holland (NHN) and that this greenport has contact with other greenports in the Netherlands. This contact is about the exchange of information between greenports and about drawing attention for important issues at the national government. The programme manager of Greenport NHN, which is also interviewed for this research, says that there is a structural collaboration between the six official greenports, called Greenport Holland. In this conversation, the greenports Westland/Oostland, Aalsmeer, Venlo, Duin- en Bollenstreek, Boskoop en Northern North Holland (NHN) are represented. However, according to the programme manager, this collaboration is not functioning very well, because of administrative bureaucracy. There is some contact with areas which are not officially marked as greenport, but the structure of these organisations is inadequate and there is lack of capacity. Furthermore, Greenport NHN is involved in some national issues as well. One of these issues is MIRT Greenport Mainport, which is treated by a collaboration of the Ministry of Economic Affairs, the Ministry of Infrastructure and the Environment, Schiphol Airport, Rotterdam Harbour and six Dutch greenports among which Greenport NHN.

ECW is collaborating with other greenhouse areas on the field of geothermal energy. ECW organised a platform to exchange knowledge and experiences in geothermal projects with other geothermal operators in the Netherlands. These operators are mainly operating in geothermal energy for the greenhouse sector. Furthermore, ECW emphasizes that they are involved in a structural, provincial conversation with important companies of North Holland. ECW is calling these companies the ‘movers and shakers’ of the province. This conversation is meant to test and discuss the provincial policy with the business world. In this way, ECW is testing the provincial policies on the developments of Agriport and is giving the province feedback from their practice experiences, so that the policy fits in the ideas for the greenhouse area.

To complete the interviews: future of Agriport

Developer Agriport A7 thinks that the future growth of Agriport will be coming from the greenhouse companies that are already established in the cluster. The large companies that made the upscaling movement from 5 to 10 hectares in Westland to 30 to 40 hectares in Agriport can more easily make the step to construct another 50 hectares of greenhouses. The companies just went through a difficult period of the financial crisis and the EHEC crisis and are now ready to make new investments. The organisational structure of the large scale companies is different than the companies that are still doing business on 2 hectares of greenhouses. *“I think they missed the boat. Large companies are more likely to grow further, than small companies that have to make a huge jump forward,”* says the commercial director of Agriport A7. This vision is confirmed by one of the growers (interviewee 6), who says that there is only a small group of companies that can possibly make the step to move to Agriport.

Another grower (interviewee 7) says to be for 100 percent sure that Agriport will exist of 800 hectares of greenhouses in ten years. *“I do not know any greenhouse area in the world, which is better than this area,”* he says. *“Actually, it is perfect.”* One of the growers (interviewee 6) is mentioning, that in the greenhouse sector in the Netherlands, there is no need for extra greenhouse surface. That means that somewhere, greenhouses should disappear, when Agriport is growing. The other grower (interviewee 7) says that the merge of two neighbouring companies happened once in Agriport, but is likely to happen more. In this way, the largest greenhouse companies are becoming even larger.

The Municipality of Hollands Kroon thinks that the ideas of combinations between companies with added value are an important factor for the future of Agriport. They think Agriport will keep on looking to possibilities in the field of sustainability and a circular economy without waste. Opportunities for the future are lying in a biomass power plant and the further development of geothermal energy. The future opportunities in geothermal energy are also mentioned by energy cooperative ECW, Agriport A7 and the growers.

4.3 Document study

As a complement to the conducted interviews, this chapter describes the results of the document study for greenhouse area Agriport. The researched documents are the land use plans for Agriport, municipal visions, provincial policy documents and the position paper and implementation agenda of Greenport NHN. The reference details of these documents could be found in Table 8. The quantitative results of the document study could be found in Table 9.



Figure 7 Aerial photo of one of the greenhouses in Agriport, with the villages of Opperdoes and Medemblik in the back.

Doc.	Document title	Year	Author(s)	Institution / Publisher	Type of institution
1.	Bestemmingsplan Agriport A7 Grootschalige glastuinbouw	2006	Bergstra, A. Van Veldhuizen, J.E.	Gemeente Wieringermeer	Municipality
2.	Bestemmingsplan Uitbreiding Agriport A7 Grootschalige glastuinbouw	2010	BügelHajema	Gemeente Wieringermeer	Municipality
3.	Structuurplan Gemeente Wieringermeer	2006	KAW architecten / ARCADIS	Gemeente Wieringermeer	Municipality
4.	Bestemmingsplan Agriport A7 Bedrijventerrein agribusiness en logistiek, derde herziening	2010	Dekker, R.W.	Gemeente Wieringermeer	Municipality
5.	Omgevingsvisie Hollands Kroon 'Ruimte voor elkaar'	2016	Cremers, A.	Gemeente Hollands Kroon	Municipality
6.	Ruimte voor Rust én Dynamiek Strategische visie	2013		Gemeente Hollands Kroon	Municipality
7.	Structuurvisie Noord-Holland 2040	2015		Provincie Noord-Holland	Province
8.	Uitvoeringsprogramma Structuurvisie Noord-Holland 2040	2014	Gedeputeerde Staten	Provincie Noord-Holland	Province
9.	Uitvoeringsagenda Economie 2016-2019	2016		Provincie Noord-Holland	Province
10.	Meerjarenplan Greenport Noord-Holland Noord 2016-2018	2016		Stichting Greenport Noord-Holland Noord	Development foundation
11.	Position Paper Glastuinbouw Greenport Noord-Holland Noord: Verbreden en verbinden: kansen voor de glastuinbouw in de Verstuin van Noord-West Europa	2013	Lucas, E. Brandsen, F. Cozijnsen, B. Dekker, J. Graven, P.	Stichting Greenport Noord-Holland Noord	Development foundation
12.	Stimulans Glastuinbouw Noord-Holland	2009	Rotteveel, A. Koeckhoven, O.	LTO Noord	Interest group
13.	De Kop Werkt! Publieke Ruimtelijk-economische uitvoeringsagenda	2013	Stuurgroep De Kop Werkt	Gemeente Hollands Kroon, Gemeente Texel, Gemeente Schagen, Gemeente Den Helder, Provincie Noord-Holland	Collaboration of municipalities and province

Table 8 Documents Agriport

Document	1	2	3	4	5	6	7	8	9	10	11	12	13
General catchwords													
greenhouse	62	45	3	18	-	-	-	-	-	3	5	4	-
horticulture	238	294	12	14	11	3	13	13	16	17	67	92	2
Agriport	153	286	32	97	23	2	3	1	-	1	17	13	-
Horizontal dimension													
collaboration	2	3	1	-	2	1	-	-	-	3	7	2	-
association	1	1	-	1	1	1	-	-	-	-	-	1	-
observation	-	-	-	-	-	-	-	-	-	-	-	-	-
comparison	1	1	-	-	-	-	-	-	-	-	-	-	-
Vertical dimension													
collaboration	5	6	1	6	2	1	3	8	22	23	7	4	2
chain	2	2	5	-	8	8	1	3	4	8	10	1	-
transport	8	7	2	3	1	2	4	2	-	-	2	-	-
logistics	29	20	1	48	7	1	3	13	2	6	12	13	-
trade	2	2	1	-	1	-	1	-	7	5	-	5	-
market	7	6	-	-	16	1	1	5	7	1	10	1	-
Institutional dimension													
role	1	-	1	-	7	23	38	16	61	3	6	8	-
active	-	-	-	-	2	10	12	3	-	4	3	3	1
passive	-	-	-	-	-	-	-	-	-	-	-	-	-
plan	506	513	187	206	77	10	134	142	16	16	4	16	12
regulation	60	36	3	38	46	14	31	42	43	8	2	13	2
measure	16	9	-	1	8	9	9	24	7	-	-	2	1
stimulate	5	3	6	-	7	12	16	28	32	20	3	11	3
facilitate	4	1	-	-	20	9	12	10	2	2	1	3	1
strengthen	9	6	15	3	15	21	32	51	33	18	4	2	18
subsidy	-	-	1	-	-	-	3	4	18	5	1	-	-
fund	-	-	-	-	-	-	-	1	18	4	2	-	7
finance	6	4	2	3	4	8	17	22	47	4	2	-	8
Power dimension													
relation	10	4	-	-	-	4	1	2	2	2	2	7	1
unequal	-	-	-	-	-	-	1	-	-	-	-	-	-
dominant	-	-	-	-	-	-	-	-	1	-	1	-	-
support	3	4	-	-	3	-	5	-	3	2	-	-	-
External dimension													
collaboration	-	-	-	-	2	3	2	-	-	14	-	6	-
external	-	-	-	-	-	-	-	1	1	2	1	-	-
outside	5	5	-	-	1	3	1	1	4	7	6	3	1
international	2	3	2	1	2	2	34	4	53	29	4	3	2

Table 9 Results document study Agriport

In general, the outcomes of the document study confirm the findings of the interviews and supplement the thoughts of the interviewees. The general catchwords ‘greenhouse’, ‘horticulture’ and ‘Agriport’ are used to monitor the relevance of the documents and to analyse in which degree the documents are focused on the greenhouse area Agriport. The document ‘De Kop Werkt!’ (document 13) does not contain a lot of general catchwords and is therefore not seen as a relevant document. The general catchwords are most intensively used in the land use plans and the documents of Greenport NHN. Greenport

NHN is using ‘Agriport’ in combination with the potentials for the greenhouse areas, which are among others related to energy, innovation and the large scale of the available land parcels.

4.3.1 Horizontal dimension

In general, the conclusion could be made that the horizontal dimension is not emphatically present in the documents. Policymakers and land use planners do not mention the indicators for the horizontal dimension very often. No explicit stimulation measures to stimulate the horizontal dimension could be found in the documents. The horizontal dimension is most present in the documents from Greenport NHN (document 10 and 11; resp. 3 and 7 times) and the two land use plans of Agriport 1 and Agriport 2 (document 1 and 2; resp. 4 and 5 times). Greenport NHN illustrates that the growers should take the joint responsibility for the area. The joint exploitation and management of the greenhouse concentration area on the field of CO₂, energy, water, electricity and environmental quality should be done by the growers collectively, according to Greenport NHN (document 11) (Lucas et al., 2013) (Lucas et al., 2013) (Lucas et al., 2013). From the interviews could be concluded that the growers are indeed collaborating on these fields. This corresponds with the interview with Greenport NHN, in which the program manager (interviewee 3) says that the growers are able to arrange collective facilities by themselves. The Municipality of Hollands Kroon writes in its Environmental Vision (document 5) that they monitor the developments in the field of sustainable water and energy supply, which are the result of collaboration between greenhouse growers. On the basis of these developments, the municipality is acting in a flexible way and with high priority on collaboration.

4.3.2 Vertical dimension

The indicators for the vertical dimension are frequently found in almost all documents in the document study for Agriport. Indicating words as ‘market’ (55 times), ‘chain’ (52 times) and ‘logistics’ (155 times) are mentioned very often in the documents. The land use plans (document 1, 2 and 4) are paying the most attention to the logistics. This is mainly because the land use plans also contain a part that describes the business area for agrologistics, that is adjacent to the greenhouse area. In the interview, the Municipality of Hollands Kroon (interviewee 2) already indicated that they specify that this so-called agribusiness area is meant for companies, which can add value to agribusiness and the circular economy in Agriport. It means that possibilities to strengthen the vertical dimension of Agriport are facilitated. For Greenport NHN, innovation in the vertical chain and stimulation and strengthening of the chain are important items on the multiannual agenda (document 10). Collaboration in the vertical chain is mentioned in all the researched documents, but especially in the economical implementation agenda of the province (document 9, 22 times) and the multiannual plan of Greenport NHN (document 10, 23 times). Furthermore, the Province of North Holland is mentioning the strength of Northern North Holland in its Structural Vision for 2040 (document 8) as a large scale production area and says that the province provides opportunities and space for combinations between logistics, services and primary production.

4.3.3 Institutional dimension

The indicators for the institutional dimension could be frequently found in the documents. All documents are constructed by institutions, which is therefore a logical result. Not all investigated documents are discussing the role of these institutions. Especially the

Province of North Holland is expressing its role in the documents and discusses their role for every project in the Economical Implementation Agenda (document 9). For the projects that are dealing with Greenport Northern North Holland, the province says to be partner, (policy)developer, mediator and regulator. Measures that are accompanying this are marketing, research reports, collective visions, administrative consultation, collaborative structures and regulations that are based on the Structural Vision (document 7). One of the most important intended outputs of these measures is the acceleration of the energy transition in the greenhouse sector.

All the documents from the Province of North Holland (document 7, 8 and 9) and the multiannual plan of Greenport NHN (document 10) are including a part about subsidies and funds. Furthermore, the words ‘stimulation’ and ‘strengthening’ are frequently used by the province (resp. 76 and 116 times) and Greenport NHN (resp. 23 and 22 times). The province is using subsidies as one of the tools to stimulate and strengthen the greenhouse clusters of North Holland. The province tries to strengthen the business climate, the innovation power and sustainability (document 9). These results correspond with the interview outcomes.

4.3.4 Power dimension

The indicators for the power dimension are not very often found in the documents. However, the two land use plans for Agriport (document 1 and 2) contain the indicators ‘relationship’ (resp. 10 and 4 times) and ‘support’ (resp. 3 and 4 times) relatively more than the other documents. The land use plan of Agriport (document 2) mentions the scale of the greenhouse companies as a powerful characteristic of the cluster. The document suggests that the large companies are better able to compete with international competitors, to sign contracts directly with large supermarkets, to become more energy-efficient and to invest in innovations. The first land use plan of Agriport from 2006 (document 1) mentions the qualities of the location of a greenhouse cluster in the Wieringermeer and already highlights the support for the development of a greenhouse cluster in the local community, because of the need for growth of the regional economy in the whole northern part of North Holland. This support for the development is also mentioned by one of the growers (interviewee 6). The land use plan (document 1) also mentions that the greenhouse companies in Agriport are striving for a societal support to be as large as possible, among others by producing in a sustainable way. The strive towards a large societal support is confirmed by the interview with the tomato grower (interviewee 7), who explained the two principles, which are used to create societal support among neighbouring citizens.

4.3.5 External dimension

One of the interesting findings in the documents, regarding the external dimension, is that LTO Noord (document 12) is sketching a vision in which the Netherlands could be seen as an international trade centre, with Agriport (for vegetables) and Aalsmeer (for flowers) as two large, internationally oriented production areas. LTO Noord (document 12) displays the connections between the greenhouse areas in North Holland and other areas in the Netherlands and mention the strong connection with Westland. These findings correspond with the interview results, in which one of the growers (interviewee 7) explains the close connection with Westland and argues to see the Netherlands as a whole as the greenhouse cluster. In general, the visionary documents of the Province of North Holland (document 7 and 9) and the multiannual plan of Greenport NHN (document 10)

do frequently mention the international course of the cluster Agriport. Other indicators are less frequently used and appear in the same documents. Greenport NHN highlights the importance of the external dimension by saying that their organisation is functioning in an optimal way, when they have connections with supraregional networks. They also mention a big support of the greenport organisation itself – in and outside the region – will contribute to the success of the projects of Greenport NHN. From the interviews, it was already known that Greenport NHN (interviewee 3) is trying to enlarge the connection of the region with the rest of the Netherlands, by for example bringing the ideas of the growers from Agriport in discussions with the mainports Schiphol, Rotterdam and Amsterdam. The ambitions of Greenport NHN are to unlock international opportunities for strengthening trade, knowledge sharing, innovation and research. Greenport NHN is using the awarding of a ‘knowledge and innovation award’ and a ‘student challenge’ to inspire innovative students and entrepreneurs, but also to enlarge the national image of northern North Holland as an innovative region (document 10). In the Economical Implementation Agenda (document 9), The Province of North Holland is mentioning the word ‘international’ 53 times, of which it is 30 times not directly relevant for the greenhouse sector.

5 Case study Bergerden

The case study of Bergerden has been conducted to identify the characteristics of a greenhouse cluster that is less-developed. Paragraph 5.1 contains the results of the field analysis. Thereafter, paragraph 5.2 contains the results of the interviews and 5.3 is showing the results of the document study.



Figure 8 The entrance of Bergerden

5.1 Field analysis

In the following table, the configuration of the greenhouse area Bergerden and its development between 2005 and 2015 is displayed.

Company	Crop	Place of origin	Surface 2005 (ha)	Surface 2015 (ha)
Aubergine De Linge	Aubergine	Bleiswijk	4,0	7,7
DartPlant (voorheen Presikhaaf)	Plants	Arnhem	3,3 indoor 7,5 outdoor	3,3 indoor 3,7 outdoor
De Ossekamp ⁵	Tomato	Huissen	6,5	0,0
DerksenPlant BV	Cactus	Lent	1,1	1,8
Handelskwekerij Kregting	Euphorbia / Pelargonium	Gendt	0,0	3,1
Hedera Rikken	Hedera	Lent	0,7	1,7
Hofstede Hovaria	Hydrangea	Huissen	0,0	1,2 indoor 2,9 outdoor
JVB Potplanten ⁶	Pot plants	Lent	4,5	0,0
KarmaPlants	Anthurium	Etten-Leur	0,0	3,0
Kwekerij de Molenhoek	Orchids	Horssen	0,0	3,0
Kwekerij Harry Beijer	Terrace plants	Huissen	2,0	2,6
Kwekerij Stef Huisman	Tropical plants	Huissen	2,4	2,4
Potplantenkwekerij Maters	Primula / Cyclam	Lent	1,7	0,0
Royal Berry	Strawberry	Poederooijen	0,0	11,9 indoor 7,1 outdoor
Schouten en Van Marwijk ⁷	Orchids / cambria / oncidium / bougainvillea	Ressen	1,6	0,0
Van der Harg-Van Winden	Bell pepper	Pijnacker	8,7	8,7
Van der Kleij	Bell pepper	Berkel en Rodenrijs	3,5	3,5
Total area			47,5	67,6
Average per company			4,0	5,2

Table 10 Greenhouse companies in Bergerden

The established companies in Bergerden are characterised by a variety of crops that differ from vegetables to pot plants. The average surface per company grew between 2005 and 2015 from 4,0 to 5,2 hectares primary production surface per company. This is larger than

⁵ This company went bankrupt. The greenhouse is taken over by Royal Berry, which established in Bergerden in 2010.

⁶ This company stopped its business in 2011. Part of the land plot is taken over by Handelskwekerij Kregting.

⁷ This company went bankrupt at 9 November 2012. The land plot is taken over by Royal Berry.

the average greenhouse surface in 2015, which is 1,81 hectares for flowers and plants and 3,43 hectares for vegetables (Agrimatie, 2017). There are several companies that grew, but most of the surface growth is caused by the growth of one single strawberry company. Notable is the fact that four companies stopped their businesses between 2005 and 2015. In the same period, five companies established in Bergerden.

5.2 Interview results

The interviews in Bergerden are conducted with two officers of the Municipality of Lingewaard, one officer of Province of Gelderland, two greenhouse growers and a project leader of LTO Noord (Dutch Federation of Agricultural and Horticultural Organisations).

Introduction of the interviews

Before asking questions which are related to the different dimensions of greenhouse clusters, the interviewees were asked about the additional value of the greenhouse sector for the area. The growers were asked for their reason to establish in the cluster.

Additional value for the cluster

All interviewees declare that the greenhouse cluster is very important for the region. The cluster is one of the focal points of the municipality and is an important economic potential for the province. The economic relevance of the sector could be seen directly in business in the greenhouses, but also indirectly in other businesses. *“Directly, this is about the growers and indirectly about suppliers, customers, transport, logistics et cetera. The sector enlarges the employment opportunities for the inhabitants,”* said one of the municipal officers of Lingewaard (interviewee 10). Suppliers and transport are mentioned as important indirect businesses for Lingewaard. Spatial relevance is mentioned by the municipality (interviewee 10), which highlights that the sector has a major impact on land use in the area. The Province of Gelderland (interviewee 8) mentions that the provincial efforts for the horticultural sector are mostly focused on the concentration of greenhouses in the intensification areas and the deconstruction of spread greenhouses throughout the province. The development of Bergerden is largely supported by the LTO, which is making policy for the representation of interests of the growers. The fulfilment of this policy is done by the projects that are set up by the LTO.

Reasons to establish in Bergerden

The greenhouse growers mention several reasons to establish their company in Bergerden. One of the most important reasons is the social connection with the area. The two interviewed growers are coming from the older greenhouse area in Huissen and have their family and friends in the surrounding environment. One company (interviewee 13) is located in Huissen for more than a hundred years. The establishments where these companies were originally located are developed as new residential area for the expansion of Huissen. The remaining parts of the older greenhouse area around Huissen form the restructuring area Huissen-Angeren. The growers were interested in Bergerden after the initiative of the municipality. The municipality proposed to buy the old greenhouses for the development of houses and offered them a location in Bergerden. The land price, the collective energy supply and the collective water supply are mentioned as important reasons to establish in Bergerden. The development of a collective energy supply was known from the beginning and is mentioned as an advantage of the area. The collective

energy and water supply are located on collective land parcels, which means that the private property could completely be cultivated with a greenhouse, which is also mentioned as an advantage by one grower (interviewee 12).

5.2.1 Horizontal dimension

Degree of collaboration among direct competitors

The collaboration between direct competitors could, according to the Municipality of Lingewaard, be more intensive. Both growers mention that a growth of the amount of companies in Bergerden can result in more collective advantages and better results of the collaboration. The present collaboration is focused on several themes. Most important activities in which the growers are collaborating on the horizontal level are energy, water and sustainability. Most important reasons to collaborate have to do with the issue of scale. CHP-installations are usually seen in large scale greenhouse horticulture, but could be operated by the collective energy supply in Bergerden. Furthermore, the plant nurseries united themselves in marketing, sales and transport.

Both interviewed growers say that the collaboration with other companies in Bergerden started, because of the idea to start a collective energy supply to create a modern greenhouse area. The collective energy supply is a cooperative of which all participating companies are member and thus collectively owner. Later, other collaborations were initiated. One grower is mentioning that they are hiring each other's greenhouses in order to catch the peaks in some parts of the year.

Growers say that they can act more sustainable by having an energy cooperative. More advanced technical measures can be used by collaborating on the field of energy. The growers point out that the collective energy supply makes the individual companies able to act more sustainable, than they could have done when operating stand alone. Sustainability is a theme that is mentioned by all actors within this research and could be seen as an important motivation to collaborate. For the relatively small companies within Bergerden, the energy collaboration could bring advantages. The small pot plant companies could not afford innovative energy supplies if they should develop them individually. They face with difficulties to become more sustainable, but could take advantage of the presence of relatively larger vegetable producers. CHP-installations are collective investments that would, according to the small growers, not be done without the collective energy supply. *“Because we did this together, we are more sustainable and can save energy”* (interviewee 13). The growers mention that the collaboration on the field of energy came in an acceleration in the past few years and that they would like to strengthen this in the near future with windmills and solar panels and a connection with the district heating network.

Furthermore, the pot plant growers from Bergerden united themselves, together with a few other growers from the area between Arnhem and Nijmegen, into the collaboration 'KAN-plant'. This is an organisation in which twelve plant nurseries from the city region Arnhem-Nijmegen are united to make their marketing, sales and transport more efficient. Plants can be transported more efficiently to their customers, because KAN-plant is client at one transport company – which is located close to the area as well – which combines the freight transport to the flower auction or to customers in other parts of the country. In this way, the companies are together profiting from the advantages of being of larger

scale. The structural meetings between the KAN-plant companies every month are a good opportunity to initiate other fields of collaboration on the horizontal level. For example, the companies decided to have a collective stand at trade fairs to enlarge visibility for their customers.

The Municipality of Lingewaard (interviewee 9) mentions the presence of a lot of smaller companies instead of a few large greenhouses as a strength of the cluster Bergerden. The Municipality of Lingewaard thinks that collaboration between greenhouse growers has a positive effect for the greenhouse cluster. Therefore, the municipality tries to stimulate the collaboration between direct competitors, but it does not seem that easy to develop the collaboration as quickly as the municipality desired. According to one municipal officer (interviewee 9), the growers in the area have an independent culture in which they would like to solve their own problems, without the help of others. In comparison to other areas like Westland and Zeeuws-Vlaanderen, the growers of Bergerden are less willing to co-operate and more trying to save their own skin. The municipality argues for an intensification of collaboration and adores the developments within KAN-plant. In the interview, this municipal officer (interviewee 9) proposed the creation of a similar horizontal collaboration among vegetable growers in the area. As mentioned above, the municipality is actively asking companies to co-operate and to join projects, but usually this does not lead to an intensive collaboration.

Degree of observation and comparison

The observation and comparison among direct competitors and the exchange of information is mainly taking place in an informal way. Growers of KAN-plant mention that the existence of the KAN-plant network enlarges the exchange of information. All members of the KAN-plant network can profit from this exchange. *'By having conversations about the things you do together, you sometimes create new ideas as well,'* one of the growers said (interviewee 13). Furthermore, the informal sphere after the meetings is mentioned as pleasing and is sufficient to exchange the latest news from each other's company.

5.2.2 Vertical dimension

Need for vertical relations among greenhouse growers

In the vertical chain is dominated by a few large trading companies. Therefore, these companies have a large influence on the price of the products. According to the province, the growers have difficulties with this, because they have relatively small companies. The need for more vertical relations could be derived from the fact that the companies unify themselves in KAN-plant to be more in the picture of large trading companies.

The Province of Gelderland says that they try to support the local for local principle, in which the grower sells its products on the local market. In this way, the chain is smaller, which means that the margins for the grower are higher. According to the province, the growers have a bad negotiation position. *"There are only a few large trading companies, which are fixing the prices."* The growers can compete with these companies, when they will establish in cooperatives or do upscaling. *"However, the growers want to stay independent,"* says the Province of Gelderland.

This is also seen at the company of one of the interviewed growers. He was dependent of one large trader, who went bankrupt in december 2013. The company became member of

the horizontal collaboration KAN-plant, to become visible and more powerful in the vertical chain. This grower says that the vertical relations of the company are important, but says that these relations do not necessarily have to be located in the cluster itself. The presence of vertical relations in Bergerden itself would be interesting for the grower, but it is more important that the vertical relation is earning its existence because of its efficiency. Therefore, it seems not realistic for a vertical relation to establish in such a small greenhouse cluster as Bergerden (see following paragraph: '*Degree of collaboration in the vertical chain*').

Degree of collaboration in the vertical chain

Both growers mention it is difficult for companies in the vertical chain to have the right of existence. Therefore, the collaboration in the vertical chain is not limited to the own cluster. Growers mention that the transport company is located in the area, but that they have a lot of vertical relations that are not located closely. Several suppliers and the flower and plant auctions are not located in Lingewaard. One grower even buys its small cutting plants from a company that is located in eastern Germany. The companies say that it is not necessary to have vertical relations within the cluster. The transport sector is present in the region and in the digital world it is easy to have contact with vertical relations in other parts of the Netherlands. To have the best value for money, growers are sometimes buying their half-products in Westland.

An important factor of having suppliers and customers in other parts of the country is the upscaling of companies. Upscaling is a phenomenon that is not only observed in the primary production companies, but is also seen in the companies in the vertical chain, like suppliers, traders and transport companies. This is partly affected by the upscaling of primary producers. The supplying companies cannot take the risk to become dependent of a few primary producers and have to grow as well. The upscaling of companies result in a smaller choice for vertical relations, but it also means that parts of the chain are not located within small greenhouse clusters anymore. Both interviewed growers think it is more important that the suppliers exist on a healthy basis, than that they are located close to Bergerden. Nevertheless, one of the growers (interviewee 12) is explicitly mentioning to prefer buying half-products at a company that is located in Huissen, because he thinks the existence of this company is important for the greenhouse area. However, this grower also says that it is not realistic to think new companies in the vertical chain will establish in the surroundings of Bergerden. The companies do not have the right to exist in such a small greenhouse area. Unless the companies in the vertical chain do not have a location in or near Bergerden, it is easy for them to deliver in Bergerden, because the greenhouse companies are clustered together. The grower (interviewee 12) mentions that smaller orders could be delivered in combined rides, which is not possible when the greenhouse is located on its own in a remote region.

5.2.3 Institutional dimension

Role of the local government in the development of the greenhouse cluster

In general, the outcomes of the interviews show that the role of the Municipality of Lingewaard is pro-active and that initiatives and stimulation are coming from the government. It was the initiative of the Municipality of Lingewaard to establish a growers

association to start collective projects in energy supply and water storage. However, the role of the municipality is discussed a lot, among growers, but also within the organisation of the municipality itself.

The Municipality of Lingewaard takes on the task to search for and to attract greenhouse companies to establish in the area. The municipality understands that greenhouse areas within the Netherlands are competing in the attraction of companies. Therefore, they see it as a task of the municipality to make Bergerden as attractive as possible to accomplish the establishment of new companies. The municipality has a financial position in this issue as well, because the largest part of the available land is owned by the Municipality of Lingewaard. The land position of the municipality has a noticeable effect on the role of the local government. The disappointing sales of land in Bergerden had important effects on the financial status of the municipality. After the start of the financial crisis, the municipality had to write off land values and accept the losses to keep the land price around market price. The current land position ensures that the sales of land are important for the future finances as well. The future sale of land is therefore evident for the municipality. This explains why the municipality is taking an active role in attracting companies to the area and making Bergerden more attractive for potential establishers. Multiple officers are hired by the municipality to search for companies and ask them to contribute in projects to make the area attractive. These officers are approaching growers and ask whether they are willing to work together with other growers. For several projects, the municipality is searching with a directed focus for coalitions of entrepreneurs, growers and associated companies.

Both interviewed growers emphasize that they are established in a horticulture-minded municipality, which guarantees the support of local government for the horticultural sector and the development of greenhouses within the area. The mayor of Lingewaard is known as a woman who would like to put effort in the development of the horticultural sector within the municipality. The collaboration between the government and the growers could be defined as constructive.

However, the role of the municipality is criticised as well by one grower (interviewee 12), who thinks that Bergerden could be better off, if the government is doing less in the attraction of companies to the area. It costs a lot of money to hire officers which are stimulating the growth of cluster Bergerden and the results are, according to this grower, doubtful. Most of the municipal offers that are doing acquisition are expensive freelancers. Research and the payment of personnel costs a lot of money – several tonnes every year, according to this grower –, which could only be earned back by the sales of land. This means that project costs are raising the land price as well. This does not lead to a better position of the cluster Bergerden. The opinion of this grower (interviewee 12) is that the municipality could better stop spending money to inefficient stimulation measures. This money is seen as an investment for the future, but is spend in a so-called financial black hole.

Also within the organisation of the Municipality of Lingewaard itself, a discussion takes place about the role of the local government. According to one of the municipal officers (interviewee 9), some municipal officers think that the municipality should take a less active role, because entrepreneurs could become lazy when they are too much stimulated by the government. If the municipality is always carrying for the companies, the

companies can become more vulnerable for developments which are carried by the municipality. There are, according to this officer (interviewee 9), sounds for a more passive role, so that entrepreneurs will come to the municipality to ask for help instead of the current, reverse situation. However, this asks for assertiveness among growers and that does not seem to be developed well enough yet.

In some cases, LTO Noord has the same role as the municipality. LTO also tries to bring growers together to cooperate in initiatives. The LTO project manager (interviewee 11) mentions that LTO is carrying a project to realise a collective water storage. Therefore, they try to bring companies together as well. The role of LTO Noord and the municipality are overlapping more, because the LTO project manager is part-time seconded at the municipality for the acquisition of greenhouse growers for Bergerden.

Guiding vision or strategy for the area

In the interviews, the organisations (interviewees 8, 9, 10 and 11) are asked whether they have a guiding vision or a strategy for the development of the area Agriport. The general topic of the different visions is the variety of measures to stimulate of the development of the greenhouse area.

The Municipality of Lingewaard created a market proposition for NEXTGarden as a guidance for its operations. The document (see 5.3, document 15) is used to attract new growers to the area, but also indicates on which themes the municipality is focusing. Most measures and initiatives that are being executed by the municipality are having this proposition as a basis. The three focus points of this proposition are a sustainable energy mix, innovation and start-ups and the development of 'Euregion Rhein-Waal' as Dutch-German market. The municipality is trying to bundle the freestanding development strategies for the areas Bergerden, Huissen-Angeren and the business area of Agropark to an integrated task for NEXTGarden as a whole. Furthermore, the structural vision of the municipality for 2022 is an important guide. The investigation of both documents is further elaborated in chapter 5.3.

The municipality also highlights the relevance of provincial policies, which are affecting greenhouse development in Bergerden. The Province of Gelderland is handling its Environmental Vision, in which greenhouse development areas are designated. In these areas, among which Bergerden, the development of greenhouses is stimulated. The other areas are assigned as being greenhouse horticulture extensification areas. The prevailing provincial policy is intended to move the spread greenhouses to the concentration areas. In the extensification areas, greenhouse companies are allowed to expand its businesses only once with 20 percent. Given the trend of upscaling, this 20 percent expansion is not enough for most companies, which should motivate them to move towards the greenhouse intensification areas.

LTO Noord (interviewee 11) says that they always supported the vision and policy of the municipality. LTO Noord and the municipality are closely working together on the field of acquisition. Furthermore, LTO tries to lobby and include the interests of the greenhouse sector in the municipal vision. The project manager of LTO Noord says that this is usually going without any problems and underlines the constructive collaboration between LTO Noord and the municipality.

Usage of instruments by local government, formal institutions

Instruments that are used by governments are based on making the area more attractive for possible investigators and new greenhouse companies. This is done by trying to generate new innovations and sustainable initiatives and by promoting the area. The measures are all based on the idea that the cluster will and has to grow in size in the coming decade.

The municipality is intensively putting time and energy in the stimulation of the development of the greenhouse cluster. There are several municipal officers which are working part-time or full-time on the stimulation of the greenhouse cluster. As mentioned above, the municipality tries to make the area more attractive by bringing companies together in several projects. Examples of these projects are the cultivation of water lentils or the collaboration between large herb trader companies and the cultivation of black pepper, ginger, curcuma and basil in NEXTGarden. The growers can together with Wageningen University & Research investigate whether these herbs could be tested and grown on a larger scale in the greenhouses of NEXTGarden. The projects are initiated by the municipality and are intended to bring greenhouse companies together and generate enthusiasm among growers. Furthermore, the Municipality of Lingewaard makes itself visible at the Horticultural Business Days in Gorinchem. The municipality uses communication as a tool to promote the area and tries to put Lingewaard on the horticultural map. This is done by posting press releases on a website and in a newsletter to show all positive developments in the area. The municipality also sees the sale of land as an instrument to stimulate the greenhouse cluster. The municipality mentions that it facilitates the sale of land under favourable circumstances for growers.

The ambition of the Province of Gelderland is to become energy neutral for Bergerden in 2035. Therefore, it is important to stay in contact with the energy sector and to think about concepts as the circular economy. The development of a connection with the district heating network is stimulated by the provincial government. This network is fed with heat from waste incineration plants. The amount of waste will probably decrease in the future, so the province is also looking to alternative sources for the heating of greenhouses, like heat-cold storage and geothermal energy. The province is trying to finance the unprofitable part of the connection with the district heating network, to fill the financial gap and to lower the risk for the greenhouse growers in the area. In this way, innovation and sustainability is stimulated by the provincial government. Furthermore, the Province of Gelderland says that small growers are mostly busy with the growth of their plants and the production and do not have experience with marketing or spatial planning processes. The small companies therefore need guidance in this, which could be facilitated by the greenhouse covenant.

LTO is initiating innovative projects. A project with LED-lighting in a pot plant greenhouse is an example. Other projects that could be initiated in the greenhouse covenant are the development of a collective warm water supply, the development of a collective CHP-installation or projects that are focussed on communication and the promotion of the area.

Growers are aware of the fact that the Municipality of Lingewaard does not have a lot of money. According to the growers, the municipality is especially thinking about sustainability and trying to fill the available land with new greenhouses. The growers see

that the municipality is willing to lobby and to start conversations with the province for the development of the greenhouse area.

Regulations, land use plans and planning concepts

The facilitation of larger land parcels is discussed, but is limited to a maximum, according to both the province and the municipality. Furthermore, is made easy for growers to sell their outdated greenhouse, to provide possibilities for new developments and prevent depletion of the older greenhouses in the surroundings of Bergerden.

Notable is the fact that the government actively designated the locations where greenhouse development should take place. The Municipality of Lingewaard and the Province of Gelderland assigned the area where greenhouse growers are allowed to expand their company and assigned the extensification areas. The Municipality of Lingewaard mentions that the land use plan is not used as a stimulating instrument, but that it are regulations within which companies could establish in Bergerden. The way in which the municipality is handling with the regulations could be creative or proactive to stimulate the establishment in Bergerden. The municipality is facilitating the greenhouse development by handling a flexible land use change policy. Land use change is important in the restructuring area Huissen-Angerden. Under certain conditions, old greenhouses can be replaced for several houses. The old land use change policy was not flexible enough to stimulate greenhouse growers to sell old greenhouses, which are not efficient anymore and from a societal perspective not desirable in the landscape. The greenhouse company can build a new greenhouse at another location within NEXTGarden. The new land use change policy is adjusted in a way that the restructuring is stimulated.

There is a trend in greenhouse horticulture that new greenhouses are becoming larger and larger. The Province of Gelderland thinks that Bergerden has to adapt to provide larger land parcels, but sees that this is limited to a maximum in practice. *“Lately we had someone who would like to buy 40 hectares. We cannot provide that. We could sell some lots of 10 hectares, but then it is over,”* is the reaction of the Province of Gelderland. The province advises these companies to search elsewhere. *“I think that there is some room left in the northern part of North Holland and in Drenthe.”* The province thinks that there is no space available in the Netherlands for companies of this scale. The Municipality of Lingewaard also thinks that upscaling in or around Bergerden is limited to a maximum, but that upscaling is desirable in the area. A stimulation of entrepreneurial spirit among the growers is necessary to reach that. There is no land use plan that prohibits the upscaling of Bergerden to one big greenhouse company of 150 hectares, but that is not the municipality's preferred situation. A mesostructure with a diversity of products and solid companies gives Bergerden its strength, says the municipal officer.

The growers are confident with the land use plans. *“The land use plan is completely in favour of the greenhouse horticulture”*. The growers appreciate the fact that the available land in Bergerden is still appointed for the development of greenhouses. This guarantees the possibility to expand the greenhouse company in the future.

LTO also negotiates about the implementation of some rules with the municipality. Better implementation of the ‘Rood-voor-rood’ rule, makes it easier for growers to build new greenhouses and replace their companies to Bergerden.

Interesting is the fact that the initiating grower of Agriport had serious interests to buy a large parcel in Bergerden. The idea of this grower was to buy almost half of the available land in Bergerden for the construction of a greenhouse of 80 hectares. The Municipality of Lingewaard thought that the construction of such a large greenhouse did not fit in the future vision of Bergerden and they rejected the offer of this company. Later, this grower had large influence in the development of Agriport and the functional concept of the area.

Financial instruments

The greenhouse area receives a lot of financial funds from the Province of Gelderland, mainly for becoming a sustainable greenhouse area. The Municipality of Lingewaard put a lot of money in the land exploitation of Bergerden and provides, besides that, several small project subsidies.

The Municipality of Lingewaard is owner of most of the agricultural land that is available for the development of greenhouses in Bergerden. The value of this land makes the municipality a financial player in the cluster. According to the LTO, the land price in Bergerden is above market price, because the pricing mechanism is part of municipal politics. The alderman does not prefer to write off land values, because of his image and municipal elections every four years. Citizens of Lingewaard do not desiderate losses within the municipal finances, which makes writing of land value not a favourable measure to stay on the market price. This results in a land price which is continuously above market price, which is stagnating the sale of land for new greenhouse development.

Besides the fact that the municipality puts a lot of money in the exploitation of land, they try to stimulate the cluster with other financial measures. The municipality used 10.000 euros for the stimulation of a cannabis project and 15.000 euros for a water lentils project. Apart from the displacement regulation and land use change policy which are funded by the province, there are no big subsidies according to the municipal officers. Notable is the vast amount of money that is used for the land development of Bergerden. Together with the Municipality of Nijmegen, the Municipality of Lingewaard had to devalue on the land for millions of euros. According to one of the growers, the municipality used financial instruments for the initial phase of Bergerden, but he thinks that the most effort of the municipality is currently in thinking about sustainability and trying to attract new companies to the area. The growers know that the municipality does not have a lot of money, so they do not expect financial support from the local government.

In contrast to the municipality, the provincial government is supporting Bergerden with a lot of money. The Province of Gelderland sees its most important role as 'financier'. The province does not provide financial support for the municipal land development. The Municipality of Lingewaard should finance the land development with the sale of land to greenhouse companies. In the nineties of the past century, financial support for the land development was coming from the national STIDUG fund. Later, the province provided money for the CHP-installations, because the energy company was at risk of going bankrupt. This money is coming from several sustainability regulations, to stimulate sustainable innovations and to take away the unprofitable part of the investment. Individual companies could also request for a subsidy from these provincial sustainability funds.

Decentralisation of governmental policy

The Municipality of Lingewaard indicates that the decentralisation of governmental policy has made the municipality ‘problem owner’ of Bergerden. When it comes to the development of Bergerden, the decentralisation of governmental policy led to a change in the driving force from national to municipal government, but it seems that the same actors are behind the ideas.

After the national government decided to decentralise the spatial policy towards the provinces and municipalities, the role of the different levels of government changed. According to the Municipality of Lingewaard as well as the Province of Gelderland, the collaboration between the national and lower government disappeared when it comes to the development of greenhouse areas. The STIDUG fund was a stimulation for the development of sustainable greenhouse areas. This regulation is reduced and phased out completely. According to the province, big companies do not need the help of the national government, because they are powerful enough to care for themselves. However, there are a lot of smaller companies within Gelderland, which need the governmental support. This support should now be given by the province and the municipality. According to the Municipality of Lingewaard (interviewee 9), after the decentralisation there are more instruments for the lower governments to act and the local government has to be more closely involved in the issue. According to one municipal officer (interviewee 10), this leads to the shift of the ‘problem owner’. The municipality got more responsibilities during the process of decentralisation and is now responsible for the attraction of new companies and the spatial policy. Because policies should now be created and executed on provincial and municipal level, the lowest level of government became problem owner of Bergerden. The slow process of decentralisation made it difficult to say whether the decentralisation has had positive or negative influence on the situation of Bergerden. The Municipality of Lingewaard became the driving force behind the process, but the Province of Gelderland is also involved and is providing financial support.

Collaboration between governments

The collaboration between governmental bodies is important in investigating the role of the government in the development of the greenhouse cluster. Therefore, the governmental bodies are asked in what way governmental collaboration is designated and what the added value of this collaboration could be for the development of the greenhouse cluster. Most important is the contact between the Municipality of Lingewaard and the Province of Gelderland. They have structural meetings about Bergerden, which makes the collaboration constructive. This makes that the provincial and municipal policies are adjusted to each other, which makes the measures for stimulation of Bergerden more effective.

Both the municipality of Lingewaard and the Province of Gelderland say that the collaboration between the two governmental bodies is constructive. In the structural conversations about Bergerden, they talk about land allocation and mostly about energy. Collaboration about land allocation is taking place in the application of two regulations, which are the land use change policy and the displacement regulation. The governments need each other, because the provincial policies are executed by the municipality. The Province of Gelderland is making policy for the development of greenhouse areas, the intensification areas, as mentioned above. Municipal land use plans has to be accepted by

the province, so these provincial greenhouse area policies have a direct impact on land use plans. When the municipal land use plans are not in line with the provincial frameworks, a conversation between the two governments could take place. The municipality emphasizes that the cooperation in this domain is productive. However, it occurred that the land use plan of the municipality for Bergerden has not been accepted by the province. To make it easier to sell the land in Bergerden, the municipality proposed to change the land use from 'greenhouse production area' to 'horticulture related business'. If horticulture related businesses is allowed in the area, commercial buildings and warehouses will appear in between the greenhouses. The province restricted the municipality to constrain land use in Bergerden to primary production to preserve spatial quality for the greenhouse sector. Nevertheless, the Province of Gelderland also confirms that the collaboration is constructive. The province says that the responsibility and the risks of the realisation of Bergerden are in hands of the municipality, but mentions that the province is providing a substantial amount of financial support. Most investments from the province are intended for the increase of sustainability and the improvement of parcelling and spatial quality.

The municipality declares that it is co-operating together with the province and neighbouring Municipality of Overbetuwe in the greenhouse covenant. The greenhouse covenant is a collaboration between governmental bodies and entrepreneurs to inform, to adjust and to initiate with the collective goal to strengthen the greenhouse cluster between Arnhem and Nijmegen. Participants are the two municipalities of Lingewaard and Overbetuwe, the Province of Gelderland, Rabobank, STOL, Greenport Arnhem-Nijmegen, flower and plant auction Plantion and LTO Noord Glaskracht (the greenhouse department of LTO Noord) and transport and logistics company Selman. In meetings of the greenhouse covenant, the actors are informing each other about their actions and try to connect the different actions. According to LTO Noord, this collaboration makes it easier to find each other.

Currently, there is few operational contact between the Municipality of Lingewaard and the national government. There is a top sector policy, in which the national government is promoting the top sector horticulture. The municipality is receiving a few subsidies from the RVO (Netherlands Enterprise Agency). Besides that, there is no collaboration between the municipality and the national government on the field of horticultural development. The province confirms this that this trend is also visible between national and provincial level and says that agricultural policy shifted towards the provinces. Conversations about these policies are taking place in at the IPO (Interprovincial Consultation).

5.2.4 Power dimension

Unequal relationships within the cluster

The Municipality of Lingewaard has a lot of measures to stimulate the development of Bergerden (see 5.2.3) and is owner of the available agricultural land in the area. The dominant position of the municipality can have positive and negative effects for the development of the cluster Bergerden. Furthermore, the collaboration of pot plant growers in the collective energy supply and KAN-plant is making the growers stronger, but the collaboration of growers within Bergerden is not optimised yet to create a powerful block between institutions and large trading companies.

The Province of Gelderland (interviewee 10) confirms that the Municipality of Lingewaard has a dominant role in Bergerden, mainly because of the land positions. Therefore, the municipality can decide which companies may establish in Bergerden. LTO Noord also mentions the dominant position of the Municipality of Lingewaard and says that the disunity of opinions within the organisation could lead to difficult situations. Every proposal has to go through the bureaucratic system of policy officers, unit managers, alderman, mayor, municipal council and back, which has no positive effect on the speed of the process and the results. *“It happens that the policy worker does not recognise its own proposal in the end,”* says the LTO project manager. The LTO Noord project manager also mentions the positive side of the dominant position of the municipality and appreciates that they are standing up for Bergerden. He thinks that a market party already had stopped the financial support for Bergerden. Because the Municipality of Lingewaard is carrying the project as a governmental actor, there is still a belief in its success. *“A private investigator had already cut off the funds.”*

Among the growers, it is supposed that a larger cluster also results in more advantages for the current growers in Bergerden. Both growers see that a further development of Bergerden will give a more powerful position to all the growers in the area. *“The advantage of a cluster is that you have more power together, than when you should do something on your own. Individually, it is for this company absolutely not possible to construct a connection with the district heating network, because it costs millions. For such a cluster – and especially when the cluster will expand – it is more plausible and there is more to bring in at the province and the municipality,”* one of the growers says (interviewee 12). The other grower (interviewee 13) confirms this by saying: *“We are working on the construction of a pipe connection with the district heat network from Arnhem or Nijmegen, through which residual heat from incinerators could be transported. That are things that could be accomplished with the current cluster, but will be easier when the rest of the area will also be filled with greenhouses.”*

One of the growers (interviewee 12) says that it is positive that there are some growers that take the initiative to stand up for the area and represent the area. *“You need initiators, that is the most important thing,”* he said. This grower says that there are two or three growers that can be mentioned as active initiators, among which himself and a strawberry grower, who expanded his company recently. The strawberry grower is also contacting the municipality by himself. *“The Municipality sees that as positive, to get along with Bergerden collectively.”* However, the municipality (interviewee 9) would like to see more initiative and is not content with the level of initiatives at the moment.

One of the growers (interviewee 13) says that Bergerden exists of smaller and a few larger greenhouse companies. The larger companies account for a larger part of the energy consumption. Therefore, they have a certain influence in the energy supply within the area. Mainly to serve the larger companies, CHP-installations are realised. Without having these larger energy consumers, Bergerden did probably not have had these installations. This resulted in disadvantages in the years that the energy price was very low, because the investment was based on a higher energy price. The smaller companies, which did not per se need the CHP-installations, were faced with the losses of the energy system as well. However, currently, the fact that Bergerden has the CHP-installations is seen as an advantage by the growers. A reorganisation took place and the energy supply is now resulting into prices that are conform the market or even lower.

There is a link between the power dimension and the vertical dimension, because, according to the province, the growers face difficulties with large traders on the market. The small amount of large traders makes them powerful in comparison to the relatively small companies in Bergerden. This is an argument to strengthen the position of the greenhouse growers and unite the growers in collaborations, as the municipality tries to argue (see 5.2.1 and 5.2.3). When the growers unite themselves, they can act more powerful towards actors in the vertical chain, as well as having a larger influence on the governmental policies with regard to the greenhouse area.

Relation with the environment and citizens

One of the growers (interviewee 12) indicated that the construction of Bergerden was delayed partly due to objections from neighbours in the surroundings of Bergerden. Currently, there are less objections. As long as the greenhouse companies are not causing nuisance for the residents, there is few discussion about the presence of the horticultural sector. The most discussions with surrounding residents are about light pollution.

Both of the interviewed growers say that it is an advantage to be established in a remote area, which is especially developed for greenhouses. The greenhouses are defined in the land use plan, so people could not protest against it, is the reasoning of the growers in the area. In the beginning, there was a lawsuit against the development of Bergerden, filed by surrounding residents, with complaints about horizon and light pollution. Also noise has been a problem (interviewee 13): *“In the beginning, we were bothered by people who thought that the boiler was making too much noise, but that is all disproved, so that is not a problem anymore.”* Because the development of Bergerden is now fixed in the land use plan, the growers do not expect many restraint from citizens. *“Everything is approved now. People could object to it, but it does not have any sense,”* says one of the growers (interviewee 12).

When the plans are realised, the citizens are less dissatisfied than they were before, according to one grower (interviewee 12). The construction of Bergerden also resulted in a good access road to the old greenhouse areas and thus less freight transport through the village of Huissen. The natural landscape zone with bicycle pathways around Bergerden is also positively experienced by citizens.

5.2.5 External dimension

Collaboration with greenhouse growers from outside Bergerden

Growers in Bergerden have contact with growers in other parts of the country, but this is not intensively and mostly not on a formal basis. One grower (interviewee 12) says that he is in the cooperative board of flower auction Plantion and therefore, he visits companies in other greenhouse areas in the Netherlands. He says that he recently visited a tomato grower, a lisianthus grower and a chrysanthemum grower in the western part of the country. He indicates that it is interesting to see how other growers are running their business, but that it is difficult to do investments to convert your own production line. The other grower (interviewee 13) is mentioning that he is working together with growers from all over the Netherlands who are growing the same crop. In this collaboration, the growers are doing the supply of some materials collectively.

The Municipality of Lingewaard is not stimulating the collaboration between growers from different greenhouse areas in the Netherlands, but mentioned the existence of

Greenport Gelderland as a stimulating organisation. In the meetings of this kind of organisations, growers also take place. Other organisations are STOL, the greenhouse covenant and the LTO. One of the interviewed municipal officers is asking itself whether the existence of multiple overarching organisations is leading to undesired administrative complexity.

Collaboration with governments from other greenhouse areas

The Province of Gelderland and the Municipality of Lingewaard are seeking for connection with national greenport conversations. The governmental meetings of Greenport Holland are visited by the province, to exchange information about the different ways of working that are handled in the different areas. The two greenhouse concentration areas within the Province of Gelderland are the Bommelerwaard and Bergerden. The Municipality of Lingewaard concludes that the collaboration between these municipalities is marginal, but suggests that triangular meetings between the Municipality of Zaltbommel, the Municipality of Lingewaard and the Province of Gelderland could be useful for the horticultural sector in the province. Currently, the Municipality of Lingewaard declares that they probably do not have enough time to watch beyond their own problems to collaborate with other greenhouse areas. According to the municipality, it is up to the province to initiate this collaboration.

The Municipality of Lingewaard also says that it could be a good addition to improve the contact between other greenhouse locations in the Netherlands. The municipality thinks that developments that are taking place in other greenhouse areas could be taken along when forming an opinion about or a vision for the development of Bergerden. When all knowledge and experience is shared among the different greenhouse areas in the Netherlands, the whole horticultural sector could benefit from this collaboration. Therefore, one of the municipal officers (interviewee 10) says that the municipality is trying to get a connection with Coalition HOT (see 4.2.5). In this collaboration, restructuring of old greenhouse areas will be addressed. This is currently happening in several areas in the Netherlands, but NEXTGarden is not yet included in the project. The other municipal officer (interviewee 9) says that the municipality is spending not enough time on the connection with other greenhouse areas, mainly because they are busy with solving their internal problems.

To complete the interviews: future of Bergerden

The Province of Gelderland thinks that the land will finally be sold, but the smaller plots on the edges of the area will not be sold because they have an inefficient dimension and size. It seems that the total surface of greenhouses will stay the same or will lightly decrease. According to the province, research among 300 horticultural entrepreneurs in the restructuring area shows that only 10 percent of the growers would like to continue its businesses. Other growers say that they would like to stop its businesses after reaching retirement age. The amount of greenhouse entrepreneurs will decline, while the average size of the companies will grow. However, the province also sees that the restructuring in Huissen-Angerden will not result in land lots bigger than 10 hectares.

One company bought in a land lot in December 2016 to expand its greenhouse and this is making the growers and the municipality optimistic about the future of the cluster. A project leader from LTO Noord mentioned that an extra alternative location could be assigned and prepared to be developed after Bergerden I is filled with greenhouses.

However, he thinks that the municipality does not prefer to start developing this location very soon, given the sales struggles in the past ten years. This extra location – called Kamervoort or Bergerden II – is already reserved for the development of greenhouse areas, but “*is covered with dust for a while now*” (LTO Noord, interviewee 11).

The municipality (interviewee 10) is seeing positive signals and tries to be “*carefully positive*” about the development of the cluster and the sales of land. More growers are thinking of expanding its company and building new greenhouses. A new mix of energy sources becomes an attractive and sustainable element of the area. The development of solar panel fields and the construction of a biogas installation are seen as events that are stimulating other investments in the area. The future connection with the district heating network could, according to the municipality, also be seen as an important investment.

Both growers see an acceleration in becoming more sustainable and name that as a positive signal for the future of the greenhouse area. A project is running for the construction of solar panels on the collective irrigation water pond. One grower (interviewee 12) mentions the construction of windmills in the area as a possible new source of electricity. The strength of Bergerden is the collective realisation of such initiatives, because individual growers are not able to finance for example a connection with the district heating network on its own. The growers see the establishment of new companies as a strengthening of the cluster in the contacts towards provincial and municipal government. The existence of the collective heating network is a strength of the area, which makes it more attractive to establish a new company. When the connection with the district heating can be realised, newcomers in the area could also profit of the existence of the collective heating network. For the new companies it is relatively easy to make a connection with the existing network.



Figure 9 Greenhouses in the area Bergerden.

5.3 Document study

As a complement and a confirmation to the conducted interviews, this chapter describes the results of the document study for greenhouse area of Bergerden. For Bergerden, this research explores the land use plan for Bergerden and the visions of the municipality, the province and the Rabobank. The agendas of Greenport Gelderland, Greenport Arnhem-Nijmegen and Greenport Betuwse Bloem are used to supplement the list of stimulating measures that are taken to develop the greenhouse cluster. Moreover, the market proposition NEXT Garden, which is mentioned by several interviewees as a useful document, is explored to show the direction in which the area should develop according to the municipality. The details of these documents could be found in Table 11. The quantitative results of the document study could be found in Table 12.

Doc.	Document title	Year	Author(s)	Institution / Publisher	Type of institution
14.	Bestemmingsplan Bergerden	2013	Pouderoyen compagnons	Gemeente Lingewaard	Municipality
15.	Next Garden Marktpropositie	2016	WeLoveThe City	Gemeente Lingewaard Gemeente Nijmegen Greenport Arnhem-Nijmegen STOL Provincie Gelderland	Several, municipality as driving force
16.	Structuurvisie Gemeente Lingewaard 2012-2022	2011	Bruckwilder, J. Luggenhorst, E.	Gemeente Lingewaard	Municipality
17.	Concept-omgevingsvisie Gelderland	2016	Tercera	Provincie Gelderland	Province
18.	Glastuinbouwpact Arnhem Nijmegen: Intentieverklaring voor een brede samenwerking 2017-2020	2017		Glastuinbouwpact Arnhem Nijmegen	Province, municipalities, greenport, bank, auction and LTO
19.	Uitvoeringsagenda 2016-2020 Greenport Gelderland	2016	Verwoert, H.A.	Stichting Greenport Gelderland	Development foundation
20.	Strategische agenda 2011-2015	2010	Vorage, R.	Greenport Arnhem-Nijmegen	Development foundation
21.	Ambities 2012-2015 – Na de bloei komen de vruchten	2012	Betuwse Bloem	Greenport Betuwse Bloem	Development foundation
22.	Visie op tuinbouw in Oost-Betuwe	2008	Bal, G.	Rabobank Oost-Betuwe	Bank

Table 11 Documents Bergerden

Document	14	15	16	17	18	19	20	21	22
General catchwords									
greenhouse	21	-	11	4	-	-	2	-	2
horticulture	47	14	106	188	42	27	118	90	55
Bergerden	66	1	21	2	-	1	13	2	9
Horizontal dimension									
collaboration	-	2	-	7	-	2	3	9	-
association	-	-	-	-	1	-	1	1	-
observation	-	-	-	-	-	-	-	-	-
comparison	-	-	-	-	-	-	-	-	-
Vertical dimension									
collaboration	-	3	1	32	13	23	13	21	2
chain	2	7	-	22	4	16	8	14	4
transport	9	1	1	33	-	-	-	2	-
logistics	1	5	-	79	-	18	10	23	1
trade	-	-	2	2	-	8	5	4	-
market	1	16	-	159	4	71	3	15	2
Institutional dimension									
role	4	-	8	332	-	3	23	1	1
active	1	2	5	36	2	5	9	7	3
passive	-	-	-	-	-	-	-	-	-
plan	282	-	171	690	-	21	3	5	15
regulation	86	-	72	476	-	6	-	1	-
measure	10	-	23	298	-	1	-	-	-
stimulate	1	1	11	104	1	3	5	11	2
facilitate	-	-	12	53	-	5	1	3	-
strengthen	7	1	51	252	1	23	4	18	2
subsidy	1	1	2	38	-	-	-	2	-
fund	-	-	5	15	-	1	-	5	-
finance	1	3	41	86	-	22	6	-	2
Power dimension									
relation	-	-	-	6	1	-	11	6	-
unequal	-	-	-	-	-	-	-	-	-
dominant	-	-	1	-	-	-	2	-	-
support	-	-	3	29	1	2	4	4	-
External dimension									
collaboration	-	1	2	9	-	2	2	1	-
external	-	-	1	8	-	-	2	-	-
outside	-	1	3	9	-	7	2	5	1
international	1	1	8	39	-	19	4	27	-

Table 12 Results document study Bergerden

The general catchwords ‘greenhouse’, ‘horticulture’ and ‘Bergerden’ are used to monitor the relevance of the documents and to analyse in which degree the documents are focused on the greenhouse area Bergerden. The catchword ‘Bergerden’ is most mentioned in the municipal documents (document 14 and 16, resp. 66 and 21 times). All documents contain the word ‘horticulture’. The greenhouse growers in Bergerden (interviewee 12 and 13) say that the Municipality of Lingewaard is horticulture-minded. This is confirmed by the fact that the Structural Vision 2012-2022 of the municipality contains 106 times the word ‘horticulture’. The Province of Gelderland uses the word ‘horticulture’ 188 times in its Environmental Vision (document 17) and emphasizes the importance of the

sector for the province and its large spatial impact on the landscape. The province says that it facilitates the strengthening of the business climate in the horticultural areas in Gelderland. In the interview, the Province of Gelderland (interviewee 8) mentions instruments to realise the improvement of the business climate in Bergerden (see 5.2.3). The Strategic Agenda of Greenport Arnhem-Nijmegen uses 13 times the word 'Bergerden' and mentions the area Bergerden as one of the strong elements in the SWOT-analysis of Greenport Arnhem-Nijmegen, as being the area's visiting card. Greenport Gelderland (document 19) mentions Bergerden only one time and combines this with the attraction of new companies and a necessary improvement of the area's image. Document 21 in which the ambitions of the Betuwse Bloem are elaborated, the word 'horticulture' (90 times) is mainly used in combination with stimulating and promotional measures to help growers improving their business climate.

5.3.1 Horizontal dimension

The indicators for the horizontal dimension are not found very often in the documents of Bergerden. Policymakers and other document writers do not prioritise the horizontal collaboration. Horizontal collaboration is included in documents written at the provincial level. Generally, the documents indicate that the horizontal dimension is not fully developed yet and should be stimulated. This corresponds with the interviews that are conducted at the Municipality of Lingewaard (interviewee 9 and 10) and the Province of Gelderland (interviewee 8). These organisations both argue for a better horizontal collaboration among greenhouse growers to become a stronger greenhouse area. The indicators could be found the most in the Environmental Vision of the province (document 17, 7 times) and in the ambitions of the collaborative organisation Betuwse Bloem (document 21, 10 times). Betuwse Bloem says the organisation consists of the combination of forces, which is representing the interests of 1,600 horticulture companies in Gelderland. One of the main focus points of Betuwse Bloem is to stimulate an increase in the collaboration within the horticultural sector in Gelderland. The Betuwse Bloem (document 21) is supporting the collaboration with coordination and co-financing.

Greenport Gelderland stated in its agenda (document 19) that the structure should be strengthened, when it comes to collaboration in the horticultural sector. This means that there is a wish for efficient collaboration. In 2010, Greenport Arnhem-Nijmegen (document 20) already said that the growers should strengthen the existing collaboration with their neighbours on the field of energy supply, access to the market, purchase of production resources and investments in innovation. Greenport Arnhem-Nijmegen indicates that they should, together with LTO, become facilitator in the implementation of this horizontal collaboration.

5.3.2 Vertical dimension

The indicators of the vertical dimension could be found the most in the documents that are written on the provincial level. These documents are the Environmental Vision of Gelderland (document 17, 327 indicators), the Implementation Agenda of Greenport Gelderland (document 19, 136 indicators) and the ambitions of Betuwse Bloem (document 21, 79 indicators). Furthermore, the market proposition NEXT Garden (document 15), which is initiated by the Municipality of Lingewaard, contains 32 indicators of the vertical dimension. The market proposition is a document with ambitions, but particularly written to convince companies to establish in NEXT Garden. Therefore, this document is generally highlighting the positive sides of the greenhouse

cluster. The document highlights the three strengths of NEXT Garden, of which one is a typical indicator of the vertical dimension. 'Innovation and start-ups' is the name of one of the pillars, which are promoted by the network organisations. The proximity of Wageningen University & Research is emphasized and the ambitions for an Innovation and Demonstration Centre are mentioned. One of the municipal officers (interviewee 9), also mentions the three strengths from the market proposition NEXT Garden (document 15) and says that this document is the most important guide for the actions of the municipality. In the Structural Vision (document 16), the Municipality of Lingewaard captures the development of Agropark II and Pannenhuis II to facilitate the establishment of companies in the agribusiness sector.

5.3.3 Institutional dimension

The institutional dimension of Bergerden is extensively described in the selected documents. The indicators for the institutional dimension could be frequently found in the documents. The Structural Vision 2012-2022 of the Municipality of Lingewaard (document 16) shows that the municipality has a lot of measures to stimulate, facilitate and strengthen the horticultural sector. In the other documents, it becomes clear that there are measures to become more sustainable and that the greenhouse area is stimulated by provincial funds.

The Structural Vision 2012-2022 of Lingewaard (document 16) contains a map of the municipality on which the concentration area for greenhouse horticulture is displayed. With this map, the municipality confirms to stand behind the clustering of greenhouse companies in Bergerden and emphasizes the importance of the area. The land use plan for Bergerden (document 14) is revised in 2013 and is prevailing for 335 hectares of land of which net 215 hectares could be developed as greenhouses. The land use plan describes the main structure of Bergerden, with a main road (Azalealaan) which is together with the access roads forming the casco frame. Within this frame, greenhouse companies could be developed. The land use plan and the associated policy are aimed at the development of a large scale greenhouse area with a rural appearance. The land use plan describes that the spatial policies of the province are followed. According to these spatial policies, relocation of a company in the area of Bergerden is only possible if it could be proved that the old greenhouse is removed and that the establishment of a new greenhouse is possible. Flexibility is added to the land use plan by saying that other land use than greenhouse horticulture is allowed when this land use contributes to the restructuring of the greenhouse sector and solves social constraints in the issue of restructuring. However, the land use plan is limited to developments that could be seen as existing at the moment of determination of the land use plan. Innovations for which new research is necessary are not immediately allowed by the land use plan. Possibilities to achieve sustainability goals are determined in the land use plan (document 14). The construction of a bio gas installation, geothermal energy wells and wind mills are mentioned as developments that are possible within the land use plan. The connection with the district heating network is added to the land use plan as a possibility. Furthermore, the construction of solar panels on the water storage pond is described in the land use plan. The land use plan mentions that water storage is arranged collectively as much as possible. There is no specific regulation for the reduction of light pollution, but there is mentioned that growers should apply screens on the side walls. For all parcels that are not developed yet, a land use change ability to a land use of greenhouse horticulture is added. This means that the land

use could be changed when the development of greenhouses will take place, without a revision of the land use plan. The land use plan (document 14) also mentions the existence of the reserved location Kamervoort, which could be used for greenhouse horticulture on the longer term.

One of the most remarkable findings of the analysis of the quantitative indicators for the institutional dimension is the fact that the Environmental Vision of Gelderland (document 17) contains 38 times the word 'subsidy' and 15 times the word 'fund'. From the documents can be derived that the province is financier of a lot of stimulating projects and measures. This confirms the statement of the provincial officer (interviewee 8), who says that the most important role of the Province of Gelderland is financier. One of the other documents in which these financial indicators could be found is the ambitions of the Betuwse Bloem (document 21). In this document, Betuwse Bloem mentions that the province was initiator of the network organisation and stimulated and subsidised the start-up of the network.

5.3.4 Power dimension

In the document study of the power dimension, societal support for the greenhouse sector seems to be the most important issue. 6 out of 9 documents are talking about the societal support for the horticultural sector. From the ambitions of collaborative organisation Betuwse Bloem (document 21), could be derived that the improvement of the image of the horticultural sector in the region is necessary. Also Greenport Gelderland (document 19) and Greenport Arnhem-Nijmegen (document 20) would like to enlarge the societal support of the greenhouse sector. One of the focuses of the greenhouse covenant (document 18) is on the improvement of the living environment and the enlargement of support, image and appreciation of greenhouses in the area among local citizens. Greenport Arnhem-Nijmegen says in its Strategic Agenda (document 20) that the sector should more being known in local politics. To enlarge the familiarity and the image of the sector in the region, they put lobbying on their agenda. Comparing these findings with the interview outcomes, a difference could be found between the perspective of these institutions and the greenhouse growers regarding societal support. While the governments are mentioning the necessity of improving the living environment, improvement of the living environment is not on the agenda of the greenhouse growers. They mention that nuisance for neighbouring residents is not a problem at the moment and that all greenhouse-related businesses are fixed in the land use plans.

5.3.5 External dimension

From the documents could be concluded that there is a general perception that more extensive connections and collaborations with the greenhouse sector all over the country are necessary. The need for external connections is especially shown in the selected documents that are written on the provincial level. The Environmental Vision of the province (document 17) is mentioning the importance of international appearance of the cluster and the connection with foreign markets.

Greenport Arnhem-Nijmegen (document 20) indicates that stakeholders in the horticultural area Eastern Betuwe – in which Bergerden is located – cannot further develop the horticultural sector by themselves, but therefore need the connection and collaboration on a higher spatial scale. This corresponds to the interview results, from which could be derived that the municipality (interviewee 10) and the province

(interviewee 8) are searching for connection with Greenport Holland and Coalition HOT. Furthermore, the Municipality of Lingewaard is trying to connect the companies in the area to the market in Germany. In the market proposition NEXT Garden (document 15), they mention the possibilities to collaborate with companies in the wider region, which they call Euregio Rhein-Waal. The municipality initiates the Regional Business Accelerator, which is stimulating cross-border partnerships between German and Dutch companies on the field of marketing, sales and logistics. In the Structural Vision (document 16), the municipality also says that the future construction of highway A15 to Germany adds value to the Lingewaard region in economic perspective by strengthening the connection with other regions and is causing an increase of the business climate already.

6 Comparative analysis

The case studies led to different insights and stories for Agriport and Bergerden. In this chapter, the differences in outcomes are analysed and compared. A short comparison is made for every research method.

6.1 Field analyses

The three most important differences that are visible when comparing the two field analyses of Agriport and Bergerden are scale, growth and crop. Although both greenhouse areas have a larger average greenhouse surface than the national average, the average surface of the companies in 2015 in Agriport is 39,5 hectares, compared to 5,2 hectares in Bergerden. Furthermore, between 2005 and 2015, a growth is measured of 315,9 hectares in Agriport and 20,1 hectares in Bergerden. This means that the growth of the greenhouse area has been significantly larger in Agriport than in Bergerden. Notable is the fact that Agriport started with no primary production surface in 2005. Agriport does not locate a large variety of crops. Bergerden locates vegetable growers and pot plant nurseries, which are together covering a large variety of crops. This means that Bergerden has a wider range of products.

6.2 Interviews

6.2.1 Horizontal dimension

Degree of collaboration among direct competitors

The collaboration among direct competitors in Agriport is seen as constructive and is on a large scale. The energy cooperative ECW is professionally executing an important part of these collaborations. In Bergerden, it seems that the collaboration is not optimised. There are pleas for strengthening of the collaboration, from both governmental and private parties. It also seems that the issues on which the collaboration in Bergerden takes place, like marketing and installing CHP-installations, could be reached individually by the large-scale companies in Agriport. Therefore, it seems that the collaboration in Bergerden is addressing the scale issue, while the collaboration in Agriport is going one step further. In Bergerden, the collaboration of growers in the association KAN-plant is based on the enlargement of scale and creating visibility of the greenhouse area. Collaboration in larger ambitious projects, in which specialised expertise is necessary, like harvesting geothermal energy, maintaining a smart energy grid or founding collective employment agencies, is not developed in Bergerden. The interviewed growers in Agriport do not mention intensive collaboration on the field of visibility, marketing and transport. The large scale of these companies makes that collaboration on these fields does not bring extra advantages. Furthermore, becoming more sustainable is mentioned as a reason to collaborate in Bergerden. Simultaneously, these sustainability goals are mentioned to make the area more attractive for potential establishing companies and therewith seem to be an incentive for collaboration. The commercial incentive to collaborate seems to be more on the background. The desire to realise a connection with the district heating network in a collaborative way has more similarities to the collaboration in Agriport, because this development is not possible when doing it individually. However, the grower who explains this situation still argues for more and larger companies in Bergerden to strengthen the joint power of the growers and making it easier to do these large investments. This issue is also connected to the power dimension.

The Municipality of Lingewaard also made the comparison between Bergerden and other greenhouse areas and says that companies in Bergerden are less willing to collaborate with each other than in other areas. This is one of the reasons why the municipality is stimulating collaboration in the cluster. In Agriport, it is clear that the Municipality of Hollands Kroon does not mingle with the collaboration between greenhouse companies, because this is already happening without interference.

Degree of observation and comparison

The growers in Agriport have a formal structural system of comparison with all members of the growers association. This system results in higher production quality and a higher efficiency per square metre. This is different from the informal observation and comparison in Bergerden. Growers are sharing their latest news and course of their business after the structured meetings of KAN-plant and the energy cooperation.

6.2.2 Vertical dimension

Need for vertical relations among greenhouse growers

The vertical dimension of both clusters is not focused on the own greenhouse area. All interviewed growers in both Agriport and Bergerden say that vertical relations do not necessarily have to be located within the cluster itself. The trading companies in the vertical dimension are large and have a big influence on the price of the horticultural products. The large companies from Agriport seem to have less problems with this situation than the smaller companies from Bergerden. Among the growers in Bergerden there seems to be a need for more or stronger vertical relations, because the growers unified themselves to be more in the picture of large trading companies.

Degree of collaboration in the vertical chain

All interviewed growers say that they have vertical connections with the traditional Dutch greenhouse clusters. Growers in Agriport say that Westland should stay the logistical hub in the vertical dimension and mention that there is no desire for vertical relations within the geographical boundaries of Agriport. In Bergerden, the growers indicate that vertical relations could generate advantages in the cluster, but they realise that those companies do not have the right of existence within the boundaries of the area. Greenport NHN observes a trend that the companies in Agriport are carrying out chain integration. Packaging and distribution of the products are done by the companies themselves.

In both case study areas, institutions are stimulating the vertical dimension, but the measures that are being taken differ. The Municipality of Lingewaard is promoting the development of start-ups and places where innovation is taking place, while the Province of North Holland and Greenport NHN are trying to give more opportunities for improving the connections between logistics, services and primary production.

6.2.3 Institutional dimension

Role of the local government in the development of the cluster

The Municipalities of Hollands Kroon and Lingewaard have different roles within their greenhouse areas. The Municipality of Hollands Kroon is taking a facilitating role and says not to take the initiating role. However, the role of the Municipality of Lingewaard is pro-active in stimulating, facilitating, initiating and investing. Lingewaard proposes initiatives and stimulation measures, while Hollands Kroon is clearly leaving that to the

market mechanism. An interesting difference is the fact that the Municipality of Hollands Kroon clearly says that they would not like to influence the market and facilitate the needs of the market mechanism, while the local government in Bergerden is actively entering the market by being the land exploiter and even having a stand at the Horticultural Business Days. In Agriport, the role of the municipality is less a subject of discussion than in Bergerden. In Bergerden, there are sounds for a less active government. According to several municipal officers, a less active government should stimulate growers to show their entrepreneurial force.

Guiding vision or strategy for the area

Most organisations within Agriport have flexibility and adaptability included in their explanation of their guiding principles. The guiding visions for Bergerden contain a variety of measures to stimulate the development of the greenhouse area.

Usage of instruments by local government, formal institutions

In both areas, the instruments that are used by the local institutions are following the visions that are mentioned in the previous paragraph. It means that the measures that are taken in Agriport are including extra flexibility. For example, the Municipality of Hollands Kroon tries to include flexibility in the land use plan, with the ‘yes, unless’ principle. The institutions in Agriport are demand-driven and therefore do not have a lot of measures to stimulate the development of the greenhouse cluster. The institutions are carrying for the circumstances among which the development take place and therewith save the public interest. The government is mostly facilitating the developments. The instruments that are used by the Municipality of Lingewaard are not only intended to advantage the current greenhouse companies, but are targeted to attract new investigators and greenhouse companies. Even the promotion of the area is fulfilled by the local government. In Agriport, the private actor Agriport A7 has the task and the interest to attract new investments. Therefore the land exploitation in Agriport is not bothered with problems that occur in the Municipality of Lingewaard, where greenhouse development is affected by local politics.

Furthermore, the scale of the company seems to indicate whether there is need for stimulation measures from the institutional dimension. In Agriport, where companies are of larger scale than in Bergerden, it seems that there is less need of stimulation measures among growers. Greenport NHN said that “*the growers are large enough to carry for themselves.*” The Municipality of Lingewaard confirms this thought by saying that the small companies are the companies that need these stimulation measures to survive.

Regulations, land use plans and planning concepts

In Agriport, the land use plan is developed in cooperation between the Municipality and developer Agriport A7. The developer asked for input from the growers, which means that the growers had a significant impact on the content of the land use plan. One of the growers is mentioning that this gave the opportunity to fix for example light pollution regulations (see 4.2.3). The land use plans are designated with the desires from the market in mind. In Bergerden, the government assigned the locations for the development of greenhouses. The facilitation of larger parcels is discussed, but is limited to a maximum. Consultation of private actors in the designation phase of the land use plan is not talked about during the interviews in Bergerden. Despite the fact that the interviewed growers are satisfied with the current land use plan, the facilitation of market-driven desires seems

to be limited. The restructuring in NEXTGarden, which is not going very expeditiously, is tried to be eased by making it easier for growers to sell their old greenhouse.

Financial instruments

The growers of Agriport are perceived as having a lot of investment power by themselves. There are no large funds, except for geothermal energy. In Bergerden, the Province of Gelderland indicates to put a lot of money in the development of innovations in the greenhouse sector and becoming a sustainable greenhouse area. The Municipality of Lingewaard also spent much money on the land exploitation.

Decentralisation of governmental policy

It is difficult to say whether the decentralisation of governmental policy has effects on the developments in Agriport. In Bergerden, the Municipality of Lingewaard said they became problem owner. The national government shifted the responsibilities for the development of greenhouse areas to the local governments.

Collaboration between governments

In Agriport, governmental actors indicate that collaboration is making development procedures faster. Also governmental actors in Bergerden are positive about the collaboration. The Municipality of Lingewaard and the Province of Gelderland have structural meetings about Bergerden, which makes the measures for stimulation of Bergerden more effective.

6.2.4 Power dimension

Unequal relationships within the cluster

While Agriport has Agriport A7 as a very dominant private actor, Bergerden has a dominant governmental actor: the Municipality of Lingewaard. The dominant Agriport A7 is having a strong collaboration with the governmental actor, the Municipality of Hollands Kroon. Agriport A7 is willing to invest in the area and the municipality is facilitating and guarding the public interest, which is according to the developer a good division of tasks. In Agriport, strong collaboration is leading to powerful decisions in the cluster. It seems that there is a desire among growers in Bergerden to strengthen the joint power of the growers to have a more powerful say at the municipal and provincial level. The dominant position of the municipality can have positive and negative effects for the development of the cluster Bergerden. The Municipality of Lingewaard, is divided in political terms (Gelderland, 2016), which is making it more difficult to steer the developments in the desirable direction.

Relation with the environment and citizens

The growers in Agriport emphasize the importance of support from the surrounding environment to ensure an unhindered business climate in the greenhouse area. The growers are following two principles to meet the desires of the neighbouring citizens (see 4.2.4). Societal support is not given so much attention by the growers in Bergerden. Protests of neighbours are perceived as being senseless, because all developments are already fixed in the land use plans. This declares that societal support is much more an issue in the documents of Bergerden, than in the documents of Agriport.

6.2.5 External dimension

Collaboration with greenhouse growers from outside the cluster

It seems that the growers of Agriport have better connections with the traditional greenhouse clusters in the Netherlands than Bergerden. The vertical connections of Agriport are almost all located in greenhouse area Westland. Besides that, part of the companies have a location in Westland. The large growers associations of which the greenhouse companies are member, have growers in a lot of different greenhouse areas in the Netherlands. The degree of external connections with other greenhouse areas in the Netherlands is so high that one of the greenhouse growers says to perceive the whole country as the greenhouse cluster. The fact that Greenport NHN is inviting the growers of Agriport for conferences, is indicating that the knowledge that is established in Agriport is seen as very useful to inspire growers in other areas. Companies in Bergerden do not explicitly mention to have very intensive contacts with external companies. One grower says to collaborate with growers who have the same crop. Other contacts seem to be more informal and incidentally.

Collaboration with governments from outside the cluster

Entrepreneurs in Agriport are trying to enlarge the external dimension by themselves. This is a difference between Agriport and Bergerden. There is willingness to increase the external dimension of Bergerden, but this is coming from the governmental stakeholders in the area. In Bergerden, the institutions are the initiators of the development of external connections. The Municipality of Lingewaard is trying to get a connection with other clusters and other market areas. Furthermore, they are trying to get a connection with the other greenports in Greenport Holland. The Municipality of Lingewaard mentions that they would also like to have a connection with Coalition HOT.

6.3 Document study

In the document study for Bergerden, the general catchwords are used in combination with the necessary attraction of new companies and the improvement of the area's image. Stimulation and the use of promotional measures are combined with the general catchwords. However, for Agriport the general catchwords are used in combination with the potentials of the greenhouse area related to energy, innovation and the large scale of the available land parcels.

Interesting fact is that the provincial documents from the Province of Gelderland are more intensively using the word horticulture than the Province of North Holland (188 times in document 17, but only 42 times in document 7, 8 and 9 together).

6.3.1 Horizontal dimension

For both case studies, the indicators for horizontal dimension are not very much found in the documents. In the documents of Agriport, the collective measures that should be taken to encourage further development of the cluster are seen as the responsibility of the greenhouse growers. From the documents of Bergerden could be derived that the municipal and provincial government and the greenport organisations think that the horizontal dimension is not fully developed yet and that they are initiating stimulation measures for horizontal collaboration. The actors in the area of Bergerden are more

intensively indicating the implementation and necessity of stimulation measures and assistance in the collaborative activities. This corresponds with the findings in 6.2.1.

6.3.2 Vertical dimension

Documents from both case study areas indicate that the vertical dimension could be stimulated and strengthened. The Province of North Holland is mentioning to provide opportunities to develop the vertical dimension, while the Municipality of Lingewaard indicates that the qualities of the vertical dimension of Bergerden are being used to attract new companies to establish in Bergerden. It seems that the governmental documents from Bergerden with regard to the vertical dimension are more focused on the attraction of new companies.

6.3.3 Institutional dimension

For Bergerden, the documents indicate that the municipality and the province tries to stimulate, facilitate and strengthen the horticultural sector. In Agriport, the provincial documents contain the most measures to stimulate development. An observed similarity of Agriport and Bergerden is the fact that both document studies contain measures to accelerate the energy transition. The Province of Gelderland clearly takes its role as a financier, which is confirmed by both the interviews and the documents. The Province of North Holland discusses its role in their documents, but does not see ‘financier’ as one of the important roles. The Province of North Holland uses subsidies, but covers this in marketing measures, collaborative structures and regulations.

6.3.4 Power dimension

In both case studies, societal support is the most important issue in the documents regarding the power dimension. The first land use plan of Agriport already highlighted the existing societal support for the development of the greenhouse cluster. Thereafter, this support is strengthened by the growers who established in Agriport. In Bergerden, societal support is an issue among institutions, which have the ambition to enlarge the support, the image of the greenhouse sector and the appreciation of greenhouses in the area among local citizens. However, from the interview results can be concluded that this is observed as a less important issue among growers.

6.3.5 External dimension

In Agriport, the importance of the external dimension is highlighted by Greenport NHN. The international course of the cluster is mentioned frequently in the documents and the strong connection with the traditional cluster Westland is quoted in the documents. This differs from the documents from Bergerden, in which a general perception is observed that more extensive connections and collaborations with other greenhouse areas within the Netherlands are necessary. Several institutional documents mention that Bergerden should develop more external connections.

7 Discussion

This chapter discusses and answers the three sub research questions of this research. Furthermore, this chapter discusses the methodology and the use of the multidimensional approach.

7.1 The firms and actors of the greenhouse cluster

What are the firms and actors in the greenhouse clusters?

For Agriport, the most important actors are the Municipality of Hollands Kroon, the property developer Agriport A7, energy cooperative ECW, the Province of North Holland, Greenport NHN and nine greenhouse companies. These greenhouse companies are large-scale producers of bell peppers and tomatoes, which can be identified by their entrepreneurial character. One of the growers has been involved in the emerging process of the greenhouse cluster. Furthermore, the greenhouse growers in Agriport see the neighbouring citizens as an important actor group in the development of the cluster. As was already mentioned by Buurma and Ruijs (2011), by seeing citizens as an actor and using the word ‘neighbour’, the sense of equality is released.

For Bergerden, the most important actors are the Municipality of Lingewaard, the Province of Gelderland and thirteen greenhouse companies. These greenhouse companies have a smaller scale than the companies in Agriport and their crops vary from vegetables to flowering and non-flowering pot plants. Besides these companies, several organisations exist, which are representing interests of the growers or stimulating the development of the horticultural sector. These organisations are LTO Noord, STOL, Greenport Arnhem-Nijmegen – also known as the greenhouse covenant – and Betuwse Bloem – also known as Greenport Gelderland. These different actors all have their own stimulation measures to attract new businesses to Bergerden and promote the name of the area.

The actors that are playing a role in the development of the greenhouse cluster are not similar for Agriport and Bergerden. Most remarkable difference is the fact the cluster Agriport has a private company, which actively facilitates the development of the greenhouse cluster. Developer Agriport A7 played an important role in the emergence of Agriport as a greenhouse area and is still promoting further development. Furthermore, Agriport has its own energy cooperative ECW. Bergerden also has its own energy collective, however, this is not an organisation with its own employees.

7.2 The relationships within the greenhouse cluster

Which horizontal, vertical, institutional, power and external relationships do exist between the firms and actors in the greenhouse clusters?

In Agriport, the growers have set clear reasons to work together. Horizontal collaborations are taking place when it is not possible to reach the desirable results individually, while trying to reach the best possible outcome for the whole area. In Bergerden, the growers are addressing the scale issue by means of collaborations, but the collective facilities – the energy supply and water storage – are fixed beforehand in the municipal plans. The reasons behind the horizontal collaboration seem to be more on the

background. This is already mentioned in the research of Buurma and Ruijs (2011), who stated that the municipality prescribed collaboration and already excluded all other options by describing Bergerden in the plans as being “*a modern location in an attractive landscape and with collective facilities*” (see 2.3.4). When the reasons for collaboration are set by the collaborating actors themselves, the collaboration could probably become stronger. In Bergerden, the municipal and provincial government influences the horizontal and vertical dimension with stimulation measures, to encourage collaboration. In Agriport, the municipal government and other organisations say that the collective measures are the responsibility of the growers. The wishes of the growers are facilitated by the municipal government, which is flexibly adapting its regulations to serve the market mechanism. The private actor Agriport A7 is ensuring that the interests of the growers are represented in the governmental regulations. Furthermore, private actor Agriport A7 stimulated horizontal collaboration by founding energy cooperative ECW. Agriport A7 gave every buyer of land a share in ECW and therewith encouraged horizontal collaboration among the greenhouse companies in the area. ECW is now professionally executing the intensive horizontal collaboration in the cluster, commissioned by the greenhouse growers.

It is clear that the Municipality of Hollands Kroon and the Municipality of Lingewaard take different roles in the development of the greenhouse cluster. The active and initiating role of the Municipality of Lingewaard is subject of discussion within the municipal organisation, but also among greenhouse growers. For optimal collaboration between institutions and the greenhouse companies in the area, it seems that there should be an agreement about the role of the local government. As long as there is discussion about the role of the local government among actors, but also within the organisation itself, it is difficult to properly agree upon the measures that should be taken to stimulate the development of the area. When there is an agreement about the role to be taken by the growers and the government, it is easier to implement measures, instruments and regulations that are demand-driven and in line with the desires of the greenhouse growers. This is earlier found in research of Reid and Carroll (2006), who said that trust, norms and coordinated networks are prerequisites to accomplish joint action. As seen in Agriport, a good balance between public and private actors can lead to successful collaboration and fast developments. The most striking point of the measures that are taken in Agriport, is the fact that they are demand-driven. In Bergerden, where the municipal government fulfils a role which is not collectively agreed upon, municipal officers sometimes experience difficulties with involving growers in the stimulation projects. It seems that the local government in less-developed greenhouse clusters is struggling with the difference between the demand of measures from the grower’s perspective and the possible need for measures. In Bergerden, there seems to be a mismatch of the interpretation of the need for measures between the municipality and the growers, despite the good relation between the two actors. This is why the Municipality of Lingewaard has difficulties with searching audience among growers, when initiating measures to stimulate the development of the greenhouse area Bergerden.

The constructive collaboration between public and private actors in Agriport led to the joint designation of the first land use plan for Agriport. The powerful position of Agriport A7 and fact that they involved the growers in the designation, made that the prerequisites for the greenhouses to be built were demand-driven and following the principle that it

should be the best outcome for the area as a whole. In Bergerden, the land use plan is designated by the municipality. The possibilities in the area do not cover the demands from the greenhouse growers, because greenhouse companies larger than 10 hectares are not possible in the area. When the land use plan is not able to facilitate the desires from the market mechanism, this could be seen as a weakness from the perspective of the greenhouse cluster.

In both Agriport and Bergerden, the local government influenced the emergence of powerful actors. Agriport A7 became an influential player in the cluster Agriport, because it was given the space to develop its own land use plan by the former Municipality of Wieringermeer. The Municipality of Lingewaard hindered the arrival of a large scale greenhouse company and in this way prevented the emergence of a powerful private actor in the area. This choice still has its influence on the character of Bergerden and is interesting to discuss. The local government functioned as a directing area manager. It is questionable whether this directing choice finally has positive or negative effects for Bergerden. This grower, who later established in Agriport, is clearly having an entrepreneurial approach and tries to stimulate other companies in its environment to have a collective ideology. As is mentioned by one of the growers in Bergerden, the area needs initiators to keep developing. This entrepreneur is initiator in Agriport and sees the good relationship with the environment as essential to operate in an unhindered way. By hindering the emergence of private powerful actors, the Municipality of Lingewaard ensured their own – possibly undesired – dominant position in the cluster.

Growers are willing to accept the fact that vertical relations do not have the right of existence in their greenhouse area. Based on the market mechanism, it is difficult to maintain a full range of vertical relations in every Dutch greenhouse area. Growers indicate that most companies in the vertical chain do not have enough support for settlement in Bergerden. The trend of upscaling in the vertical chain is giving the small greenhouse areas a weaker position. Greenhouse companies could apply chain integration for the most important components of the chain and should enlarge their external connections for the missing components. For strengthening of the vertical dimension, horizontal collaboration seems to be a very good means. In this way, the growers in Agriport address distribution, packaging and personnel issues. That the horizontal dimension could be seen as a good basis of the vertical dimension, is already mentioned before by Malmberg and Maskell (2002).

Greenhouse companies in Agriport all have connections with the traditional cluster Westland and multiple connections with other greenhouse areas via growers associations. This means that all companies could be seen as so-called ‘absorptive’ local firms, which are carrying for fresh impulses for horizontal learning (Maskell and Malmberg, 2007). The external connections with other greenhouse areas in Agriport are developed in such a strong way that the geographical boundaries of the cluster are subject of discussion. Interwoven connections between different areas are mainly visible between the new and the traditional greenhouse areas. The traditional greenhouse area Westland is seen as the logistical hub for the horticultural sector by the growers. This gives the connections with Westland an important value. The absence of vertical relationships within Agriport itself, made the external connections even more important. In Bergerden, the external connections are weaker, which means that the external sources of knowledge are limited. The municipal government is searching for connections with other greenhouse areas, but

this does not seem to be driven by a demand from the growers. It is clear that, especially if the vertical dimension is not well-developed, external connections are very important for greenhouse areas. Growers are not always aware and are thus not intensively searching for these connections. This awareness is visible at the municipal and provincial government, which are searching for connection with other governments. However, the awareness of the importance of external connections should also grow among greenhouse growers. Local government can probably carry out this awareness to the established growers.

7.3 The influence of spatial planning

Which characteristics can be influenced by spatial planning in order to improve the development of greenhouse clusters?

When there is a mismatch of the interpretation of the need for measures between the municipality and the growers, the municipal government and the established growers should together come closer to each other in terms of what are the necessary measures that have to be taken to support growth of the area. Agriport A7 mentioned the '*good division of tasks*' as one of the reasons that procedures for the development of the greenhouse cluster went fast and that the collaboration between private and public actors is constructive. When the municipal government is giving the growers active participation in drawing up an agenda, participation of growers in the stimulation measures for the greenhouse area is probably growing. This provides unnecessary expenses of public money and gets the actors behind the same ideas. The greenhouse growers could be stimulated to come up with measures themselves. To get to the involvement of greenhouse growers, the advantages of collaborative measures should become clear. In contrast to Agriport, the Municipality of Lingewaard says that the growers in Bergerden are less willing to join collective actions than growers in other greenhouse areas. In Bergerden, the neighbouring citizens were not supporting the land use plan and the growers that would establish were less involved in the plan-making. According to Booher and Innes (2002), covering all interests during the planning process is an indicator of success. When the actors are not aware of their interdependency, the network power of Booher and Innes (2002) does not exist within the greenhouse cluster (see 2.3.4). The growers in Agriport tried to build this network, by covering the interests of the neighbouring citizens in the land use plan. When the growers are not building the network themselves, policymakers could act as the builders of the network. The municipal officers in the less-developed greenhouse clusters could probably fulfil this role and try to search for common interests between municipality, greenhouse growers and other actors before defining and implementing stimulation measures.

In the process of creating common interests, the designation of the land use plan can be executed in collaboration with growers that are established and growers that are willing to establish within the area. In this way, the desires of the market can be included in the land use plan. Earlier, Hajer and Zonneveld (2000) were already stressing the importance of more active involvement of stakeholders in the plan-making. Agriport A7 used the collaborative designation of the land use plan to ensure that the area is fulfilling the desires of the sector for the coming 20 years instead of the past 5 years. The sector itself is more able to see the changes in the market. This is also the reason why flexibility is

included by the Municipality of Hollands Kroon. When designating the land use plan, the two principles for the surrounding environment (see 4.2.4) could be included, to minimise the objections against the plan and optimise the support among all actors. The influence of growers on the content of the land use plan is an advanced form of horizontal collaboration, which is used to reach common goals for designing the greenhouse area in a desirable way. It seems that ‘cooperative competition’ in the horizontal dimension, as it is mentioned in 2.2 by Bergman and Feser (1999), is contributing to the development of the greenhouse cluster. An important strength of horizontal collaboration is shown, when the way of thinking is based on the idea that the result should be the best outcome for the area as a whole.

7.4 Reflection on the used methods

This paragraph describes the limitations of the used concept, the selected case studies and the research methods and suggests alternatives to improve the methodology.

The multidimensional concept

In this research, the choice is made to investigate the greenhouse clusters with the multidimensional concept of Bathelt (2005a). By using this concept, it was easier to unravel the complexity of the greenhouse clusters. However, the use of this concept also has its disadvantages. To get a complete overview of the multiple dimensions and how they influenced each other, every dimension has to be further investigated into detail. It is very time-consuming to investigate all five dimensions of the greenhouse cluster. For example, the power dimension is a complicated dimension, which consist of many socially constructed relationships. To get a clear insight in this dimension, the power dimension on itself can be subject of an intensive research. This also applies to the other dimensions. The vertical dimension consists of among others a lot of trading companies, service companies, auctions, suppliers of half-products, horticultural consultancy companies and service companies. To limit the complexity of this research, these companies were no object of this research. The interviewees are asked about their vertical relations, but the companies in the vertical dimension are not interviewed themselves. This could be seen as a missing link in this research, but the focus of this research is limited to the establishment of primary production in principle.

Case study selection

The choice for the case study areas of Agriport and Bergerden has given insights in a well-developed and a less-developed greenhouse cluster in the Netherlands. However, the satellite location as being a concept that is generally applicable is already questioned in 2.3.3 by Hajer and Zonneveld (2000). It is difficult to generalise the satellite locations, because every greenhouse location has its own characteristics. During the case selection in 3.2, there has been searched for independent greenhouse clusters, which are not located close to other greenhouse clusters. The choice of defining a greenhouse cluster as being a small region of the Netherlands – a traditional greenhouse cluster or a satellite location – could be discussed. There are sounds for perceiving the Netherlands as a greenhouse cluster as a whole, of which all smaller greenhouse areas are part. In chapter 2, this research is defining the greenhouse cluster as being a local region, based on the agglomeration economy of Weterings (2006), in which firms can benefit by being located near one or more other related firms. Especially in the vertical dimension, and for

Agriport in the horizontal dimension as well, connections are not limited to the local level, but are spread over the Netherlands. It is therefore not surprising that one of the growers of Agriport thinks that all horticulture-related companies in the Netherlands should be seen as ‘the cluster’ and that competitors are located abroad. The geographical boundaries of the cluster could be questioned, which is already done by Porter (2000a). The strength of the spill-overs of the cluster Agriport to Westland is taking on an important part of productivity and innovation for the greenhouse companies in Agriport. Therefore, the greenhouse area Agriport could not be seen as a single greenhouse cluster, following the theory of Porter (2000a). If the cluster would be perceived as being the whole horticultural sector of the Netherlands, it also explains the fact that vertical relations of the area Bergerden serve the whole country and thus choose for a location in the traditional ‘centre’ of the greenhouse cluster. Reflecting this on the research methods, for this research, there is chosen to investigate the greenhouse areas within the Netherlands that are the most independent, based on location. However, the connectedness – in this research defined as the external dimension – is possibly not based on location – or on location on a larger scale – and seems therefore also interesting to investigate for the other not-selected greenhouse locations within the Netherlands.

Field analysis

The results of the field analysis differ from the statistics of CBS, but this is mainly due to the fact that only primary production area is measured. The interval of the measurements in 2005 and 2015 is the result of the available satellite images. The disadvantage of this method is that there is no data available of the growth in the two clusters between 2015 and 2017, which could have been relevant information for this research. This could probably have been solved by using secondary resources, for example more recently updated topographic maps.

Interviews

The choice could have been made to interview more greenhouse growers, to enlarge the interpretations from their perspective. However, the growers that are interviewed have been giving a good impression of the grower’s perspective and their way of thinking. In both areas, growers are interviewed who have a clear overview of the situation in the cluster and the grower’s perspective with regard to the relationships within the area. This is also confirmed by municipal interviewees in both case studies.

Document study

For the document study, 22 documents have been studied. Most of the documents are mentioned by the interviewees as being interested documents to investigate. Besides that, the land use plans and other spatial development documents are included. The indicators have been quantified to give an overview of which documents were containing the most relevant information. Thereafter, the quantified indicators are used to analyse the documents in a qualitative way. The selection of documents gave clear insights in the multiple dimensions of the cluster. However, both the horizontal and the power dimension seemed to be less represented in the documents, than the other three dimensions. Most plausible explanation of the small representation of the horizontal dimension in the documents, is the fact that horizontal collaboration is largely part of internal business and is not described in public documents. Power is mostly a socially constructed phenomenon, which is difficult to describe in documents. Undesired power relations are probably not fixed in the investigated documents, which made the results of

the document study for the power dimension less relevant. In this research, there is chosen to search for indicators of the power dimension where possible and to interpret their context with the interview results. To investigate the power dimension deeply, an intensive research of social constructions within the greenhouse cluster is necessary. The document study proved to be a useful method to investigate the characteristics of the vertical, institutional and external dimension.

8 Conclusion

8.1 Main research question

Which characteristics of the Dutch greenhouse clusters explain why some greenhouse clusters grow, while others stagnate over time and which of these characteristics can be improved by spatial planning?

The investigation of the greenhouse clusters with the help of the multiple dimensions of Bathelt (2005a) led to insights in the differences between well-developed and less-developed greenhouse clusters. This research unravelled the relationships between growers among themselves, but also between related companies, institutions and governmental organisations that are all involved in the complex development of the greenhouse cluster. The case study research showed that the characteristics of the well-developed greenhouse cluster differ from the characteristics of the less-developed cluster. When comparing the different outcomes, it seems that there are multiple issues in which could be learned from the explanation of the cluster characteristics with the help of the multidimensional concept. After analysing all dimensions, this research can conclude that the development of the greenhouse cluster is influenced by characteristics in all five dimensions. The local government of the specific greenhouse area can use the analysis of the multiple dimensions to gather starting points for the support of the greenhouse cluster and for the adjustment of its land use policies. The analysis provides a basis for area-specific measures, which are not extracted from the generalised national concept of traditional clusters and satellite locations. In order to achieve these area-specific measures, a good division of tasks in the development of the greenhouse cluster is important. Constructive collaboration between public and private actors provides fastens developments and catalyses growth of the cluster. The quality of this collaboration grows when greenhouse growers are involved in the designation of stimulation measures and the content of the land use plan. Demand-driven stimulation measures are contributing to an optimal involvement of greenhouse growers. When the measures are in line with the desires of the greenhouse growers, governments and other institutions could count on a wider support among actors. Therefore, the search for common interests could bridge the gap between local government and greenhouse growers. Making sure the common reasons for collective activities will make the support for the activities stronger. Trust, norms and coordination between actors (Reid and Carroll, 2006) can contribute to the success of stimulation measures in the greenhouse clusters. The designation of the land use plan in a collaborative way can be advanced horizontal collaboration and facilitates the desires of the greenhouse area for the future.

8.2 Scientific recommendations

To scientifically ensure that there are differences in characteristics between well-developed and less-developed greenhouse clusters, other greenhouse areas in the Netherlands could be investigated as well. These cases could be used to confirm the statement that there are differences between well-developed and less-developed clusters. To come to more interesting insights in the development of greenhouse clusters, the small greenhouse area Alton could be a very good case study to investigate. According to the Province of North Holland, the foresights for this area were not very promising four years

ago and degradation seemed to occur. With the help of restructuring and spatial regulations, the area is given new spirit from governmental initiative.

As pointed out in paragraph 7.4, it is interesting to investigate the external dimensions of all greenhouse areas in the Netherlands and analyse whether the connectedness of the different areas is based on location or that there is no correlation between connectedness and the distance between greenhouse areas.

The vertical dimension is in this research limited to the vertical relations of the primary production companies. Further research could elaborate the insights in relations between other companies in the chain. It is not clear yet how the vertical relations within the chain are spatially divided over the country or even over the globe. The relations between for example traders and auctions, or traders and transport companies are not included in this research, but could give interesting insights in the spatial configuration of the vertical dimension.

The field analysis in this research is limited to the two case study areas. It would be interesting to analyse the satellite images for all greenhouse areas in the Netherlands. In this way, spatial data about the primary production surface could be provided. This can possibly be an entrance for a quantitative analysis of the growth of greenhouse areas in the past decennium. This quantitative analysis could then be compared with results from the qualitative analysis of the multiple dimensions. In this way, the correlation between growth and the observed characteristics of the greenhouse areas could be supported with more scientific results.

Because the document study was shortcoming to investigate the power dimension, this dimension could be investigated by conducting a social scientific research. The network power of Booher and Innes (2002) gives opportunities to analyse the awareness of interdependencies between actors. Trust between actors during communication and political views could be included.

8.3 Societal recommendations

The multidimensional approach could be used to analyse other greenhouse areas to provide insights in the potential developments. Strategies for the development of these areas could be derived from the characteristics after an in-depth investigation. The analysis of the multiple dimensions of the greenhouse area can provide a basis for area-specific measures, which are not extracted from the generalised national concept of traditional clusters and satellite locations. Local governments with the ambition to support continued growth, could use the characteristics of the well-developed cluster as a guideline, but should not immediately copy the governmental strategy. The gap between the characteristics of less-developed clusters and the characteristics of well-developed cluster could be decreased by the local government of the less-developed cluster, but this should be executed in a narrow conversation and cooperation with the established growers. To get all growers behind measures that should be taken, intensive conversations between municipality and the established growers could take place. During these conversations common interests should be found, so that measures could be taken that are broadly supported by all actors. When there is a mismatch of the interpretation of the need for measures between the municipality and the growers, the gap between private and public actors should be bridged. Therefore, the growers could be involved in plan-

making and be stimulated to invent measures for the development of the area. Local governments of less-developed greenhouse clusters should strive for a good division of tasks between public and private actors, an inclusion of common interests in the applied measures to stimulate the development of the greenhouse area and a collaboratively designated land use plan to cover the common interests in the development.

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List of abbreviations

CBS	Statistics Netherlands Dutch: <i>Centraal Bureau voor de Statistiek</i>
CHP	Combined heat-power installation Dutch: <i>warmtekrachtkoppeling (wkk)</i>
CO ₂	Carbon dioxide
ECW	Energy Combination Wieringermeer
EHEC	Enterohemorrhagic Escherichia Coli In 2011, an outbreak of these bacteria caused a crisis in the food sector which resulted in extremely low market prices for vegetables.
GR	Joint Arrangement Bergerden Dutch: <i>Gemeenschappelijke Regeling Bergerden</i> Former collaboration between the Municipalities of Lingewaard and Nijmegen.
HHNK	Water Board Hollands Noorderkwartier Dutch: <i>Hoogheemraadschap Hollands Noorderkwartier</i>
HOT	Restructuring and Development of the Horticultural sector Dutch: <i>Herstructurering en Ontwikkeling Tuinbouw</i>
IPO	Inter-provincial Consultation Dutch: <i>Intervinciaal Overleg</i>
KAN	City Region Arnhem-Nijmegen Dutch: <i>Knooppunt Arnhem-Nijmegen</i>
LTO	Dutch Federation of Agricultural and Horticultural Organisations Dutch: <i>Land- en Tuinbouw Organisatie</i>
M.E.R.	Environmental Impact Report Dutch: <i>Milieueffectrapportage</i>

MIRT	Multiannual Programme Infrastructure, Spatial Organisation and Transport Dutch: <i>Meerjarenprogramma Infrastructuur, Ruimte en Transport</i>
MW	Megawatts
NHN	Greenport Northern North Holland Dutch: <i>Greenport Noord-Holland Noord</i>
ONHN	Development Corporation of Northern North Holland Dutch: <i>Ontwikkelingsbedrijf Noord-Holland Noord</i>
RVO	Netherlands Enterprise Agency Dutch: <i>Rijksdienst voor Ondernemend Nederland</i>
STIDUG	Stimulation regulation for the Construction of Sustainable Greenhouse Areas Dutch: <i>Stimuleringsregeling Inrichting Duurzame Glastuinbouwgebieden</i>
STOL	Foundation for the Stimulation of Horticulture in Overbetuwe en Liemers Dutch: <i>Stichting Stimulering Tuinbouw Overbetuwe Liemers</i>
VROM	Former Ministry of Housing, Spatial Planning and the Environment Dutch: <i>Ministerie voor Volkshuisvesting, Ruimtelijke Ordening en Milieu</i>

Appendix I – Interview questions group 1: greenhouse growers

The interview questions are based on the indicators of Table 2. The interviews are conducted in Dutch. Therefore the interview questions are elaborated in Dutch.

Introducerende vragen:

- Wat is de omvang van uw bedrijf?
- Hoe lang is het bedrijf al gevestigd op het cluster?
- Wat waren de redenen voor uw bedrijf om zich te vestigen in dit cluster?
- Wat is uw status binnen het bedrijf? Eigenaar/bedrijfsleider/etc.

1. Heeft u contact met andere glastuinbouwbedrijven?

Zo ja, vraag a, zo nee vraag i

Binnen het cluster

- a. In welke mate werkt uw bedrijf samen met andere glastuinbouwbedrijven binnen het eigen glastuinbouwcluster?
- b. Is dit contact formeel of informeel?
- c. Wat is voor uw bedrijf de meerwaarde van deze samenwerking? Kunt u deze samenwerking toelichten? Wat houdt deze samenwerking in? Wat is de reden van deze samenwerking?
- d. Is deze samenwerking van belang geweest bij de vestiging van uw bedrijf in dit glastuinbouwcluster?

Buiten het cluster

- e. In welke mate werkt uw bedrijf samen met andere glastuinbouwbedrijven buiten het eigen glastuinbouwcluster?
- f. Is dit contact formeel of informeel?
- g. Wat is voor uw bedrijf de meerwaarde van samenwerking? Kunt u deze samenwerking toelichten? Wat houdt deze samenwerking in? Wat is de reden van deze samenwerking?
- h. Is deze samenwerking van belang geweest bij de vestiging van uw bedrijf in dit glastuinbouwcluster?
- i. *Alleen indien vraag 1 = nee*: Wat is de reden dat er geen sprake is van samenwerking met andere glastuinbouwbedrijven?

2. Heeft uw bedrijf relaties met handelaren, toeleveranciers en transportbedrijven?

- a. Welke van deze relaties zijn gevestigd binnen het eigen glastuinbouwcluster?
- b. Welke van deze relaties zijn gevestigd buiten het eigen glastuinbouwcluster?
- c. Waarom zijn deze relaties belangrijk voor uw bedrijf?
- d. Is er een meerwaarde als uw huidige relaties buiten het cluster zich zouden vestigen binnen het eigen cluster?
- e. Welke bedrijven zouden een toevoeging of verrijking kunnen zijn van het eigen cluster?

- f. Is de ontwikkeling van meer of betere relaties in de keten binnen of buiten het eigen glastuinbouwcluster belangrijk voor de toekomst van uw bedrijf?
3. Wat is in uw ogen de bijdrage van de overheid aan de ontwikkeling van het glastuinbouwcluster?
 - a. Wordt uw bedrijf gestimuleerd of belemmerd door de overheid (zo ja, door welk overheidsorgaan)?
 - b. Heeft uw bedrijf contact met dit overheidsorgaan?
 - c. Welke middelen gebruikt de overheid voor deze belemmering of stimulans?
 - d. Wordt uw bedrijf gestimuleerd of belemmerd door de overheid door middel van bestemmingsplannen of andere wetgevingen of bepalingen?
 - e. Zo ja, wat voor effect hebben deze middelen op uw bedrijfsvoering?
 - f. Welke stimulerende middelen vanuit de overheid zouden volgens u de ontwikkeling van het glastuinbouwcluster nog meer kunnen bevorderen?
 - g. *Alleen indien a = nee*: Zou de overheid volgens u uw bedrijf wel kunnen stimuleren en zo ja, op welke manier ziet u dit graag gebeuren?
4. Zijn er bedrijven of overheden die een dominante rol spelen bij de ontwikkeling van het cluster of uw bedrijf?

Zo ja vraag a, zo nee vraag e

- a. Waaruit komt die dominante rol voort?
- b. Heeft deze dominante rol een positieve invloed op de ontwikkeling van het cluster?
- c. Heeft deze dominante rol een negatieve invloed op de ontwikkeling van het cluster?
- d. Heeft deze dominante rol invloed op de besluitvorming met betrekking tot het cluster?
- e. Heeft deze dominante rol een financiële positie binnen het cluster?
- f. Ondervindt de ontwikkeling van het cluster tegenstand vanuit burgers of de samenleving? Wie, wat waarom?
- g. Wat zou er in uw ogen aan machtsposities binnen het cluster veranderd moeten worden om de ontwikkeling van het glastuinbouwcluster te bevorderen?

Afsluitende vragen

- Zijn er andere zaken die nog niet aan de orde zijn geweest en u wel graag wilt toevoegen?
- Welke personen zou ik nog meer kunnen bezoeken om meer te weten te komen over deze vragen?
- Welke personen zouden een toevoeging zijn aan dit onderzoek?

Appendix II – Interview questions group 2: other interviewees

Introducerende vragen

- Wat is uw functie binnen deze gemeente/overheid?
 - Op welke manier bent u betrokken bij het glastuinbouwcluster?
 - Wat is uw betekenis voor het glastuinbouwcluster en welke ervaring heeft u binnen het cluster?
-
5. Is het cluster in uw ogen belangrijk voor de gemeente (bijvoorbeeld op het gebied van economie, werkgelegenheid)? En waarom?
 6. Wat is het beleid van de gemeente met betrekking tot het glastuinbouwcluster?
 - a. Is er een leidende visie, strategie of een concept waar het beleid van de gemeente op gebaseerd is?
 7. Hoe ziet u de toekomstige ontwikkeling van het glastuinbouwcluster?
 8. Is er samenwerking met gemeenten, de provincie en het Rijk met betrekking tot het glastuinbouwcluster?
 - a. Is er samenwerking met overheden uit andere glastuinbouwclusters?
 - b. Wat voegt deze samenwerking toe aan de ontwikkeling van het glastuinbouwcluster?
 - c. *Alleen indien a = nee*: Ziet u wel mogelijkheden of meerwaarde in samenwerking met overheden uit andere glastuinbouwclusters?
 - d. Indien van toepassing: Is de samenwerking en de verantwoordelijkheid van de gemeente/provincie veranderd door de decentralisatie van het overheidsbeleid?
 - e. Zo ja, in welk opzicht is dit veranderd en wat heeft dit voor effect op de ontwikkeling van het glastuinbouwcluster?
 9. Welke middelen gebruikt uw organisatie om de ontwikkeling van het glastuinbouwgebied te stimuleren?
 - a. Gebruikt uw organisatie bestemmingsplannen om de ontwikkeling van het glastuinbouwcluster te stimuleren? (Of: probeert uw organisatie invloed uit te oefenen op bestemmingsplannen om de ontwikkeling van het glastuinbouwcluster te stimuleren?)
 - b. Gebruikt uw organisatie financiële middelen om het glastuinbouwcluster te stimuleren?
 10. Bevordert uw organisatie onderlinge samenwerking tussen glastuinbouwbedrijven?
 - a. Zo ja, welke middelen gebruikt uw organisatie hiervoor?
 - b. Zo nee, ziet u mogelijkheden om de samenwerking tussen glastuinbouwbedrijven in het cluster te vergroten? En op welke manier?
 - c. Bevordert uw organisatie ook onderlinge samenwerking buiten het cluster?
 11. Bevordert uw organisatie samenwerking tussen glastuinbouwbedrijven en toeleveranciers/handelaren/transportbedrijven?

- a. Zo ja, welke middelen gebruikt uw organisatie hiervoor?
 - b. Zo nee, ziet u mogelijkheden om de samenwerking tussen glastuinbouwbedrijven en leveranciers/handelaren/transportbedrijven te vergroten? En op welke manier?
 - c. Bevordert uw organisatie ook onderlinge samenwerking buiten het cluster?
12. Zou u de rol van de overheid met betrekking tot het glastuinbouwcluster graag anders willen zien? En zo ja, op welke manier?
13. Zijn er bedrijven of overheden die een dominante rol spelen bij de ontwikkeling van het cluster?
- a. Zou in uw ogen iets moeten veranderen aan de dominante rol of machtspositie binnen het cluster?
14. Zou u de rol van uw eigen organisatie graag anders willen zien?

Afsluitende vragen

- Zijn er andere zaken die nog niet aan de orde zijn geweest en u wel graag wilt toevoegen?
- Welke personen zou ik nog meer kunnen bezoeken om meer te weten te komen over deze vragen?
- Welke personen zouden een toevoeging zijn aan dit onderzoek?
- Zijn er documenten beschikbaar zoals beleidsvisies en -strategieën die ik zou mogen gebruiken voor mijn onderzoek?