

# Clusters and networks in the Betuwse Bloem

*A study of the firm-network in the horticulture  
cluster of the Betuwse Bloem and its possible  
policy implications*



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**TITLE** Clusters and networks in the *Betuwse Bloem*

**SUBTITLE** A study of the firm-network in the horticulture cluster of the Betuwse Bloem and its possible policy implications

**DATE / VERSION** 10-07-2015 / Final version

**IMAGE FRONTPAGE** Apple orchard in the *Betuwse Bloem*

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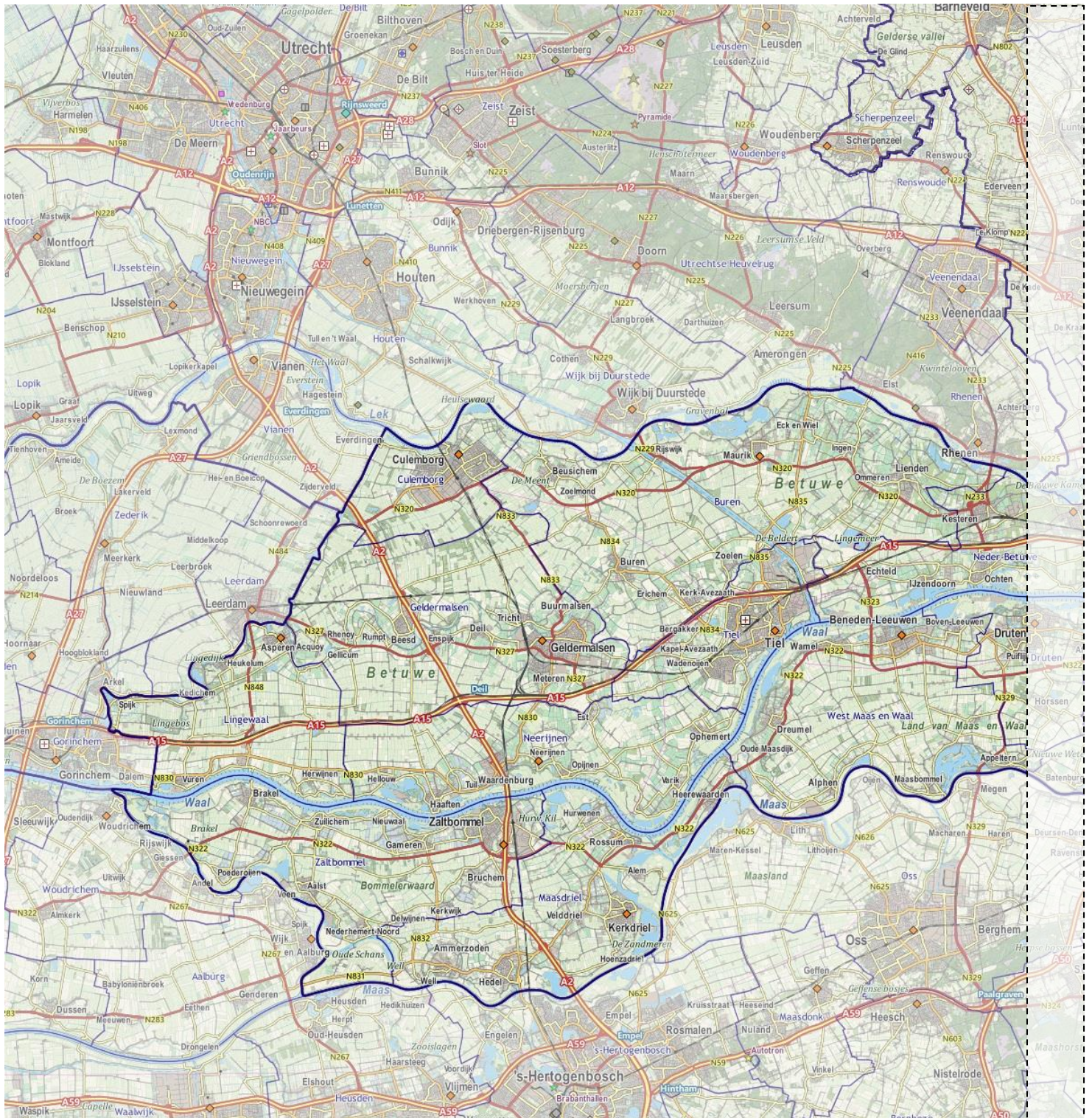
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
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# DETAILED MAP OF THE BETUWSE BLOEM



 = border of the province

*Unfaded*

 = part of the *Betuwse Bloem*



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Dear readers,

When I took an evening stroll in the summer with my mother our conversation triggered an epiphany. She was telling me about a recent biking trip she took with my dad when they passed by Venlo. Looking at the map they noticed tiny little roses around Venlo. They wondered if there was anyone telling these rose cultivators to locate in this area and why they would want to be so close to each other. Then I realized she was talking about one of the competing clusters of the Betuwse Bloem, the latter my body and soul for the last year. Her questions not only made me realize that I was studying an interesting topic, but also that economic geography actually is everywhere.

Besides the unintended help of my mother I would like to give thanks to several other people who have helped me top off my thesis, so I can finally can myself a Master of Science after eight years of blood, sweat and tears. First of all my supervisors Frank and Frits, who might sound like an adventurous Disney duo, but nevertheless provided me with comments, critics and insights whenever I needed. My gratitude to Frits in particular for his infinite enthusiasm and for providing the opportunity to conduct my research at the Rabobank. And to Frank because even though he is a hard man to get hold of, he has been very helpful in providing new angles on pieces where I thought my work was done. Also my thanks to Jonathan and Ron, whose determination has defeated the inefficiency of the post-it system at the electricity department. But even more important they carried out several data analyses, providing me with some key statistics for my research. I also would like to thank my parents who have let me live at their house for free for the last year and have listened to my nagging whenever my thesis made me turn to the dark force.

It has been a process. And even though at times I could not foresee a happy ending, I am glad, proud and thankful that I have been able to create the report you see lying before you.

Enjoy,

Evelien

*Paris, July 2015*

## Summary

Over the last decades the region has replaced the nation as the relevant scale in economic geographic studies. A key element here is that each region has its own comparative advantages and certain sectors will concentrate in certain regions and form a cluster where externalities arise. In the Netherlands the horticulture clusters are joined in the Greenport Holland structure. The *Betuwse Bloem* is not part of the official Greenport structure, but is a self-proclaimed Greenport. Clusters have been studied in many ways, but most of these studies lack a focus on the inter-firm networks in these clusters, either trade networks or knowledge networks. With the rise of the knowledge economy the number of studies on knowledge networks has grown, but trade remains an important part of the economy and its networks are changing in nature. The success of clusters depends to some extent on the relationships between businesses, the inter-firm network. These relationships do not automatically develop in clusters, but being part of a cluster makes that far more likely.

The cluster and the inter-firm trade network in the *Betuwse Bloem* will be studied with the following research question: *Do clusters and inter-firm trade networks of horticulturists regionally overlap in the Betuwse Bloem and could therefore a place-based policy to stimulate regional and local economy be plausible?* To answer this question three elements have been analyzed; the spatial concentration of horticulture businesses, the incoming and outgoing relationships of cultivators in the *Betuwse Bloem* and the inter-firm trade network of these cultivators.

First, the spatial concentration of horticulture businesses in the Netherlands has been elaborated on by calculating the location quotient for horticulture firms by municipality. It showed that the horticulture is represented above the national average in the *Betuwse Bloem* and that the fruit cultivation is most strongly represented.

Secondly, the incoming and outgoing transactions were analysed by means of a data file containing over 33 million transactions between professional Rabobank clients in 2011. These transactions showed that of the transactions made by the cultivators in the *BB* 52.4% stayed within the *Betuwse Bloem* and even 28.9% within the municipality. Of the transactions that crossed the borders of the *Betuwse Bloem* the majority involved a municipality adjacent to the *Betuwse Bloem* or the municipality of *Westland*. When the cultivators in the *Betuwse Bloem* chose a supplier the physical proximity was not of significant importance. In choosing to trade with a customer however the physical proximity seemed to matter. The transactions also showed that cultivators in the *Betuwse Bloem* are more likely to sell their goods at centralized than localized points of sale when compared to cultivators in the Netherlands.

Finally the inter-firm trade network was analyzed by means of the transactions file as well. Through a hierarchical cluster analysis carried out by the data management

department of the Rabobank groups of cohesive businesses were derived based on their relationships. The cultivators of the *Betuwse Bloem* belong to seven different networks, but the majority (87.7%) has been allocated to the same network. The majority of the cultivators in the Netherlands have been assigned to the same network (78.3%) which makes that the cultivators of the *Betuwse Bloem* belong more centralized to an inter-firm trade network.

The results suggest that strong local links exist between the cultivators and their suppliers and customers. In addition the cluster and the inter-firm trade network seem to overlap largely. Since in a static study no causal relationship can be established it is impossible to say whether the cluster has fostered the inter-firm network or the other way around. This is an important topic for further research. In addition this study did not include international transactions, which would be important for further research given that the Netherlands are an export nation in a globalized world.



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## List of abbreviations

BB = *Betuwse Bloem*

CI = Concentration Index (*dutch: Concentratie Index, CI*)

CoC = Chamber of Commerce (*dutch: Kamer van Koophandel; KvK*)

CPB = Netherland Bureau for Economic Policy Analysis (*dutch: het Centraal Planbureau*)

ERD = Economic Research Department (*dutch: Kennis en Economisch Onderzoek; KEO*)

LISA = *Landelijk Informatie Systeem Arbeidsplaatsen en Vestigingen (only dutch)*

LQ = Location Quotient (*dutch: locatie quotiënt*)

SIC = Standard Industrial Classification (*dutch: Standaard Bedrijfs Indeling; SBI*)

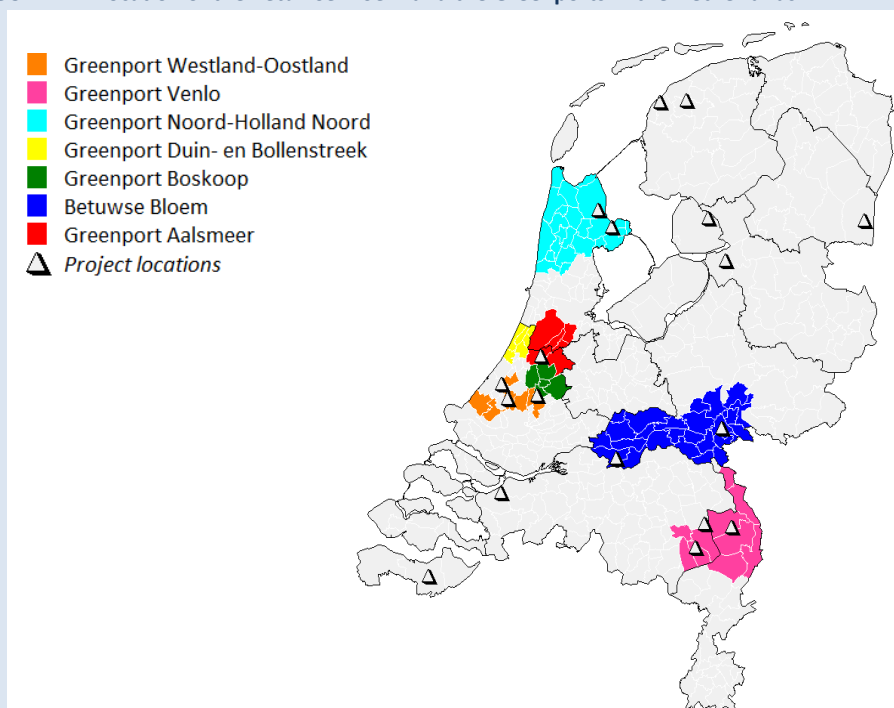
SN = Statistics Netherlands (*dutch: Centraal Bureau voor de Statistiek; CBS*)

## CHAPTER 1 | INTRODUCTION

Since several decades the concept of the region has gained a central place in economic geographical studies. Even though at the time it was not a new idea, Jane Jacobs did bring the idea of the region as a relevant economic scale to the attention of the public (Atzema et al., 2002). She criticized economists for using only the state as an unit for analysis and emphasized that *“most nations are composed of collections or grab bags of very different economies, rich regions and poor ones within the same nation”* (Jacobs, 1984, p.32). For a while her work did not receive much attention, but in late 1990’s two notable economists adopted her ideas; Michael Porter and Paul Krugman. They elaborated on the regional scale by emphasizing that every region has its own competitive advantages and regions will therefore develop in a unique way (Atzema et al., 2002). In line with this notion some sectors have the tendency to concentrate in certain regions, creating specialized regions in which businesses can manifest themselves in phenomena like formations or clusters.

A sector that tends to concentrate in certain areas in the Netherlands is the horticultural sector, which is of significant importance for its economy. In 2012 the sector accounted for 10% in both national employment and added value (LEI Wageningen UR, 2013). Six areas have been indicated by the government as significant within the horticulture sector, including *Aalsmeer, Boskoop, Duin- and Bollenstreek, Noord-Holland Noord, Venlo* and *Westland-Oostland* (figure 1.1). In the tradition of naming the port of Rotterdam and Schiphol ‘mainports’ and Eindhoven ‘Brainport’, these horticulture areas have been designated the title of ‘Greenport’. They are appointed as the core areas for the Dutch horticulture by the Ministry of

FIGURE 1.1: Location of the *Betuwse Bloem* and the Greenports in the Netherlands



Housing, Spatial Planning and the Environment (VROM) within the Greenport Holland structure. Within this project the six Greenports are called the *leaders* and several other areas outside these Greenports have been indicated as *followers*; either locations for development projects or smaller already developed horticulture areas. Two of these *followers* are located in the southwestern region of the province of Gelderland, the project locations of Bommelerwaard and Overbetuwe (figure 1.1). For these areas a funding has been made available for greenhouse cultivators that move within or to one of these areas, in order to stimulate the concentration of these cultivators (Province of Gelderland, n.d.). The province of Gelderland claims that one of the possible benefits is more possibilities for efficient production. Questions can be raised however to the efficiency of such funding, since the funding is only available for greenhouse cultivators themselves and no other businesses in the value chain.

The region in the southwest of Gelderland is commonly known as the Betuwe. Derived from this name the project the *Betuwse Bloem* was put in place in 2006 by the province of Gelderland (figure 1.1) (Province of Gelderland, 2005). A public-private partnership and network organization aiming at creating a common vision for the horticulture cluster in the Betuwe and its surroundings. In 2012 this project became more tangible when the foundation of the *Betuwse Bloem* was added to the project (LEI, 2011). This foundation supports the *Betuwse Bloem* in its activities and is led by a board consisting of representatives from the Province of Gelderland, the Chamber of Commerce, sector associations and interest groups. For example the Dutch Federation of Agriculture and Horticulture (LTO Nederland) and the Rabobank. Also each of the cultivations is represented in this board by one or more national interest groups. Additional steering groups exist which are concerned with the different cultivations. In these groups representatives of sector associations and interest groups are seated as well, supplemented by deputies from the province and the municipalities where a certain cultivation is represented. Although the *Betuwse Bloem* is not taken up as a Greenport or *leader* in the Greenport Holland structure, it proclaimed itself a Greenport by simply adding the title to its official name; Greenport the *Betuwse Bloem*. The two development projects of Bommelerwaard and Overbetuwe are located within the area (figure 1.1).

#### **INFOBOX – Key figures of the *Betuwse Bloem***

The horticulture in the Netherlands accounts for a considerable part of the national employment and added value; in 2012 for both the employment and added value the horticulture accounted for 10% (LEI Wageningen UR, 2013). In 2010 the self-proclaimed Greenport the *Betuwse Bloem* accounted for 10% of the national added value of the horticulture sector. The main contributors were the cultivators themselves, or primary sector (45%) and their suppliers (40%). The remaining 15% were accounted for by the processing and distribution industries (LEI, 2011). Over the last years the *Betuwse Bloem* has held up a stronger growth rate of added value than the overall horticulture sector in the Netherlands; respectively 30% versus 19% over the years 2005-2010 (LEI, 2011). In particular the share of suppliers within the horticulture sector has grown considerably with 82%.

## 1.1| Problem statement

Since the time that Porter (1998a) argued that regions and clusters will dominate the economic map of the world many studies about this phenomenon have been published and regions, competitive advantages and clusters have become central themes in many economic geography theories (Weterings et al., 2007). In many of Porters works traces of the ideas of Marshall can be found, a 19<sup>th</sup> century economist who laid the groundwork for setting out the benefits of clustering. He stated that industrial districts were more than the sum of their parts through increased specialization and collective efficiency (Pitelis & Pseiridis, 2006). These benefits would later become known as Marshallian externalities. Externalities being unintended costs or benefits affecting an actor who did not choose to incur that cost or benefit. Studies on clusters have since come a long way and Porter has defined a cluster as follows: “[...] *geographic concentrations of interconnected companies and institutions in a particular field*” (Porter, 1998b, p.78). An important notion here is that these clusters are no entities but a population and have no set boundaries (Langen, 2002). The borders are constantly evolving through emerging and declining industries and the entry and exit of firms (Porter, 2000). Defining a cluster is therefore highly ambiguous and open to interpretation.

When Marshall set out the advantages of clusters for the local competitive advantage in the 19<sup>th</sup> century, he attributed these advantages mainly to the nearby presence of skilled labor. Many authors have since build on the concept and nowadays the explanations of Porter in particular are widely held which he set out in his ‘diamond’ (figure 2.1). In this diamond he names four sources for competitive advantages; the demand conditions, the factor conditions, the related and supporting industries and the context for firm strategy and rivalry (Porter, 2000). These interrelated components show the business environment of a location, or the cluster, and must *all* upgrade when an economy is to advance. Therefore the study of clusters is a useful addition in the field of economic analysis. Traditionally, economics are studied through groups of firms, industries, sectors and SIC codes. Clusters however, show the actual nature of competition including a geographical dimension; the connections between firms and industries in these clusters are fundamental to competition and productivity (Porter, 2000).

There are three ways in which clusters can have a positive impact on the diamond; increased *productivity* of a firm or industry, increased *capacity for innovation* and productivity growth and increased stimulation of new *business formation* which can expand the cluster (Porter, 2000). He emphasizes however that: “[...] *the mere co-location of companies, suppliers, and institutions creates the **potential** for economic value; it does not necessarily ensure its realization*” (Porter, 1998b, p.88). Therefore, according to Porter (1998a) policymakers should focus more on stimulating clusters. However, co-location merely amplifies the pressure to innovate and upgrade (Porter, 2000) and stimulating clusters is therefore no panacea for economic development. Boschma (2005a) has doubts about the generally assumed success formula of clusters. He points out that being part of a cluster can also have negative

consequences for a business. Cluster theory presumes that the clustering of an industry causes economic growth. A study of the Dutch Environmental Assessment agency (PBL) shows that local or regional clustering is no guarantee for growth in neither employment, nor productivity (Weterings et al., 2007). Other authors argue the positive effect on a business's individual performance when being part of a cluster (Kukalis, 2010; Langen, 2002). There is no clear consensus on the relation between clustering and economic growth and this ambiguity has been a central theme in many recent studies.

Boschma and ter Wal (2009) distinguish three problems that many of these studies struggle with. Firstly, most studies examine clusters in a cross-sectional setting, although a longitudinal study could provide more information on the *development* of the clusters. In addition a causal relationship could be better examined between a company being part of a cluster and its changing performance. Secondly, most studies do not regard the different sizes of companies, therewith the different capacities of companies to participate in clusters and the inter-firm network. And finally, most researchers are focused on place and proximity, while the importance of the inter-firm network is neglected. The last point of criticism has lately often been addressed in studies on knowledge linkages in a cluster and innovation capacity (Meeus & Oerlemans, 2004; Giuliani, 2007; Bell & Zaheer, 2005). This is not surprising with the continuing emergence of the knowledge economy.

Thus, even though knowledge is becoming increasingly important and the recent upswing of studies on knowledge linkages, it does not mean that knowledge extensive production, trade and trade networks have become less important. Historically the Netherlands are a nation of trade and export, which are still of great importance to the economy; in 2013 over 32% of the gross domestic product resulted from the export sector (CBS, 2015). The Bureau for Economic Policy Analysis (CPB) analysed the distribution of the added value of the exported goods and came to the following conclusion; primary products, for example agricultural products, were responsible for 26% of the added value of export products in 2005, a slight decrease compared to 1995 (28%) (CPB, 2008). For technological and knowledge intensive production the share increased from 38% in 1995 to 43% in 2005. Even though the export sector only shows a part of the Dutch economy, it does indicate the importance of knowledge and technology in production is increasing, but it also shows that the role of the trade of primary products still has an important place.

The production of any good, whether it is knowledge intensive or a more primary good, requires a fast and efficient supply chain in order to provide the customer with their goods as fast as possible and at the lowest price for the demanded value. This supply chain theory which is built on backward and forward linkages is more and more looked at as a supply network (Han, 2009). In the modern economy which is shifting from an *economy of scale* to an *economy of specialization* is more based on individualism and flexibility which has caused the need for businesses to produce in a faster and more flexible way (Oort et al., 2006; Jägers et al., 1998). The establishment of a cooperative network of suppliers and customers has become a necessity (Oort et

al., 2006). Porter (2000) underlines the importance of networks like that by stating that the positive impact of clusters to some extent depends on the relationships between firms. These relationships are for example informal (face-to-face) relationships, or networks of interacting individuals and institutions. These relationships do not automatically develop in clusters, but being part of a cluster makes their development far more likely (Visser, 2000).

Taking both trade- and knowledge-networks into consideration, it is easier to argue for knowledge networks to be studied. However, as the export sector shows the trade of primary product is still relatively important to the Dutch economy. In addition, the rising need for businesses to have an actual network of suppliers and customers makes that the nature of trade network is changing and an important topic to study.

## 1.2| Research question

The problem statement shows that recently studies into knowledge networks have generated more interest than trade networks, even though an important part of economic dynamics consists of trade relationships. Several interesting aspects to study in the *Betuwse Bloem* come to the forth: the cluster, the inter-firm trade network and the policies regarding these topics. To link all these aspects, the following research questions have been formulated:

*Do clusters and inter-firm trade networks of horticulturists regionally overlap in the Betuwse Bloem and could therefore a place-based policy to stimulate regional and local economy be plausible?*

### *Sub questions*

To answer the research question adequately the following sub questions have been formulated:

1. *To what extent are horticulture businesses spatially concentrated in the Betuwse Bloem?*
2. *Which incoming and outgoing trade relationships do horticulture businesses in the Betuwse Bloem maintain?*
  - a. *To what extent can a sector pattern be distinguished in the transactions made by the cultivators in the Betuwse Bloem?*
  - b. *To what extent can a spatial pattern be distinguished in the transactions made by the cultivators in the Betuwse Bloem?*

## 1.3| Research objective

The research objective of this report is twofold. The first objective relates to the analysis of the cultivators in the *Betuwse Bloem* and their relationships. In order to get a clear understanding of the spatial behavior of cultivators in the *Betuwse Bloem* the concentration of cultivators in the Netherlands will be set out. This can show to what extent the horticulture businesses in the *Betuwse Bloem* are spatially



concentrated. Then a closer look will be taken at the relationships of the cultivators in the *Betuwse Bloem*. The analyzing of the location and industry of their suppliers and customers should show whether the choices for trade partners made by the cultivators are in line with the expectations of neighboring firms. For example whether the cultivators in the *Betuwse Bloem* maintain significantly more relationships with suppliers and customers within the *Betuwse Bloem*, because of reduced transport costs and face-to-face relationships amongst others, or if they alternatively look for partners further away. The suppliers and customers will be taken into account separately in this respect. Because of the nature of the production value chain the relationships with the suppliers will show a different geographical and functional spread than the relationships with the customers will. Cultivators will use multiple suppliers to produce a certain good, but will sell them to different customers and to probably less of them than the amount of suppliers are traded with. Thirdly, by analyzing transaction made by the cultivators, inter-firm trade networks can be identified. By examining these networks we can see to what extent the potential cluster overlaps with the inter-firm trade network of the cultivators in the *Betuwse Bloem*.

A second objective of this report is to provide a framework which can be used to gather additional information regarding regional development policies which aim at upgrading clusters, inter-firm networks and regional economies. In particular it could give insight into whether the *Betuwse Bloem* is an actual horticulture cluster and if it should therefore be taken up in the Greenport Holland Structure.

## 1.4| Relevance

### 1.4.1| Scientific relevance

Many of the recent studies on clusters have three major shortcomings. One of those is the underexposure of the inter-firm network (Boschma & Ter Wal, 2009). Even though Boschma and Ter Wal were mainly interested in knowledge networks, a big part of economic development still consists of the exchange of goods and money and more research on trade networks is therefore just as important. As Kemeny & Storper (2015) argue the majority of the economy nowadays consists of the production of non-tradable goods and services. However, the part of the economy involved with tradable good has a strong effect on the overall economic performance of a region. *“The tradable sector generates income that is spent on non-tradables in its home market, influencing wages in local-serving firms and industries in a variety of ways”* (Kemeny & Storper, 2015, p.2). An efficient and competitive production system of tradable goods is therefore important for a regions economic success. Together with the changing nature of the trade network and the persisting importance of trade, it is important to keep studying trade networks.

Another scientific relevance is the fact that there is no consensus on the relationship between being part of a cluster and being part of an inter-firm network. There is no consensus whether there is a relationship to begin with and if this possible relationship is causal or if the two are related in another way. This research could

give more insight in this relationship for the horticulture sector. Even though clusters are recently often studied in knowledge intensive sectors, it is important to study them in traditional sectors like agriculture as well. Every single cluster contributes in its own way to the national productivity and affects the productivity of other clusters (Porter, 2000). This means that even traditional clusters like agriculture should be upgraded and therefore studied.

#### 1.4.2 | Societal relevance

The societal relevance of this study is twofold. Firstly, the results might be interesting for policymakers, since many recent spatial policymaking in the last decennia have been focused on clustering. A closer examination of the overlap between a cluster and an inter-firm trade network could give useful insights for future policy making.

Secondly, since the horticulture is of such importance to the Dutch economy a growing horticulture sector can have a positive effect on the whole Dutch economy and lead to growing prosperity in the Netherlands.

#### 1.4.3 | Policy motive

The idea of regional specialization is very strongly policy driven and has become a trend and has been taken up by many national governments and institutions like the European Union as a way to design spatial policies. The Greenport Holland Structure is one of those projects aiming to bring regional specialization into economic policy. The *Betuwe Bloem* has not been implemented by the national government, but is a network organization initiated by the province of Gelderland. One specific policy initiative concerns funding that has been made available by the province of Gelderland for greenhouse businesses which move to or within one of the appointed greenhouse development areas (Province of Gelderland, n.d.). For the greenhouse cultivation development, several areas in Bommelerwaard and Overbetuwe have been appointed as eligible for this funding. The province of Gelderland points out two benefits for greenhouse cultivators to cluster their businesses: better possibilities for expansion and more possibilities for efficient production. Others however, point out the downsides of such policies towards greenhouse cultivation. Many greenhouse cultivators only use greenhouses only for a part of their cultivation and would like to keep it in close proximity to their land-based activities (Berkhout et al., 2013). These cultivators will therefore not be keen on moving towards a greenhouse development area. Another downside to this policy is the fact that the funding is only available for the cultivators themselves, and not for other businesses in the value chain. This shows a clear separation of clusters and networks in the view of policymakers; even though the introductory literature review shows one cannot be studied separate from the other.

### 1.5| Reading guide

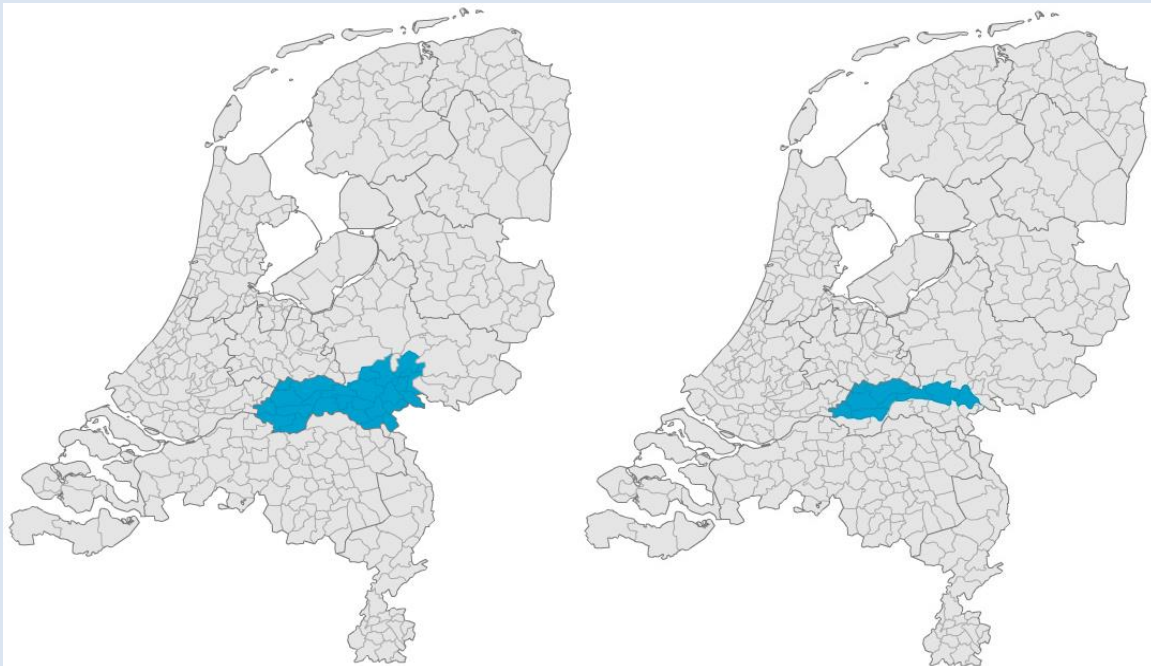
The theoretical starting point of this research has already briefly been set out. In chapter 2 this introduction will be elaborated on by setting out previously conducted studies and by presenting different angles on clusters, inter-firm trade networks and

other related concepts. In addition to a definition of the key concepts in this study, several hypotheses will be drawn up. The second chapter will conclude by assembling all key concepts into a conceptual framework related to the research question, providing the reader with grip throughout the report. Chapter 3 will elaborate on the methods that will be used in the empirical analysis. To start off, a detailed description of the scope will be given. The chapter progresses in describing the used datasets, since information will be gathered from several sources. The methods that will be used to determine the sample and analyze the data and the outcomes will be the concluding part of this chapter. The results will be presented in chapter 4 leading to accepting or rejecting the hypotheses where possible and by giving an answer to the descriptive questions. Building on the descriptive analysis an answer to the research questions will be formulated in chapter 5. In chapter 6 the results and answers will be discussed in the light of alternative interpretations. Possible constraints of the research and interfering factors will be set out, which allows to make suggestions for further research.

## INTERMEZZO – The Betuwe and the *Betuwse Bloem*

The name of the *Betuwse Bloem* is derived from the Betuwe, an area of which the borders partly overlap with the borders of the *Betuwse Bloem* (see figure I.1). The Betuwe is not a region with institutionalized borders, but generally the area of Gelderland between the river Waal and the river Lek is considered part of the Betuwe. The Betuwse consist of three smaller areas, the Overbetuwe, the Nederbetuwe and the Tielervwaard. These names can be traced back to three of the municipalities within the *Betuwse Bloem*. Overall the Betuwe consists of 9 municipalities out of the 28 which are part of the *Betuwse Bloem*.

FIGUUR I.1: The area belonging to the *Betuwse Bloem* (l) and the Betuwe (r)



Many rivers are interwoven in the landscape of the *Betuwse Bloem*, and over the centuries these rivers have left thick layers of clay behind. These layers have created fertile agricultural land, but also basin soils useless for agriculture (Terlouw et al., 2011). Up until the crisis in the 1930's these basin soils held the area back from flourishing and the Betuwe was of very little significance for the Dutch economy. The lagging economic development of the Betuwe made the government realize something needed to be done and one of the first regional cooperation projects was put in place in the Betuwe. The basin soils were dewatered, creating fertile agricultural areas. However, the upswing of the region did not turn out to be sustainable (Terlouw et al., 2011). The small-scale agriculture businesses that rose in the Betuwe were not able to cope with the trend of upscaling, stimulated by European agricultural policies and the agriculture disappeared from the basin soils. The region however became a place of economic interest in the 1960's with the emergence of highways, placing the Betuwe on an advantage location, right on the intersection of two important highways (Terlouw et al., 2011). One connects the Rotterdam harbor area to the Ruhr area and another connects the Randstad region to the south. Many entrepreneurs and project developers then took an interest in the region, but most of the activities were focused outward the region.

Its advantageous location did not just interest the business community, but the region became a base for commuters to surrounding cities like Utrecht and 's-Hertogenbosch. In 1964 the area had a settlement surplus for the first time since measurements were kept (Terlouw et al., 2011). With approximately 41,000 inhabitants Tiel is the largest city within the Betuwe (SN, 2011). However, this shrinks into insignificance when taking into account the entire *Betuwse Bloem* which adds Nijmegen and Arnhem into the equation, bringing the population of the *Betuwse Bloem* to a total of 948,537 inhabitants in 2011.

## CHAPTER 2 | THEORETICAL FRAMEWORK

In the introduction several problematic issues concerning research on clusters and networks have been indicated; the lack of longitudinal studies, the negligence of firm size and capabilities and the underexposure of networks. Together with the persisting importance of trade network and its changing nature, the underexposure of networks will be taken up. By conducting a literature review and examining previous research on the topic, a theoretical framework for the upcoming analysis will be lined out. Stemming from this framework, several hypotheses will be drafted which will be tested and either rejected or adopted in the subsequent chapters. To make the range of theoretical perspectives more amenable, the key concepts will be captured in a conceptual framework, which will be used as a reading guide throughout the report.

### 2.1| Introduction

To provide the framework with a place in the theoretical timeline, two general notions will be made in advance. A first notion which should be made concerns the struggle when Jane Jacobs challenged the classical economic assumption that the nation-state is the main player in macroeconomics (Jacobs, 1984). Rather she saw the nation-state as a collection of different economies and different regions. In line with her struggle a new debate rose surrounding the possible advantages and disadvantages of regional specialization. Two fronts can be distinguished which have a different view on the benefits of geographical concentration and the mechanisms by which regional development takes place. On one side there is the so called Marshall-Arrow-Romer model (MAR), claiming businesses will experience greater benefits when a certain sector concentrates in a region (Beaudry & Schiffauerova, 2009). This specialization is supposed to encourage knowledge spillovers, labour market pooling and transport cost savings due to economies of scale. The monopoly of an industry in a region would restrict the flow of workers and ideas to competing regions, protecting businesses in the region in times of uncertainty. In her later work Jacobs proposed a counter model, emphasizing that benefits for businesses are external to their industry and the mix of industries occurring more often in cities is the better site for innovation and economic development (Beaudry & Schiffauerova, 2009). She argued that diversified economies, including associated industry cross-overs and complementary knowledge, are key in the emergence of new and innovative activities and therewith economic growth. In addition diversification spreads the risks that come with economic fluctuations, when one industry might flourish at the expense of another (Kemeny & Storper, 2015). According to Beaudry and Schiffauerova (2009) evidence for both models can be found. However, the MAR model applies slightly more often to low-tech sectors whereas higher-tech sector flourish more often in diversified regions.

A second notion concerns the *size* of the world. In our world which is becoming more and more globalised, one would expect *place* to become less relevant. Falling transport costs, high speed communication and the increased openness and accessibility of markets should make the importance of the local diminish (Porter, 1998a, 2000; Dicken, 2011). However, the opposite appears to be true. Products and services are manufactured in regions where it is most cost efficient and can then easily be transported to other regions due to faster ways of transportation and falling transportation costs (Dicken, 2011). This leads to different advantages over regions creating comparative advantages. These comparative advantages are highly localised due to natural endowments and the capabilities to exert these endowments which leads to more local and regional specialisation; the paradox fashionably called *glocalization*. The uneven spread of economic activities and development shows that some processes cannot be analysed on the national level (Coe et al., 2007). This has made the scale of economic analysis shift from the national level towards the local and the regional level and consequently changing the focus of research and policy making.

Moving on from these theoretical notions, this chapter will continue by elaborating on other concepts which take a central place in this research; the most important being clusters and inter-firm networks. For these two phenomena some theoretical notions will be set out, including some special consideration when incorporated in policy making.

## 2.2| Clusters

Clusters are one of the most popular, but at the same time one of the most ambiguous concepts in spatial and economic policy making nowadays. Everyone has heard of it, but not many have a clear understanding of what the concept actually signifies. Often it is lumped together with a mere concentration of businesses in a certain industry. A convenient starting point when defining concepts is the 'Dictionary of Human Geography'. The dictionary states that the concept of clusters, although then called *industrial districts*, dates back to the work of economist Alfred Marshall at the end of the 19<sup>th</sup> century (Gregory et al., 2009). Marshall stated that specialized industries are often located in particular locations and dedicated this phenomenon to the availability of skilled labor (Martin & Sunley, 2003).

Since Marshall described the industrial districts for the first time in the 19<sup>th</sup> century, studies on clusters have come a long way and many authors have addressed this concept. Karlsson et al. (2005) distinguish three analytical forms of how clusters can be approached:

The classical model of pure agglomeration, referring to job-matching opportunities and service economies of scale and scope. [...] The industrial-complex model, referring to explicit links of sales and purchases between firms. [...] The network or club model, also referred to as the social-network model, which focuses on social ties and trust (Karlsson et al., p.2).

Each of these models focuses on another way how ties between businesses can bring about economic growth. In the second model, the industrial-complex model, the externalities arise from trade and other interaction links that bring about reduced transactions costs (Karlsson et al., 2005) which is in line with the approach of this research into trade networks. This model rose from the classical and neo-classical traditions and argues that the location of a business is partly determined by its trade relationships (Gordon & McCann, 2000). Earlier researchers like Weber and Von Thünen assumed that this connection was mainly determined by transport costs and the price of local production factors. In more recent literature some additions have been made, like the inclusion of telecommunication costs (Salomon & Schofer, 1990) and a more broad definition of the transport costs, leaning more towards logistic-costs (McCann, 1998).

Asheim et al. (2006) did not so much define models to analyze clusters, but set out the different perspectives on how clusters can be advantageous, each explaining clusters in a different way and on a different scale (table 2.1). Some of these perspectives try to explain the economic growth of a region, an industry or even an agglomeration, while others focus on the micro-level by analyzing individual firms. Each of these perspectives could have its own contribution to the research because they are all based on different mechanisms. This research looks at the cluster on the micro-level, the information is available on the level of the business and in this way conclusions can be drawn on certain businesses or groups of businesses. The *New Trade Theory*, the *Marshallian Localization Economics* and the *Economics of Firm Strategy* all focus on the micro-level by explaining the choices of individual businesses (Weterings et al., 2007). A downside of a micro-economic approach is that it becomes difficult to determine a causal relationship between clustering and economic growth. Luckily the aim of this research is not to set out the mechanisms behind the economic growth in the *Betuwse Bloem*, but rather to find the inter-firm

**TABLE 2.1 – Perspectives on the advantages of clusters**

	<b>GROWTH THEORY</b>	<b>MECHANISMS</b>	<b>OUTPUT</b>
<b>1.</b>	Italian Neo-Marshallian Industrial Economics	Externalities, division of labour between businesses and social capital	Local industrial districts of export oriented SMEs, flexible specialization
<b>2. ✓</b>	New Trade Theory Marshallian Localization Economics	Externalities and increasing returns by trade	Geographical agglomeration and local specialization of economic activities
<b>3.</b>	New endogenous Growth Theory	Highly educated employment and R&D as sources for increasing returns	Local technological development and divergence in regional growth
<b>4. ✓</b>	Economics of Firm Strategy Marshallian Localization Economics	Externalities and competition	Local clustering as stimulus of productivity and competition
<b>5.</b>	Neo-Schumpeterian Evolutionary Economics	Institutions, innovation and learning	Local investors climate, learning regions and regional path dependency

Source: Asheim et al. (2006) in Weterings et al.(2007)

trade network of the businesses that are part of the cluster and subsequently to find out to what extent the cluster and the inter-firm trade network overlap.

As well as approaching the advantages of clusters on the micro-level, the *New Trade Theory*, *Marshallian Localization Economics* and *Economics of Firm Strategy* have something else in common that makes them fit for this study. The mechanisms have in common that the externalities emanate from trade interactions between businesses, either cooperation or competition. Where Marshall attributed these externalities solely to the concentration of a specialized labor force, later research added two more facets (Porter, 1998a, Atzema et al., 2011). Besides a specialized labor force, the presence of specialized suppliers and customers and finally technological knowledge spillovers are seen as key externalities (Porter, 1998b). When businesses in the same industry would locate close together, they could more easily profit from these externalities.

In recent literature Porter is often cited as a key figure in setting out the mechanisms of competitive advantages in the national and local context, drafting his famous 'diamond' and thereby making the concept workable for policy makers. He defines a cluster as follows:

Geographic concentrations of *interconnected* companies, specialized suppliers, service providers, firms in related industries, and associated institutions (for example, universities, standards agencies, and trade associations) in particular fields that *compete* but also *co-operate* (Porter, 1998b, p. 213).

An important notion in this definition is that the concentrated companies have to be *interconnected* and the businesses are *competing* and *co-operating* at the same time which brings us back to the helpful perspectives (table 2.1)

### 2.2.1 | Demarcation of clusters

One of the difficult aspects when studying clusters is how to determine its borders. "...there are no generally agreed boundaries on the organization, spatial, competition/co-operation structure, technological, industrial structure, and institutional characteristics of industrial clusters" (McDonald et al., 2006, p. 526). Because clusters do not automatically overlap with natural borders or the Standard Industrial Classification (SIC), it is possible that existing clusters are not being recognized as such. The notion on borders provides a convenient starting point in studying the *Betuwse Bloem*. To make an attempt at determining how the institutional set borders of the *Betuwse Bloem* relate to the notion that a cluster concerns a geographical concentration of businesses, hypotheses H1 and H2 have been drafted. Since the number and the location of businesses are only available on the level of the municipality and not on the micro-level, these hypotheses refer to the municipalities that are part of the *Betuwse Bloem*.

H1 | Horticulturists in each municipality of the *Betuwse Bloem* are represented above national average for at least one of the cultivations ( $LQ > 1$ )



H2 | The *Betuwse Bloem* as a whole has a representation of horticulture businesses above the national average (LQ > 1)

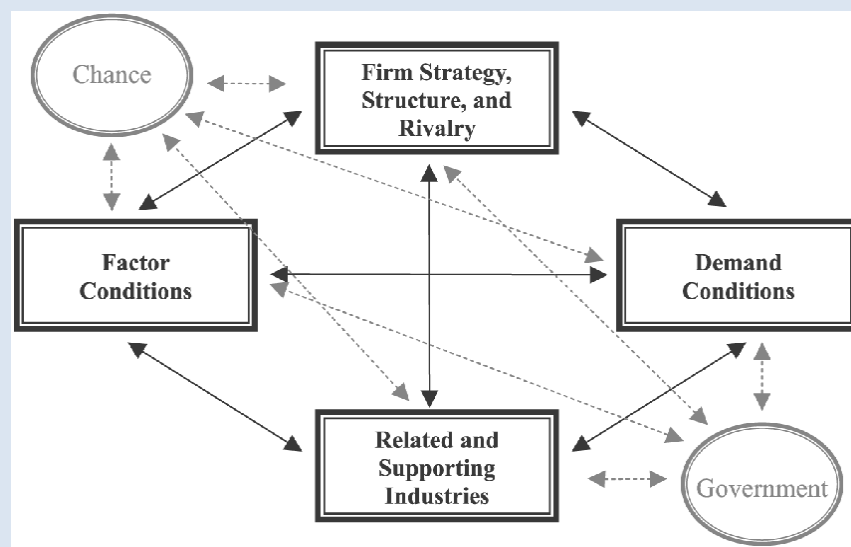
In addition to the problem of the demarcation of clusters Porter addresses another problem, namely the issue of the scale of clusters: “the geographical scope of clusters can range from a single city, region or state to a country or even a network of neighbouring countries” (Porter, 1998a, p.99). In addition to the highly interpretative demarcation of clusters, the scale is not a given and depends on the cluster in question. These two facets make the recognition and research of clusters a confusing process, but on the other hand this ambiguity makes it a mouldable concept in policymaking.

### 2.2.2 | Clusters as a policy tool

In addition to the fact that clusters are highly interpretive, the widespread believe among policy makers that clusters can in fact be created by regulations and institutions makes its popularity hardly surprising (Gertler et al., 2010). Karlsson et al. (2005) state that the phenomenon of clusters has attracted policymakers and scholars from very different disciplines, which has led to a wide range of analytical approaches and theoretical notions. Although the nature of local business concentrations has been addressed by many authors, Porter is often referred to as the person who made the concept tangible for policy makers (Martin & Sunley, 2003). Educated as an aerospace engineer and currently working as a business consultant and Harvard professor, his narrative makes the concept more accessible for practical use than the writing of most academic authors.

The earlier mentioned diamond summarizes several determinants of local, regional and national competitive advantages in the global economy (figure 2.1) (Porter, 2000). The determinants in black were part of Porter’s original diamond (1990). On

FIGURE 2.1: Porters Diamond



Source: Porter (1990)

one side the *factor conditions* or *input* refers to the presence of skilled labor, natural resources and infrastructure. On the opposite side of the diamond the *demand conditions* refer to the nature of the home-market, which for example can pressure firms to innovate faster than competing firms. The other two determinants, *firm strategy, structure and rivalry* and *related and supporting industries* both refer respectively to the nature of individual firms and the nature of the entire value chain. The two elements in grey, *chance* and *government*, are not local conditions but they refer to phenomena outside of the control of a business or cluster. They cannot be influenced, but do in turn affect the factor conditions, demand conditions, related and supporting industries and the firm strategy, structure and rivalry.

Even though Porter analyses the economy from a microeconomic perspective, emphasizing the importance of the location and the behavior of the individual firm, his Diamond model analyses the competitiveness of a group of businesses or a cluster. It has become a key tool in analyzing competitiveness. The Diamond model however has also received some criticism. Martin and Sunley (2003) have actually called it repeatedly an academic and policy fashion item. Other criticisms include that Porter emphasizes the 'home-base' concept too much and neglects the role of multinational companies (Rugman, 1992), which is ironic since he aimed at setting out the factors for national competitiveness in a globalized economy.

### 2.3| Inter-firm networks

If Michael Porter is called the father of clusters, Castells is undoubtedly the father of the network society. As a spokesman for the network society, Castells argued that following the technological revolution of the 70's society is changing, emphasizing the newfound interaction between the individual and the network, in whatever form (Castells, 1996, p.3). Not only does this affect the social relationships, but also the modes of production and development:

In the industrial mode of development, the main source of productivity lies in the introduction of new energy sources, and in the ability to decentralize the use of energy throughout the production and circulation processes. In the new, informational mode of development the source of productivity lies in the technology of knowledge generation, information processing, and symbol communication (Castells, 1996, p. 17).

In addition to this changing mode of production and development, another change occurred in the same time span. For a long time mass production was the dominant form in the economy, but the technological enhancements have initiated a shift towards an economy more based on individualism and flexibility (Oort et al., 2006). This is causing a change from the *economies of scale* towards an *economy of flexible specialization*. An increase in welfare has caused customers to extend their wish list and standard products are ironically no longer the standard. This individualization has caused the need for businesses to produce in a faster and more flexible way (Jägers et al., 1998). The establishment of a cooperative network of suppliers and

customers has become a necessity (Oort et al., 2006). Castells (1996) emphasized that the mode of development will change towards the exchange of knowledge and ideas. The exchange of knowledge is a highly ambiguous concept to measure since it is often undocumented and informal. In this research however we take a closer look at the relationships concerning the exchange of goods and money.

Before we used the 'Dictionary of Human Geography' to find a clear definition of clusters, but the dictionary does not elaborate specifically on inter-firm networks. As Huggins (2000) states, there are as many definitions of inter-firm networks as there are studies into the subject. He finds a commonality however among definitions of academics in the dichotomy of formal (or: hard) and informal (or: soft) networks. Formal relationships are documented in some way and therefore easier to study than informal relationships, which in turn are more personal and not systematically documented. Networks from both categories cannot be seen separately, instead they can be mutually reinforcing. Huggins (2000) states that the formal connections between businesses might actually be the most likely place where businesses meet and engage into more informal relationships. The formal connections could therefore be seen as the possible 'infrastructure' on which the networks of knowledge and ideas 'travel'. From this perspective the trade and the knowledge networks cannot be seen completely separately and the formal (trade) network might be key in the informal exchange of ideas and knowledge. Thus, even though the focus of this research will be on the formal network, it can be useful when studying the informal network as well.

To define inter-firm networks, an interesting notion can be found in the definition of networks, where they are described as "*a particular kind of spatial arrangement that consists of a collection of linked elements which typically exhibit a decentred and non-hierarchical form*" (Gregory et al., 2009, p. 498). The notion that a network is non-hierarchical indicates that the only 'directions' in a network can be either forward or backward, manifested in the linkages. A second notion is that a network is a 'particular kind of spatial arrangement' indicating in its turn that proximity of the linked elements is not a requirement, in contrast with the definition of a cluster. Because the concepts of clusters and networks are used interchangeably, the difference between both has to be made very clear. Visser (2000) argues that clusters and networks have commonalities, as well as differences. Both concern a certain kind of arrangement of businesses. In case of a cluster it means that businesses are spatially concentrated, but do not necessarily have a relationship, whereas in the case of a network the opposite is true. A network cannot be a network without relationships between businesses, but these businesses do not have to be spatially concentrated (Visser, 2000). Where the spatial border of a cluster is often institutional and highly interpretive, the spatial border of a network is not really significant.

Another difference can be found in the way the relationships in clusters and networks are established. For two firms to belong to the same inter-firm network having relationships with one or more other firms in the network is a requirement.

The decision for a trade partner by a firm is made in light of the competition and cooperation strategy of a business. For two firms to belong to the same cluster however having relationships with one another is not a requirement, it is an option (Visser, 2000). For example when two nearby firms in a cluster interact they are part of the same cluster *and* of the same inter-firm network. However, a third nearby firm is naturally part of the same cluster but has chosen to maintain relationships with other firms in the cluster or just firms outside of the cluster and does therefore not belong to the same inter-firm network.

With these characteristics in mind, some interesting questions come forward concerning the correspondence of the cluster the *Betuwse Bloem* and the inter-firm trade network of the horticulturists concerned. Porter (2000) argues that the relationship between a cluster and an inter-firm network can work both ways, meaning that on the one hand relationships to build a network are more likely to develop in a cluster, but on the other hand is the growth and success of a cluster partly dependent on the relationships within that cluster. In further research this causality would be an interesting topic to study, but this research is of a static nature, making it impossible to determine causality in this case.

To find out to what extent the *Betuwse Bloem* overlaps with the inter-firm network of the cultivators, a closer look should be taken at the trade relationships. Since the border of the *Betuwse Bloem* is set we can analyse this overlap or correspondence by analysing the shares of the horticulturists' relationships with suppliers and customers inside and outside the *Betuwse Bloem*.

For this purpose the following hypotheses have been drafted:

H 3.1 | Cultivators in the *Betuwse Bloem* trade significantly more with **customers** inside, rather than outside the area of the *Betuwse Bloem*

H 3.2 | Cultivators in the *Betuwse Bloem* trade significantly more with **suppliers** inside, rather than outside the area of the *Betuwse Bloem*

In order to find out to what extent the borders of the *Betuwse Bloem* are a determinant for the cultivators to participate in the same inter-firm network a fourth hypothesis has been drafted:

H 4 | Bases on their formal economic relationships, the majority of the cultivators in the *Betuwse Bloem* belong to the same inter-firm trade network

The hypotheses 1-4 together will give an overview of the potential manifestations of the cluster the *Betuwse Bloem* and the potential corresponding inter-firm network.

### 2.3.1 | Networks as a policy tool

On the local as well as the regional level the transition towards a network society is seen as a determinant of future regional development (Oort et al., 2006). And as networks gained popularity amongst policymakers and academics, they have also become more concerned with inter-firm networks as a way to structure (spatial)

economic policies (Huggins, 2000). Inter-firm networks however take on very different forms in industrial districts with different characteristics (McDonald et al., 2006). McDonalds et al. (2006) studied a vast amount of literature and analyzed the data from 43 European clusters. They concluded that despite many different industrial clusters *and* inter-firm networks, the majority of the studies support the opinion that extensive networks are beneficial for firms located in an industrial cluster. This view is supported by the European Commission who investigated 34 industrial clusters in Western-Europe, and concluded that deep and extensive networks were a requirement for successful performance (European Communities, 2002). In this study networks were referred to as both a knowledge infrastructure, as well as a way of co-operation between businesses and thus not specifying if it concerns knowledge or trade networks. Another conclusion was that the improvement of local assets would help the successful growth of industrial clusters. However, in many policy documents networks only come forth implicitly as one of the economic objectives of the policy (Oort et al., 2006). A possible reason can be because economic relationships between firms are primarily determined by the firms themselves. But these relationships can also be stimulated and guided by policies (Huggins, 2000).

Huggins (2000) carried out a comparative research to the success and failure of policy-implanted inter-firm network initiatives. He examined four different kinds of inter-firm networks of which he deemed two successful. These two networks, the *local cluster group* and the *small firm technology group* had a few characteristics in common; informal, effective broker, close spatial proximity and a high degree of commonality amongst the firms. He claims that a central role should be reserved for a network broker in order for the inter-firm to achieve sustained collaboration and co-operation. He claims that the: “[...] *most important role of the broker is to develop network projects within which the relationships between the participants become valued and defined*” (Huggins, 2000, p.128).

## 2.4| Concluding remarks

A wide range of topics has been addressed, where three topics are at the core of this research; co-location, clusters and inter-firm networks. Because these should not be confused they key characteristics are summarized in table 2.1.

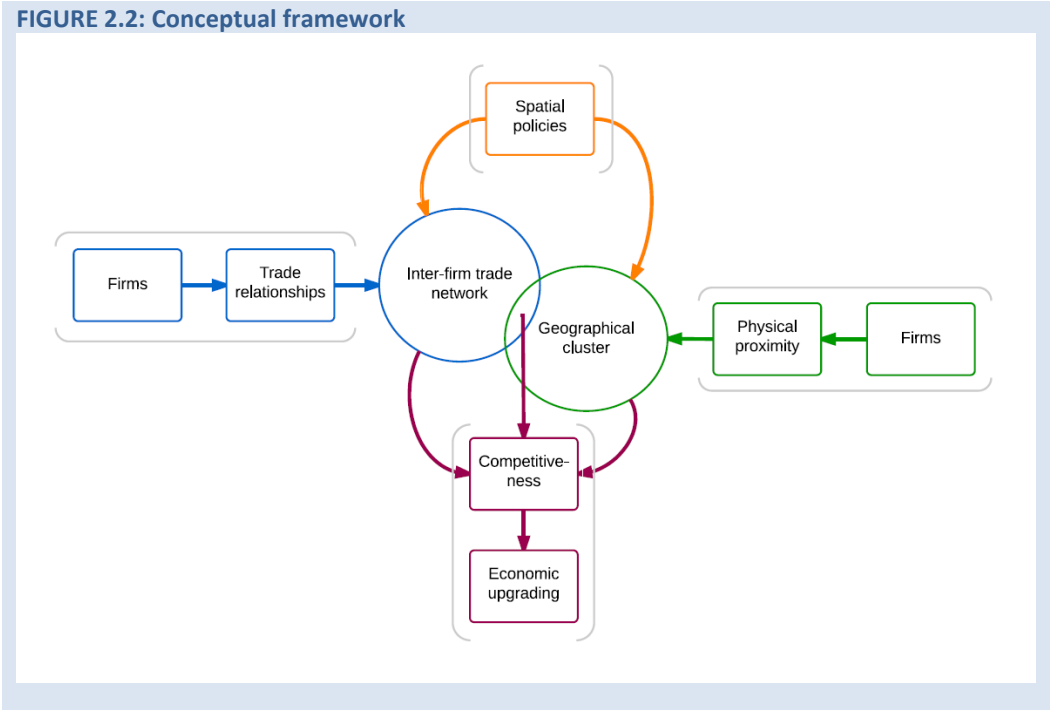
**TABLE 2.2: Key concepts**

	<i>Proximity</i>	<i>Interaction</i>
<i>Co-location</i>	Yes	No
<i>Cluster</i>	Yes	Not necessarily
<i>Inter-firm network</i>	Not necessarily	Yes

Where industrial districts, or clusters have been a topic in research and policy for a long time, the inter-firm network has come forward more recently. Just as is the case with clusters, there are as many definitions of inter-firm networks as there are studies into the subject. However, on some points researchers are generally in

agreement. First, the region has become a relevant scale in economic research and policy making. Secondly, firms located in a cluster can become something greater than just the sum of its part through collective efficiency and externalities. Thirdly, the presence of an extensive network in an industrial cluster will be beneficial for its growth and success. And finally there exists a widespread believe that industrial clusters and their inter-firm network can be influenced, which has led to the trend of taking these up in economic and spatial, in particularly regional policy making.

These key concepts and some of the corresponding mechanisms have been put in a conceptual framework (figure 2.2). Not every concept in the conceptual framework will be taken up in this research, only the concepts in blue and green will be empirically studied. The framework shows how these concepts are viewed in this study, how they are connected and how the basic involved mechanisms work. The remaining concepts in yellow and purple are to show the links between the inter-firm networks and clusters, how they relate to economic upgrading and the fact that they can be influenced by spatial policies and therewith the importance of studying this topic.



## CHAPTER 3 | APPROACH

In this chapter the methods of this research will be set out. Starting with the scope of the research this section will then continue with a detailed description of the used datasets. Afterwards a definition of the research units and the sample will be given and an outline of the methods will conclude this chapter.

### 3.1| Scope

The scope of this research has already briefly been introduced. The case study for this research will be the *BB (BB)*, a self-proclaimed horticulture cluster in the southwest of the Province of Gelderland. According to LEI (2011), an agricultural research institute linked to the University of Wageningen, the municipalities as shown in figure 3.1 are considered being part of the *BB*. The choice to study this specific area was made because the demand existed from the Rabobank Economic Research Department (ERD) to explore the horticulture in this area. Before, this area was object of a joint project of the ERD and the Chamber of Commerce (CoC), but due to cutbacks and reorganizations in both departments it was postponed indefinitely. Before postponement, the ERD had already partly addressed the tree cultivation by carrying out a chain analysis. In this research the horticulture sector in the *BB* will be taken up, consisting of the cultivation of fruit, trees and plants, vegetables, mushrooms and flowers. In this research no distinction will be made between horticulture performed in greenhouses or outdoors. In addition the businesses are selected based on their Standard Industrial Classification (SIC) code, a rating that does not take this distinction into account.

Even though the *BB* is a self-proclaimed Greenport, several locations within the area are included in the national Greenport structure as development areas. These are the two large project locations Bommelerwaard (municipalities Maasdriel and Zaltbommel) and Bergerden (municipality Overbetuwe) (see figure 1.2). In the *BB* each of the cultivations within the horticulture is represented (table 3.1), but the fruit cultivation is by far the largest cultivation in the area. And even though there are many more horticulture areas in the Netherlands, at least 30% of all Dutch fruit cultivators are located in the *BB* (SN, 2011). Together they account for 26% of the national acreage of fruit cultivators (LEI, 2011).

### 3.2| Data

In the research both quantitative as well as qualitative research methods will be used. To acquire the data for the quantitative analysis two databases will be consulted; the public database of Statistics Netherlands (SN) and a file containing information on transactions provided by the Rabobank.

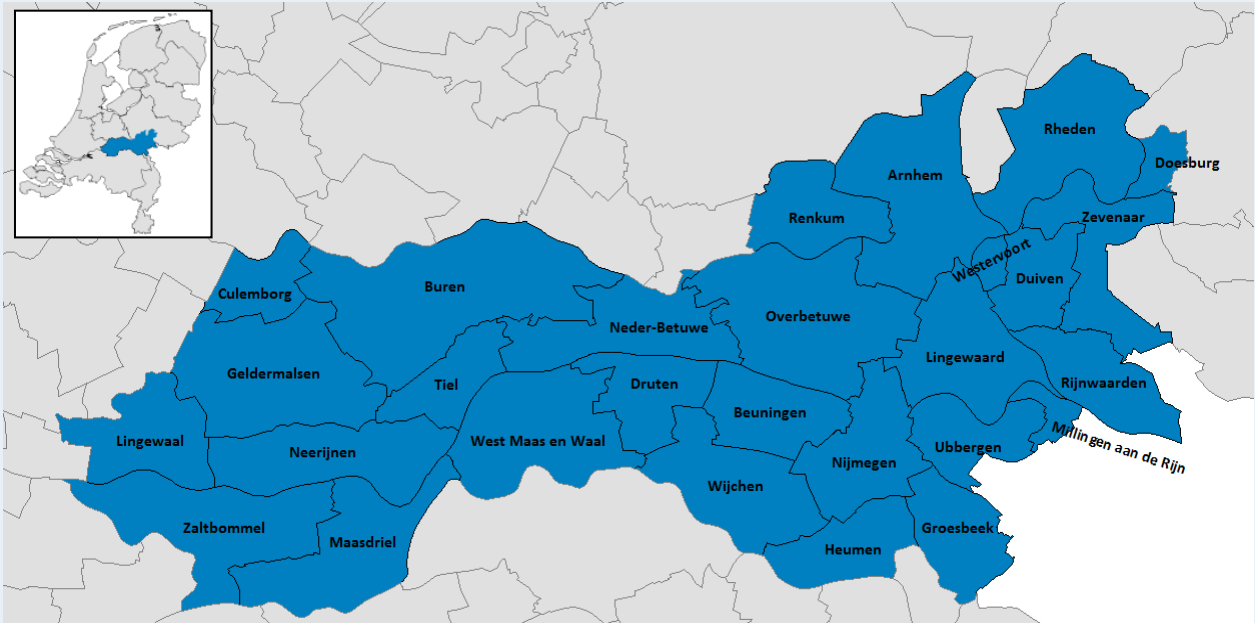
First of all the public database Statistics Netherlands (SN) will be used. This database contains statistics on a very broad spectrum of socio-economic topics, ranging from

macro-economic indicators to information in household income. This database will mainly be used to gather information on the level of the municipalities, for example the number of horticulture companies and the number of inhabitants.

The second database that will be used is a secondary database, made available by the Rabobank. This database contains information about all business transactions between March and December 2011 of businesses that have an account at the Rabobank and will further be referred to as the transaction file. Nowadays the majority of businesses in the Netherlands manage their accounts at the Rabobank, in particular businesses in the agriculture and horticulture sector. In 2013 the Rabobank market share in the Trade, Industry and Services was 44% (Rabobank Group, 2014). The market share in food and agri-businesses has been a stable nationwide share of around 85% for years.

Additional information in the transactions file shows the origin and the destination of each transaction, where these businesses are located as well as their specific SIC-code. Concerning this database, some remarks on constraints should be made. First of all, it only concerns transactions in which both the sender *and* the receiver have a Rabobank account. Secondly, the database only contains transactions within the Netherlands, which unfortunately makes it impossible to explore possible international trade networks. Thirdly, the data is available on the level of a business's headquarters, which means that in some cases a group of transactions is attributed and therefore aggregated to the headquarters. There is however no way to identify these businesses and derive the amount of transactions involved. And last, the data file only contains information from March until December 2011 which gives the

**FIGURE 3.1: Municipalities in the BB**





sample a length of ten months. This data constraint makes the creation of a fully longitudinal dataset impracticable<sup>1</sup>.

An extra notion that should be made concerning the second database is the fact that from a historical point of view the Rabobank has very strong roots in the agricultural and horticultural sector. Therefore the amount of agricultural and horticultural businesses in this data file might be disproportionate, which could lead to a slightly skewed representation of the inter-firm network in favor of the agriculture and horticulture sectors. However, in this research the horticulture sector is the main focus and at the aim of taking up as many research units as possible, no stratified sample is necessary to create a representative image for the Netherlands. Should the focus of future inter-firm network research be put on another sector, it could be wise to use a stratified sampling technique to filter out the overrepresentation of the agriculture and horticulture sectors. In table 3.1 the portions are shown of horticulture businesses in the *BB* included in the transactions file.

**TABLE 3.1: Rabobank-account coverage rate (2011)**

<i>SIC code</i>	<i>Cultivation</i>	<i>Total horticulture businesses BB (*)</i>	<i>Included in transaction file (**)</i>	<i>Coverage in research</i>
124/125	Fruits	791	341	43.1%
11301/12802	Vegetables/mushrooms	263	139	52.9%
11901	Flowers	400	196	49.0%
13001/13002	Trees and plants	298	238	79.9%
<b>Total</b>		<b>1752</b>	<b>914</b>	<b>52.2%</b>

*Source: Adaptation of Statistics Netherlands agricultural census (\*) (SN, 2011), secondary data file 'transactions' (\*\*) (Rabobank, 2014)*

### 3.3| Research units and sampling

The population of the research consists of all horticulture businesses in de *BB*. The two databases used are both secondary files of a quantitative nature. The data available at SN will mainly be used to analyze the geographic concentration of horticulture businesses. For this data file no sampling techniques are required, because the agricultural census contains limited information on *all* horticulture businesses in the Netherlands and will be used to paint a picture of the overall horticulture sector in the Netherlands. The data however is aggregated and therefore individual businesses cannot be identified. From the SN the data available on the level of the municipality will be used. Depending on the question involved either all the municipalities in the *BB* or all the municipalities in the Netherlands will be taken into account.

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<sup>1</sup> A few dozen transactions made in January and February are included in the data file. This has probably to do with the fiscal year, but no clear explanation can be found based on the file. Since it concerns less than 100 transactions out of a total of over 40 million transactions, the months January and February of 2011 will not be considered part of the sample.

The second data file, containing information on the transactions is also of a quantitative nature. In this case the constraints on the availability of data make it impossible to study each unit of the population (§3.2). However preparatory to the phase of sampling some of the businesses have to be filtered out of the data file. In this research the inter-firm trade network will be studied and in this light several kinds of businesses could distort the results. In appendix I a complete list of the excluded SIC codes is included. These businesses are excluded because they concern payments that are not necessarily made by choice and are therefore not interesting when studying the corresponding relationship. For example tax payments, memberships and insurances. When including these kinds of payments, it could create hubs in the inter-firm network, which do not realistically represent a business' network with their chosen trade partners. This filtered dataset will only be used to analyze the inter-firm trade network (see §3.4.3). To study the incoming and outgoing transactions the original dataset will be used (see §3.4.2).

After filtering out the distorting relationships, a non-random sampling technique will be used in order to select the correct target group from the transactions file. The data in the transactions file have been collected prior to this research by the data department of the Rabobank and is therefore a secondary data file. The non-random sampling technique is based on both the Standard Industrial Classification (SIC) and the location of the businesses. To be part of the sample a business has to belong to one of the seven classifications codes as shown in table 3.1, as well as being located in one of the municipalities of the *BB*.

### 3.4| Research methods and design

In this research different aspect will be studied, each requiring a different approach. Some methods are straightforward, but others might need a more elaborate explanation. In the following paragraph each of the research methods will be described following the themes in the sub questions.

#### 3.4.1 | Spatial concentration

For the first sub question all necessary data is available through Statistics Netherlands (SN). In this database the number of businesses in each municipality can be found, divided by sector. In this research the central theme is the clustering of horticulture businesses in the *Betuwse Bloem*. By analyzing the density of the horticulture businesses in the Netherlands we can see to what extent they are spatially concentrated in the Netherlands and in particular in the *Betuwse Bloem*. Therefore the share of horticulture businesses, compared to the total amount of businesses, will be used as a measurement for the concentration index in this case. After collecting the numbers for each municipality its location quotient will be calculated which enables us to compare every municipality to the national average. This quotient will basically show to what extent the horticulture is a regional specialization. Two determinants are often used when analyzing the degree of regional specialization; the share of specialized employees and the number of

businesses in an industry. In this research the businesses are the *nodes* in the inter-firm network, while the number of employees could indicate the importance of these nodes. In this research however the focus is on the formally documented relationships between businesses and the dataset does not provide further information on specialized employment in the businesses concerned.

The formula for the location quotient is as follows:

$$LQ = \frac{\beta_i/\beta}{B_i/B}$$

$\beta_i$  = businesses in sector  $i$  in the municipality

$\beta$  = total businesses in the municipality

$B_i$  = businesses in sector  $i$  in the Netherlands

$B$  = businesses in the Netherlands

These quotients can then be mapped to show visually to what extent horticulture businesses are actually concentrated and where the extremes in density are located. This concentration index will be calculated for the cultivations as well as for the overall horticulture sector, since the *BB* and each of the Greenports have a very different cultivation profile. Whether the index for horticulture businesses in the *BB* is greater or smaller than one is the key in answering this sub questions. These concentration indices might also show if there is any consistency between the density of the horticulture sector and whether a municipality is part of any Greenport or other horticulture development program.

This sub question is the only sub question in which the mushroom cultivation will be taken into account as a separate cultivation. This because the SN has information specifically on mushroom cultivators, but the SIC has no separate code for these businesses, rather they are gathered under the code for vegetable cultivators (codes 11301 and 12802). Therefore the *concentration* of mushroom cultivators can be shown, but the network characteristics cannot be derived from the transactions file. In the first sub question the mushroom cultivators will be taken into account as a separate group, because as you will see their locations actually show a quite interesting pattern (§4.1). Throughout the remainder of the report however, they will be incorporated into the vegetable cultivation.

### 3.4.2 | Incoming and outgoing relationships

The focus of the second part of the study is the inter-firm network from the perspective of horticulture companies in the *BB*, thus the ego-networks. The first step in setting out these networks is to analyze the incoming and outgoing relationships of these cultivators. For this part of the research the transactions file will be used. As stated before this data file does not contain international transactions, and therefore this analysis of incoming and outgoing transactions will only take into account the relationships within the Netherlands. Because this file contains detailed information about the origin and the destination of each transaction, setting out the relationships of the horticulture businesses is a fairly

straightforward process using SPSS. Just like the first sub question, this sub question is mainly a descriptive one and together they will paint a more detailed picture of the degree of concentration and the geographical aspect of the relationships of the horticulture sector in the *BB*.

The first step in describing the relationships of cultivators in the *BB* is by setting out the location of the suppliers and customers. For this aspect the share per municipality of the total incoming or outgoing transactions will be used to paint a picture of where these suppliers and customers are located. By using the number of transactions it does not necessarily show where most suppliers and customers are located, neither does it show the amount of money that is concerned with the transaction. By using the number of transactions as an indicator it will show us with which municipalities the most interactions takes place, whether that means with only one supplier/customer or several. Whether these transactions are distributed over one or several suppliers or customers is not important in this case, because the spatial dispersion is what we are interested in in this case. This aspect will also be visualized by using a mapping program to show the share of incoming and outgoing transactions attributed to each municipality in the Netherlands.

The second step will be to set out the sector division of the suppliers and customers. Similar as for the spatial distribution, for the sector distribution the number of transactions will be used. This shows with which sector there is most often interaction. When a certain sector stands out for its large share of transactions, this can be compared for transaction that remain within the *BB* and transactions nationwide. This will be a first step in the direction of setting out the importance of a suppliers or customers location in the choice for a trade partner of a *BB* cultivator.

In order to find out if the location of the customer/supplier is significant for the cultivators in the *BB* in their choice of trade partner, cross-tables containing frequencies with the corresponding statistical measures will be created. The categories of the tables will first be distinguished by whether the trade partners are also located in the *BB* or not. And secondly by whether the trade partner is a fellow cultivator or not. In this case cross-tables are the correct way of analyzing, because it concerns categorical variables. The most important statistical measure that will be calculated for these tables is the  $\chi^2$ . This measure basically shows to what extent the observations in the table differ from the expected calculated outcomes and whether this difference is significant by looking at the associated p-value. As a given in SPSS, the limit for the probability of exceedance is set at 5%. The p-value is displayed as the %/10. For example, when a cross-table has a  $\chi^2$  of 2.262 and an accompanying p-value of 0.32, the relationship shown in the table is not significant. With 32% (0.32) the limit is exceeded, which means the supposed connection does not exist.

The  $\chi^2$  is calculated by the following formula:

$$\chi^2 = \sum_{i=1}^n \frac{(\text{observed}_i - \text{expected}_i)^2}{\text{expected}_i}$$

$n$  = number of cells

$\text{observed}_i$  = observed frequency in cell  $i$

$\text{expected}_i$  = expected frequency in cell  $i$

An additional statistical measure that will be given is called Cramer's V. This measure shows the strength of a relation. Note that this measure does not show the significance of the relation, nor the direction, but solely the degree of coherence or the strength of the connection. In this case a Cramer's V of '0' means that there is *no* coherence between two variables and a Cramer's V of '1' means that the two variables are completely coherent.

### 3.4.3 | The inter-firm network

The main question which can be answered in this part of the research is to what extent the cluster and the inter-firm trade network correspond. The step from a chain analysis towards finding a pattern and a network requires a different approach. The original data file contains over 33 million transactions of which 3,703,695 (12,3%) come from or go to the *BB*. The transactions made or received by the horticulturists in the *BB* amount to 122,481 transactions, which is 0,4% of all the transactions in the Netherlands between March and December 2011. The relative share seems small, but because it concerns 122,481 transactions that needed to be analyzed the VSC Data Management department within the Rabobank helped carrying out several analyses, among which a hierarchical cluster analysis based on the transactions file.

#### 3.4.3.1 | Hierarchical cluster analysis

Because the original transactions file contains over 33 million transactions, it was impossible to carry out the entire data analysis on my own due to restricted computers and programs capacity. Through my internship at the Economic Research Department at the Rabobank I was able to get help from the VSC Data Management department which specializes in filtering information out of enormous data sets. In this research the aim is to derive inter-firm trade networks based on the transactions that businesses had made. For this purpose a hierarchical cluster analysis was used. This quantitative method is used to identify groups of individuals or objects that have similar characteristics, which they do not share with individuals or object in other groups (Norusius, 2012). When applying this method to the transactions file the result will show groups of businesses that have been joined together as inter-firm networks, based on the characteristics of their transactions. The characteristic on which this division is based is the number of occurrences of a transaction between any two businesses in the transactions file. The more often a transaction occurs, the more important this relationship is. This way the analysis will create groups of businesses based centers of gravity in the transactions, whereby the groups

represent the inter-firm trade networks. Important to note is that each businesses can only be allocated to one group. Even though it is called cluster analysis it does not necessarily have a link with clustering in the geographical sense of the word. The borders of the networks are thus not defined from a geographical point of view, but are defined by the businesses and their relationships.

At the start of the hierarchical cluster analysis there is no preset number of clusters for the outcome. This distinguishes this method from the other clustering method; partitioning clustering, where it is a given that  $k$  clusters will be established (Kaufman & Rousseeuw, 2005). In partitioning clustering the analysis aims at creating the best clustering possible with  $k$  clusters, while in hierarchical clustering all values for  $k$  are taken into account, resulting in the most optimal clustering with the most optimal number of clusters. Within hierarchical clustering again two methods exist; the agglomerative and the divisive method. In the divisive method all objects are put in one cluster in the beginning and in each following step the cluster is split up (Kaufman & Rousseeuw, 2005). In this research however the agglomerative method is used, where all objects are apart in the beginning and in each following step two clusters are merged and thereby the businesses will be 'assigned' to a cluster.

In this research the similarity of two objects depends on the whether they have a relationship or not, which is based on their formal transactions. Here it is only taken into account if the relationship exists without taking into account the amount of the transaction.

#### 3.4.3.2 | *Interpretation of the outcomes*

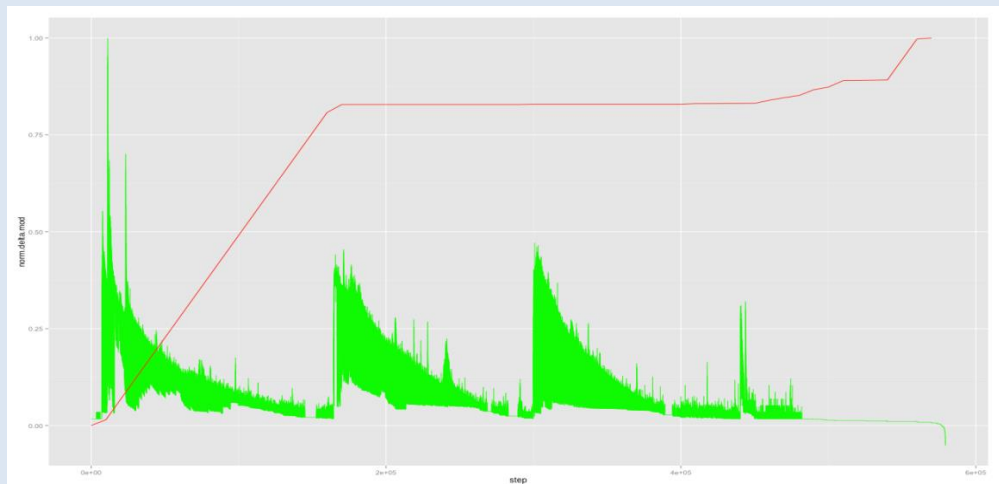
The final results of the hierarchical cluster analysis showed a highly uneven distribution of the networks, creating 5,333 networks out of 581,940 businesses<sup>2</sup>. Since the transaction file also contains several businesses with a very high number of connections, these outliers might pull many other businesses into their network. In the final results the four largest account for over 560,000 businesses.

For the hierarchical cluster analysis carried out for this research, two important aspects are shown in figure 3.2. The delta modularity indicated by the green line and the size of the groups or inter-firm networks by the red line. When looking at the green line the x-axis refers to the steps in the clustering process and the y-axis to the change in the (delta) modularity. The delta-modularity refers to the improvement of the homogeneity of the business characteristics in one of the groups. The modularity is the homogeneity of the network *an sich*, and the delta indicates how much this modularity has improved compared to the previous step in the clustering process.

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<sup>2</sup> During the hierarchical cluster analysis a peculiar error occurred that could not be resolved. This error concern a few industries which were not taken up by the hierarchical cluster analysis program: shipbuilders, fitters and steel workers. Because the processes of creating a correct dataset and obtaining the results of the hierarchical cluster analysis were very time-consuming, we decided not to re-run the analysis to include these industries. These industries are not key in the horticulture business and because it only concerns a very small portion of all businesses.

FIGURE 3.2 – (delta)modularity of the clustering process



Source: VSC Datamanagement, Rabobank (2014)

The green line, which in fact consists of many little green dots, each representing a step that was made in the hierarchical clustering process. Each dot shows the improvement in the modularity compared to the previous step. The higher the dot, the more the modularity improved with that step.

When looking at the red line the x-axis refers again to the steps in the clustering process, but here the y-axis refers to the difference in size between the smallest and the biggest group. In the final results there are still businesses that have not been allocated in one of the groups, meaning that the smallest 'group' has remained a size of 1. The biggest group in the final results consists of 191,646 businesses. As figure 3.2 shows, the groups grow fast in size in the beginning of the clustering process, but when the clustering process comes towards the end, the largest group grows only a little bit, with another rapid growth at the very end.

Because a vast majority of the businesses in the Netherlands are divided over only four groups, it could be useful to look at previous steps in the clustering process. This way the process of hierarchical clustering might become more apparent. The analysis however will be carried out with the final clustering results. For several of the intermediate steps in the hierarchical clustering process the details have been provided, namely the steps 23,506; 310,036; 460,000; 500,000 and the final step. The intermediate steps have been selected based on the peaks in the delta modularity as seen in figure 3.2, indicating that the clustering process made a huge leap forward at those points.

Where both the red and the green lines end, that is where the optimal hierarchical clustering has been reached according to the hierarchical clustering program. The final results are based on the fact that the program has calculated that it can no longer improve the delta modularity by making changes in the group compositions; the optimal clustering results. As you can see the delta modularity does not make any great improvements after the peak around the 500,000<sup>th</sup> step. Therefore the

composition of the larger networks of the 500,000<sup>th</sup> step and the final step do not differ very much. However, the size of the networks does still change in these last stages of the hierarchical clustering process. The main difference between these last two steps is that in the 500,000<sup>th</sup> step many businesses with only one transaction have not been assigned to a network yet, but by the time of the final hierarchical clustering results, most of these businesses have been absorbed by one of the four larger networks. Because these firms have only one transaction in the file, the difference between the 500,000<sup>th</sup> and the final step of the hierarchical clustering process is only marginal.

#### *3.4.3.3 | Using the hierarchical clustering results*

When using the information from the hierarchical clustering, the inter-firm trade networks, the notion should be made that in this research the inter-firm networks are solely approached in a quantitative manner. The difficulty of this approach is that the processes and networks at work cannot accurately be set out (Blackburn et al., 1990). In addition the socio-cultural context of the networks and its actors cannot be determined in a quantitative analysis (Borch & Arthur, 1995). A qualitative approach, taking into account the human interactions in the network can be a solution in this case. However, a vast number of authors agree that a quantitative approach of network analysis is necessary (Huggins, 2000). In the light of the available data set and the size of the sample that comes with it, the quantitative approach is the right one in this research.



## CHAPTER 4 | RESULTS

In this chapter the results of the analyses as described in chapter | 3 will be set out in an objective manner. These will therefore only be descriptive result which will be interpreted in chapter | 5.

### 4.1| Spatial concentration

For each municipality in the Netherlands the location quotient (LQ) of the businesses in each of the cultivations was calculated. The spatial distribution of the LQ's is shown in figure 4.1-4.6. These maps are based on the quotients for each municipality in the Netherlands which can be found in appendix II. This table shows some interesting findings. The first notion that should be made is that in only 10 out of 28 municipalities the quotient for the overall horticulture sector is  $> 1$ , meaning only 10 municipalities in the *Betuwse Bloem (BB)* surpass the national average relative amount of horticulture businesses. When looking more closely at the LQ for each of the cultivations, some interesting patterns can be found.

The municipalities of Doesburg and Westervoort score a LQ of '0' for each of the cultivations. These LQ's are based on the SN database which contains information on *all* horticulture businesses in the Netherlands. It is therefore safe to conclude that no horticulture businesses are located in Doesburg and Westervoort.

The fruit cultivation is very strongly represented in the *BB*, 20 out of 28 municipalities have a LQ of  $>1$  with outliers in Buren and Neerijnen with a LQ of respectively 29.975 and 28.995. In the Netherlands only the municipality of Borsele (Zeeland) slightly surpasses these LQ's. As can be seen in figure 4.4 the density for fruit cultivators is the highest in Zeeland and the majority of the *BB*.

The other cultivation with a very high density in the *BB* is the mushroom cultivation with an LQ of 4.437. The mushroom cultivators in the Netherlands are located in a very select group of municipalities. The large number of municipalities with a LQ of 0 causes the municipalities with mushroom cultivation to show some extremely high LQ's. Maasdriel with a LQ of 96.872 has by far the strongest representation in the *BB* and is nationwide only surpassed by Boekel (North Brabant). Within the *BB* mushroom cultivators are located in only seven out of 28 municipalities. The center of gravity of the Dutch mushroom cultivation lies in the north of Limburg and the east of North Brabant.

The degree of spatial concentration of the remaining three cultivations is closer to the national average than those of the fruit and mushroom cultivations. The vegetable cultivation is the only one in the *BB* with a LQ  $< 1$ . The vegetable cultivation is soberly represented in the majority of the municipalities, but the vegetable cultivation is no specialization of the *BB* (figure 4.2). Tough, the area is located close to areas with the highest densities of vegetable cultivations; North Brabant and the north of Limburg.

Like the vegetable cultivation, the flower and tree cultivations are represented in the majority of the *BB*, but no outliers are found for these cultivations. The flower cultivation shows a highly concentrated pattern in the Netherlands (figure 4.3). The *BB* does not belong to one of the fruit cultivation centers and the majority of the municipalities have a LQ between 0 and 1. The municipality of Zaltbommel is the exception in this cultivation with a LQ of 10.86.

In the *BB* the trees and plants cultivators are located in the majority of the municipalities. This cultivation is not highly concentrated like the flower cultivation and out of all five cultivation the most proportionate represented (figure 4.5). As a whole the *BB* is not specialized in trees and plants and most LQ's are rather close to 1, with the exception of the Neder-Betuwe (LQ=16.32).

To either reject or adopt the first two hypotheses an overview of the location quotients of the *BB* can be found in appendix II. When looking at these locations quotients, the first hypotheses has to be rejected, because the municipalities of Doesburg and Westervoort do not have any location quotient bigger than 1 for any of the five cultivations. However a remark should be made that these two municipalities account for 20km<sup>2</sup>, which is only a little over 1% of the total area of the *BB*.

H1 | Horticulturists in each municipality of the *Betuwe Bloem* are represented above national average for at least one of the cultivations (LQ > 1)

When looking at the location quotient for the *BB* as a whole (appendix II), the second hypothesis can be adopted. With the exception of the vegetable cultivation, the *BB* has an LQ > 1 in each of the cultivations, including the horticulture sector as a whole.

H2 | The *Betuwe Bloem* as a whole has a representation of horticulture businesses above the national average (LQ > 1)

When looking at the spatial concentration of the *BB* two additional remarks can be made. First, in each of the figures the municipalities of Nijmegen, Arnhem and the municipalities surrounding Arnhem remain white, indicating no or little cultivators. The straightforward explanation is that in these more urban areas the relative share of horticulture businesses is far lower than in the more rural municipalities in the west of the *BB*.

Secondly, besides the *BB* the other Greenports (GPs) are indicated in the figures 4.1-6 by different outlines. This way the different specializations of each GP can be seen in a glance. For example *GP Aalsmeer* and *GP Duin- en Bollenstreek* seems to be specialized in flower cultivation as well as the *GP West-Oostland* which adds the vegetable cultivation to its portfolio. *GP Boskoop* is mainly involved in the cultivation of trees and plants. *GP Venlo* seems to be the least specialized Greenport, displaying a high density in each of the cultivations. The *GP Noord-Holland Noord* has a quite similar profile structure to the *BB*; in both areas a center of gravity is located for one of the cultivations and tree other cultivations are moderately represented. These two areas are thus not as specialized as other GP's, but neither do they have a strong representation of all cultivation like *GP Venlo*.

FIGURE 4.1\* :LQ Horticulture (total industry)

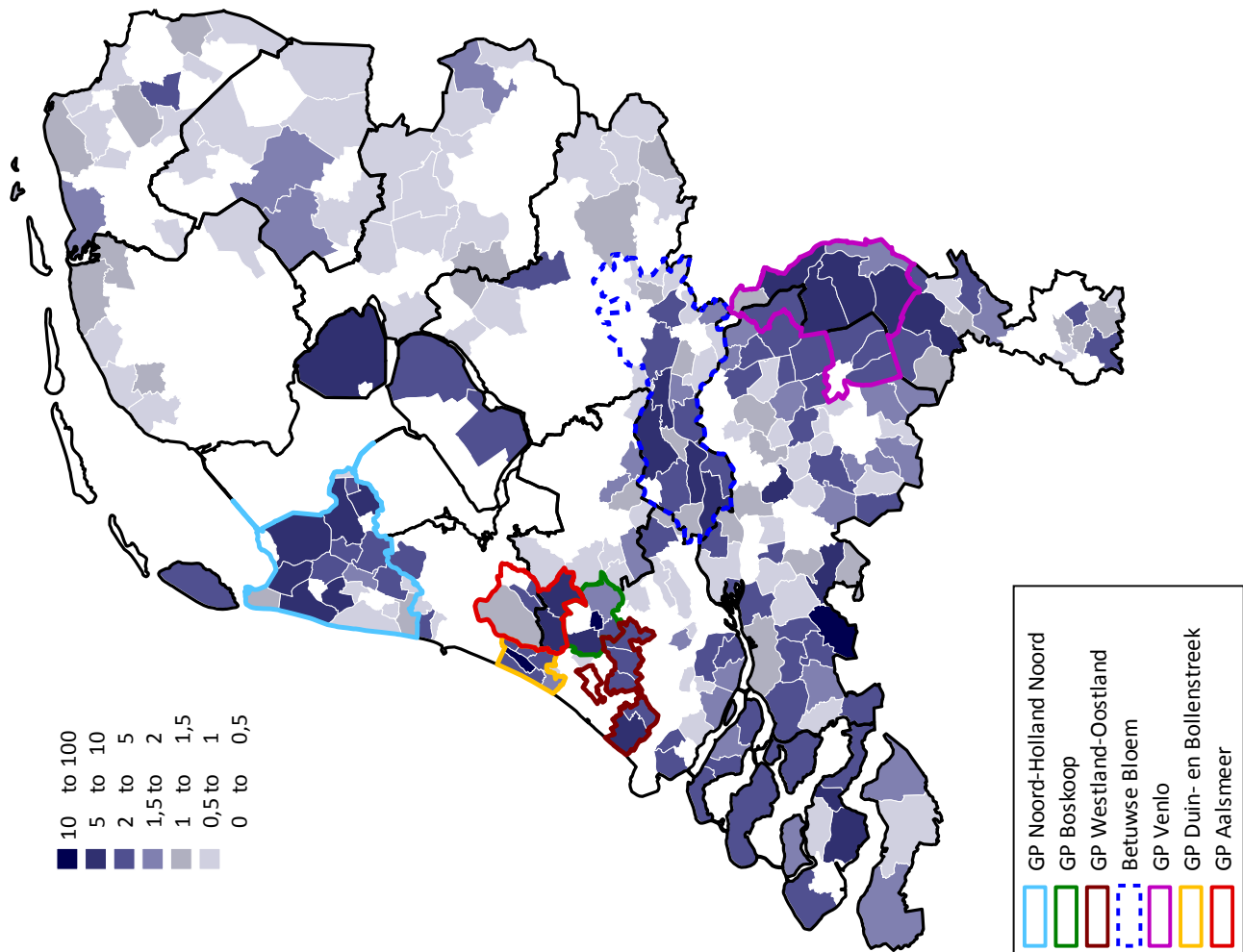
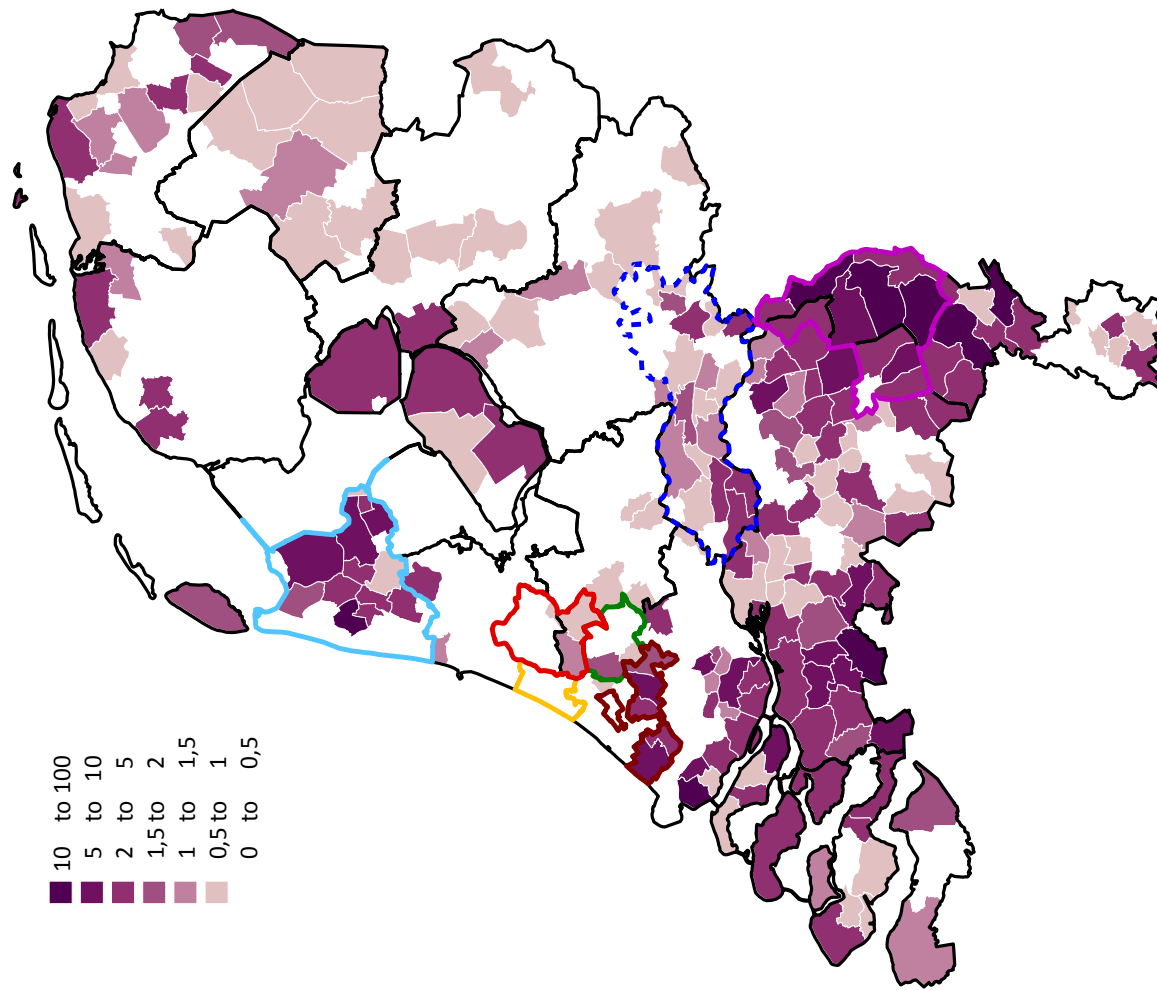


FIGURE 4.2\* :LQ Vegetable cultivation



\* Source: SN (2011)

FIGURE 4.3\*: LQ Flower cultivation

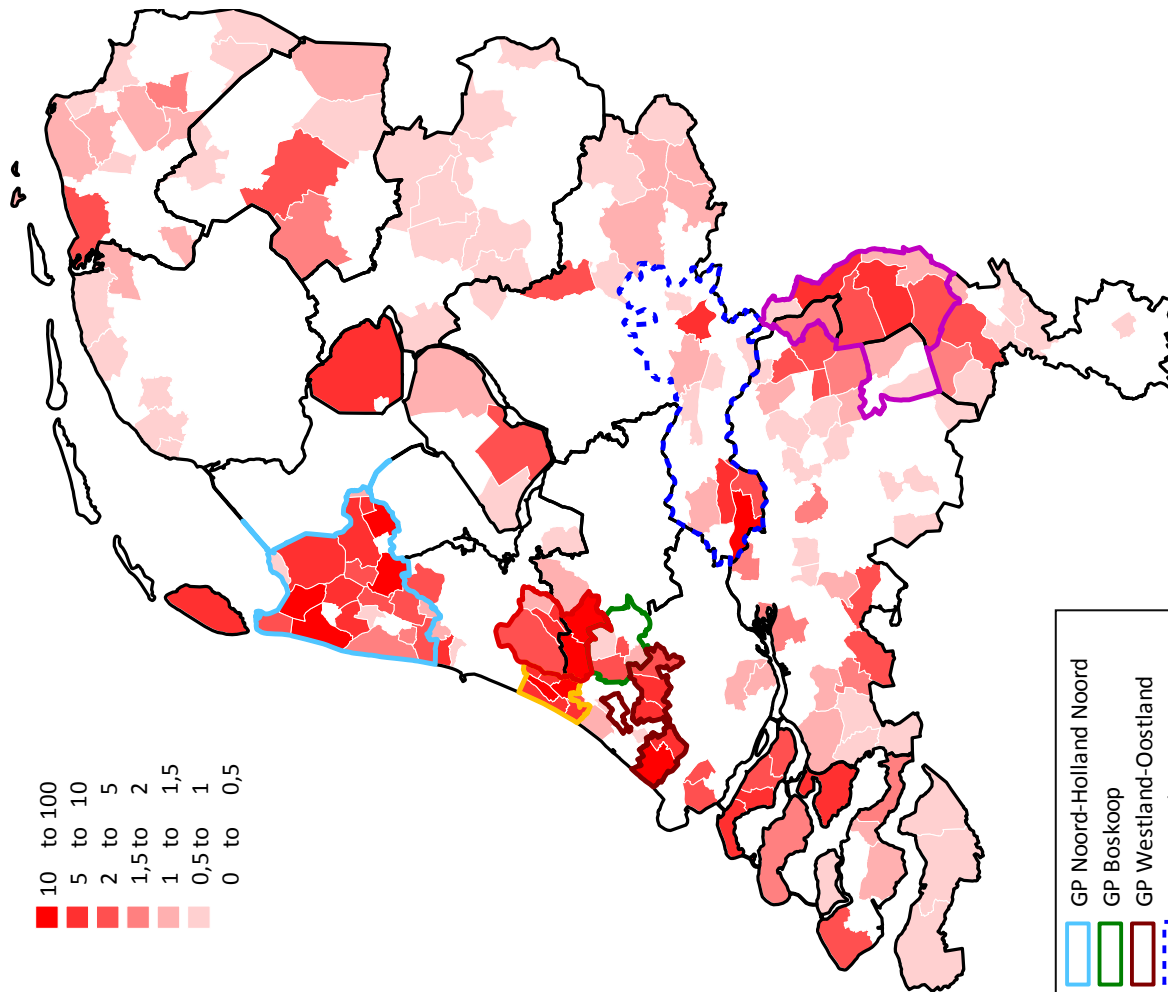
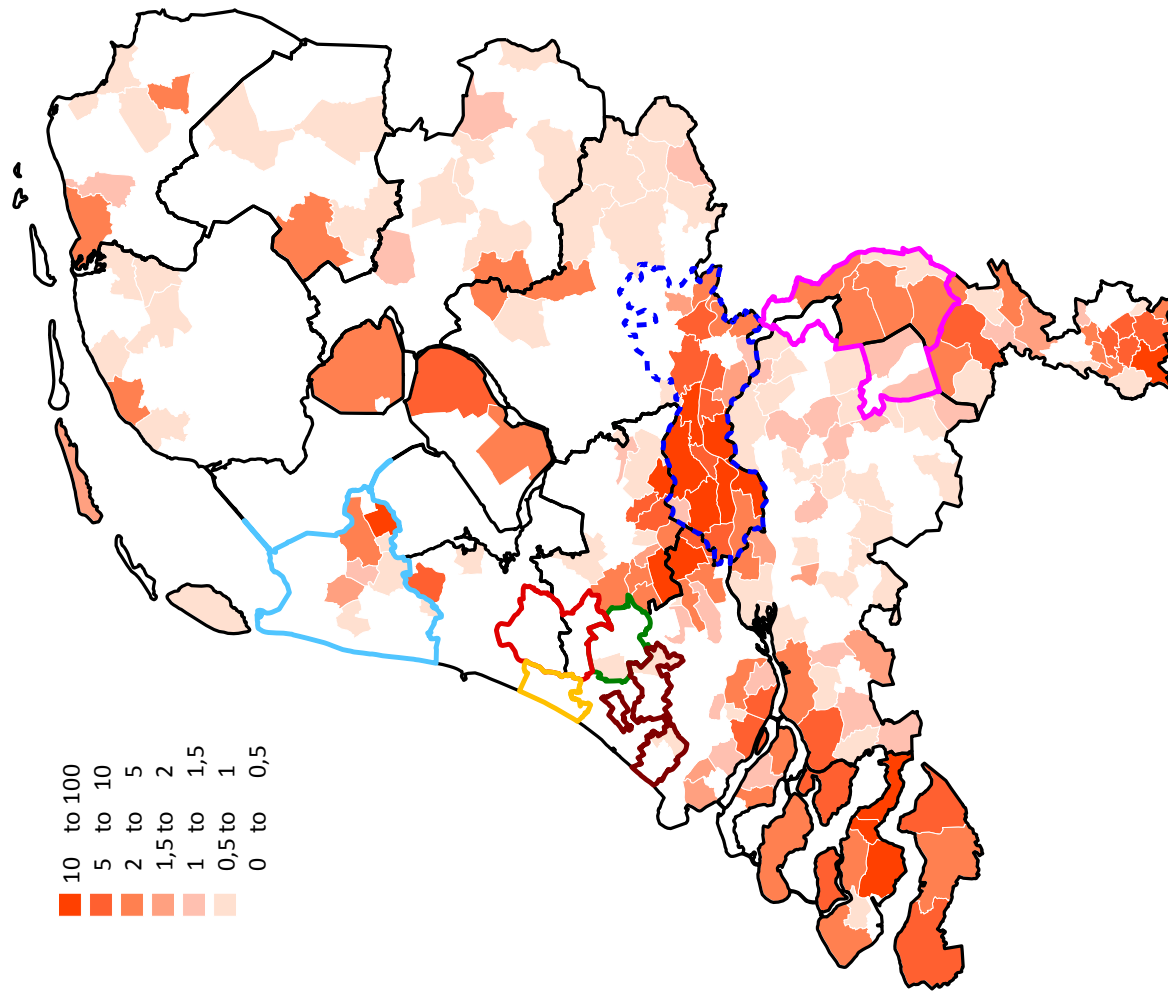


FIGURE 4.4\*: LQ Fruit cultivation



\* Source: SN (2011)

FIGURE 4.5\*: LQ Tree and plant cultivation

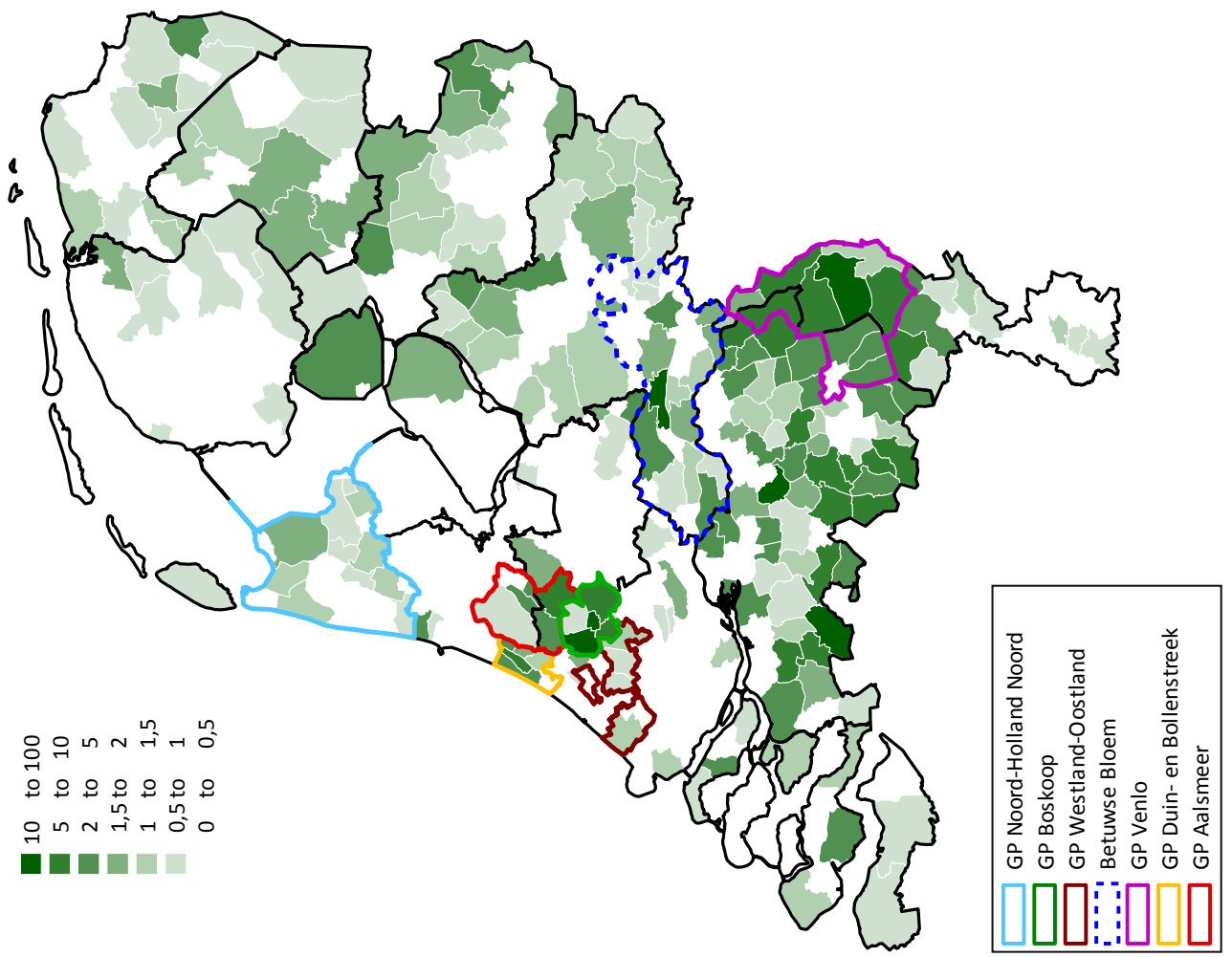
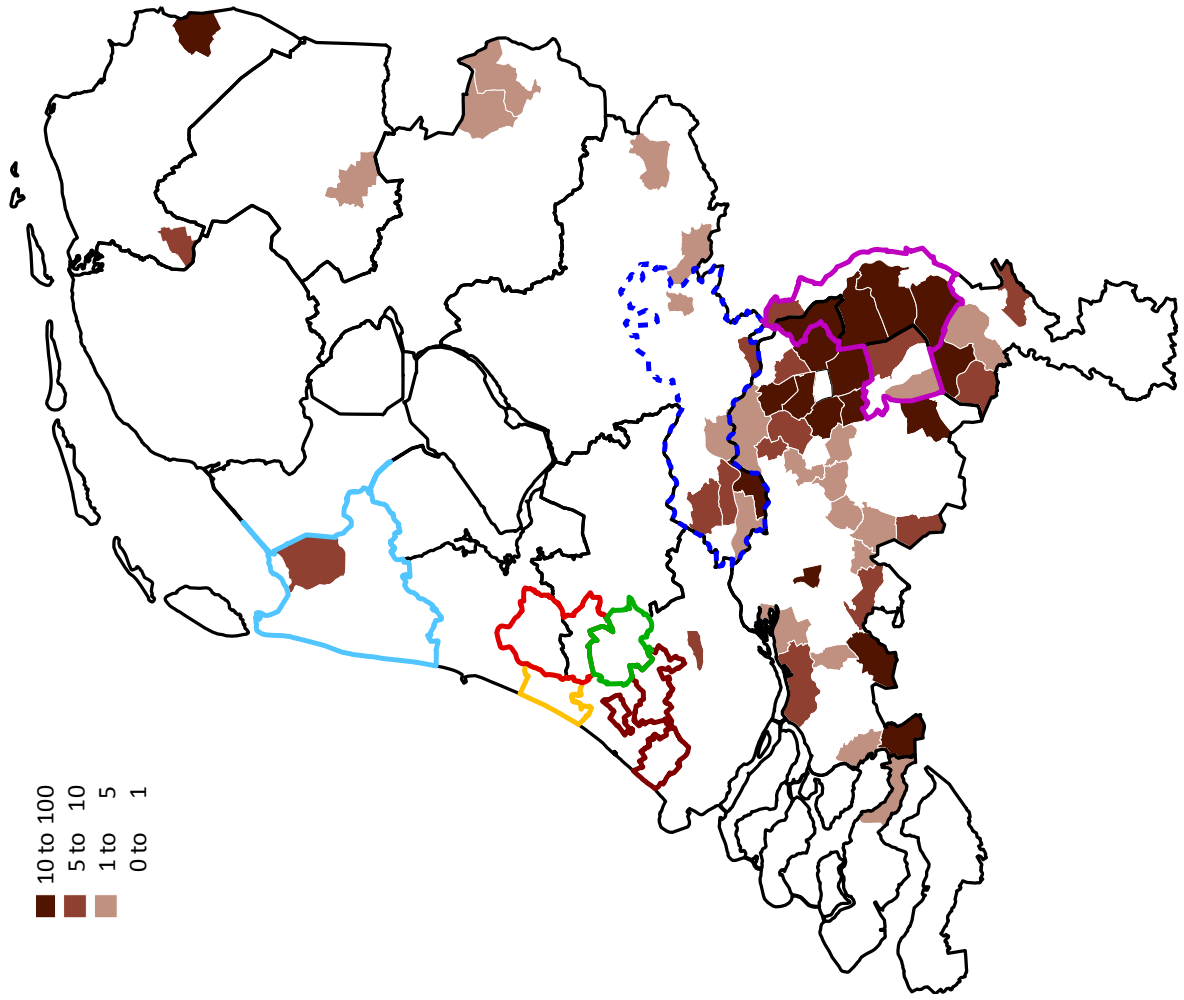


FIGURE 4.6\*: LQ Mushroom cultivation



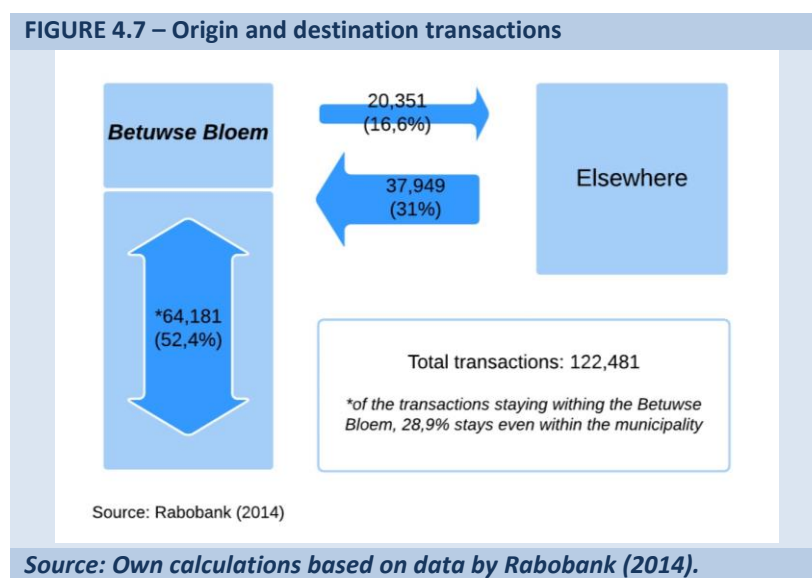
\* Source: SN (2011)

## 4.2| Relationships

After having set out the density of cultivators in the Netherlands we take the first step in analysing the trade relationships of the cultivators in the *Betuwse Bloem*. Without immediately looking at the networks as a whole, the spatial and sector characteristics of these relationships will be set out. Note that to analyse the trade relationships the original dataset has been used (see §3.3) in which the sectors that could distort the results for the inter-firm trade network (appendix I) are still included.

### 4.2.1 | Spatial distribution

The cultivators in the *BB* made a total of 122,481 separate transactions in 2011 of which 41,675 are incoming and 87,201 are outgoing transactions. Looking at the total amount of transactions this means that 6,395 of all transactions occur *between* cultivators and within the *BB*, a little over 5% of all transactions ( $[41,675+87,201]-122,481=6,395$ ). When taking into account all other trade partners besides other cultivators in the *BB*, over half of the transactions remain within the area, within the *BB* (figure 4.7). Of these transactions even 28.9% remain within the municipality.



In the appendices III and IV a list is added of the municipalities where the majority of the trade partners of the cultivators in the *BB* are located. Since more than half of the transactions remain within the *BB*, it is not surprising that out of the 50 municipalities where most trade partners are located, 18 belong to the *BB*. In this list it is also indicated whether these municipalities belong to one of the other Greenports. The location of the suppliers and customers of the cultivators in the *BB* is shown in figures 4.8 and 4.9. By displaying the share of the total incoming and outgoing transactions by municipality a pattern customers and suppliers can be seen. This does not necessarily show the municipalities where the most suppliers and customers are located; neither does it show the amount of money concerned with the transactions. It does show which municipalities have the largest frequency in transactions and therefore the most interaction with cultivators in the *BB*.

FIGURE 4.8\*: Share of interaction with suppliers (in %)

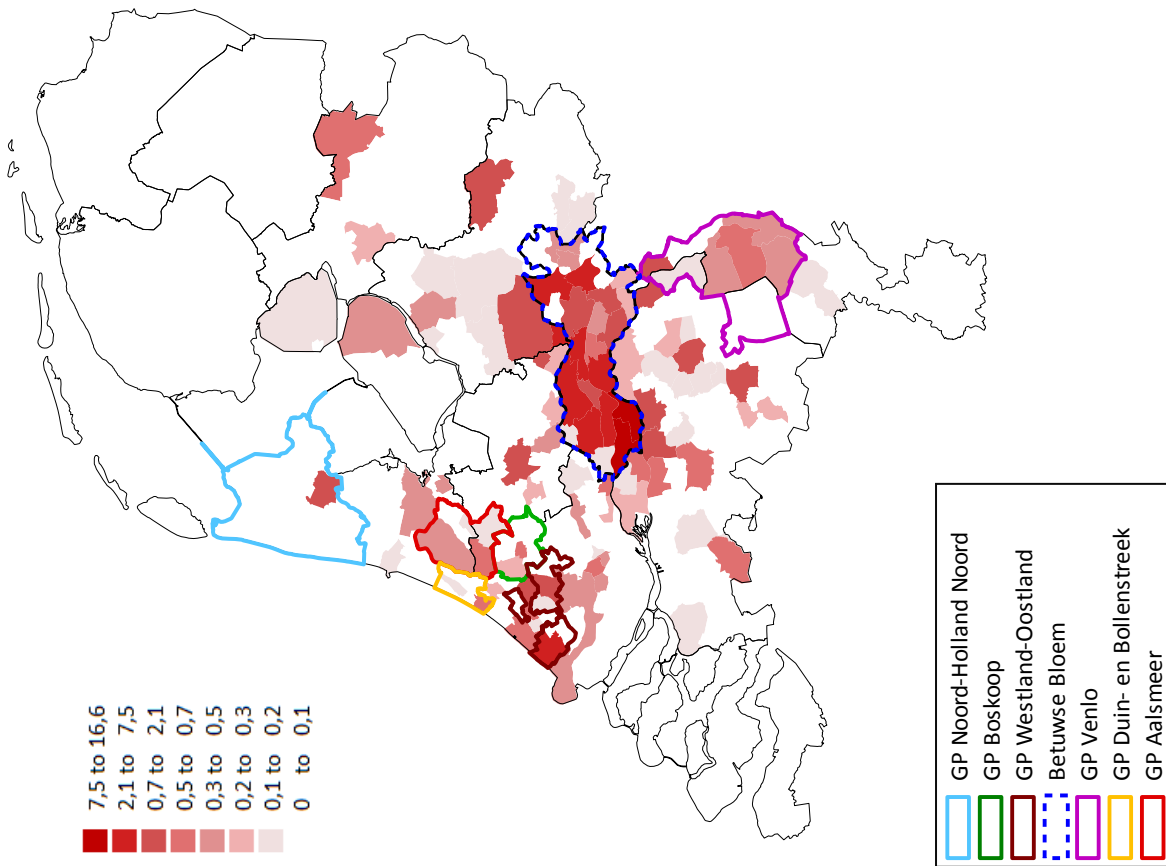
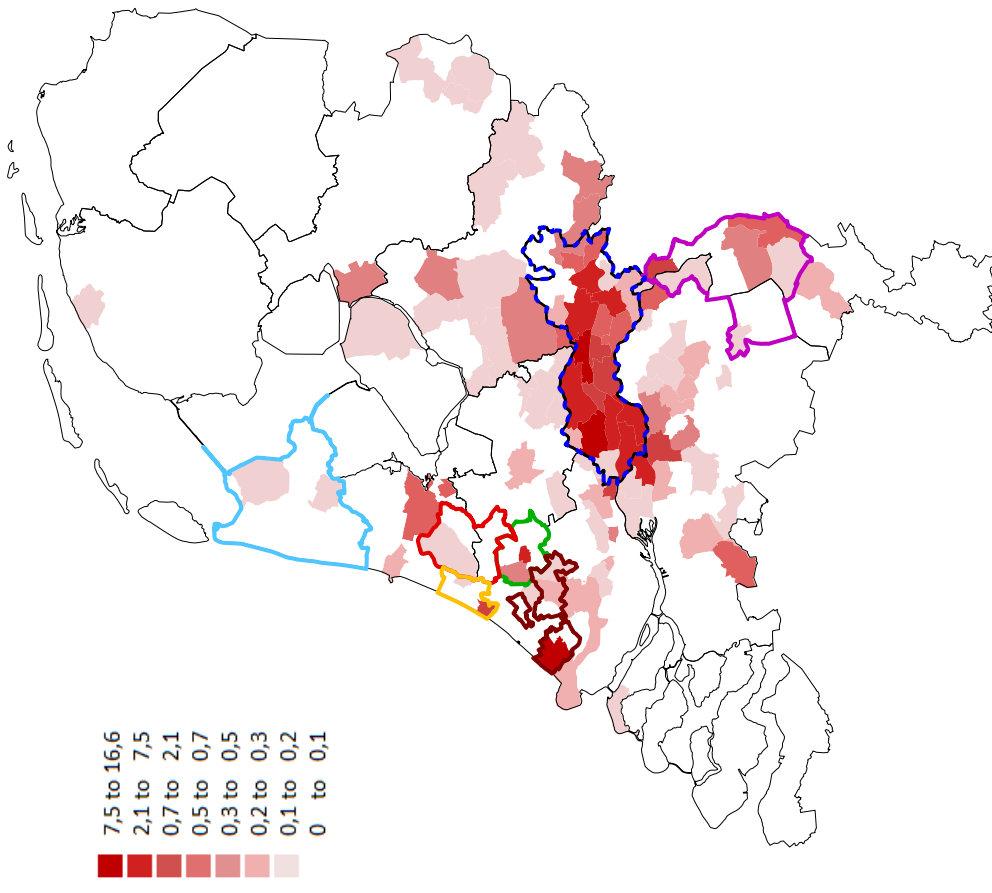


FIGURE 4.9\*: Share of interaction with customers (in %)



\*Source: Rabobank; edited (2014)

Figure 4.7 showed that a little over half of the transactions remain within the *BB*, a trend that can be seen clearly in figure 4.8 and 4.9. Not only does the majority of the transaction stay within the *BB*, the remainder of the municipalities where most interaction with customers and suppliers occurs is located around the *BB* in all directions. Since there are second to none interactions with a big part of the north, southeast and southwest of the Netherlands, the interactions are confined to a close range around the *BB* with some outliers in other areas. The most notable one being the municipality of Westland, located in the Greenport Westland-Oostland. The share of interactions of the *BB* cultivators with the other Greenports does not particularly stand out like it does for Greenport Westland-Oostland. Rather they stand out for the lack of interactions with the *BB*. In particular the Greenports of *Duin- en Bollenstreek* and *Noord-Holland Noord* have hardly any interaction with the *BB*. With the Greenports of *Aalsmeer*, *Boskoop* and *Venlo* there is slightly more interaction, but not more than for example the areas surrounding the *BB*.

Even though the pattern for the location of the customers and suppliers does not seem to differ much at first sight, the interaction with the direct customers is slightly more concentrated than with the suppliers. The spatial pattern of interaction with the customers and suppliers do not differ much, but the distribution of interaction with customers is slightly more concentrated than for the suppliers. This is indicated by the fact that the distribution of the locations of the customers is less evenly distributed than the distribution of the locations of the suppliers. For example the main location of the customers is the municipality of Westland (in Greenport Westland-Oostland) which accounts for 16.6% of the incoming transactions (appendix IV). The main location of suppliers is the municipality of Maasdriel (in the *BB*) which accounts for merely 10.4% of the outgoing transactions (appendix III). In addition when calculating the sum of the ten main municipalities for locations of suppliers they account for 53.9% of the outgoing transactions. The ten main municipalities for the locations of customers add up to 62.5% of the transactions.

#### 4.2.2 | Sector distribution

Moving on from the spatial distribution of incoming and outgoing transactions of cultivators in the *BB* we will now take a close look at the sector distribution of these transactions. In appendices V and VI an account is included of the sector distribution of the incoming and outgoing transactions, taking in the account the 25 most occurring sectors for both sides.

When looking at the distribution of the sector, the first thing that stands out is that the distribution of the outgoing transactions is far more evenly spread than for the incoming transactions. This is a logical outcome given that at each step in the supply chain several input factors and thus suppliers are used to produce a certain good. The end product, in this case the products of the cultivators, are usually sold at auctions or to wholesales, making the division over suppliers more spread out than for the customers. The list of outgoing transactions is topped by “*Services for agro-*



*and horticulture*” with the small proportion of 5.1%, after which the proportions very gradually decrease. The main suppliers are wholesales of horticulture products, transport related businesses and other cultivators.

The incoming transactions are not very evenly distributed over the different sectors. The list is topped by the “*Auction of agriculture and horticulture products*” which accounts for 25.5% of transactions with customers. On the second and fourth place the “*Wholesale of flowers and plants*” and “*Wholesale of vegetables and fruit*” are represented with respectively 10% and 8.1%. Together these centralized customers account for 43.9% of all incoming transactions. The counterpart of centralized customers is more locally oriented, which are for example markets, garden centers, etc. For the cultivators in the *BB* 5.6% of the incoming transactions is accounted for by these points of sale. When comparing the shares for central and local points of sale for the cultivators in the *BB* and nationwide, it turns out that cultivators in the *BB* are slightly less inclined to sell their goods locally. Nationwide centralized points of sale account for 35.7% of incoming transactions and more local points of sale for 8%.

Another thing that comes to the forth when looking at appendices V and VI is that for both the incoming and the outgoing transactions many of the horticulture SIC codes are represented. The exceptions are the mushroom cultivation (code: 12802), which can be explained by the fact that it is a small sector with very few businesses. And a subsector of the fruit cultivation (code: 125), which can be explained by the fact that most cultivators belong to the main sector of the fruit cultivation (code: 124) and the subsector just concerns “*Others*”. Of the transactions that remain within the *BB* 9.9% occurs between cultivators in the area. When taking into account the transactions nationwide among cultivators in the *BB*, this trend seems to strengthen. Of all transaction nationwide and concerning cultivators in the *BB* 11.5% occurs between cultivators.

#### 4.2.3 | Significance of location

After setting out the spatial dimension of the transactions, we will now go further into the difference between transactions that remain within the *BB* and those that cross the borders of its institutional area. Figures 4.7-4.9 have already shown that the majority of the transactions remain within the *BB*. Without taking into account the sector distribution we will take a look at the importance for the location of suppliers and customers in the choice for the *BB* cultivators to engage in a trade relationship. As we saw before with regard to transaction that occur between cultivators, those relationships seemed to become slightly more important when we also took into account the relationships with trade partners outside of the *BB*.

In tables 4.1 and 4.2 the relationships with suppliers and customers both within and outside the *BB* have been set out. By calculating if the difference between the shares of transactions with suppliers/customers within and outside the *BB* is significant, we can see whether the cultivators of the *BB* have significantly more trade relationships

with suppliers/customers within or outside the *BB*. This can show to what extent the institutional borders of the *BB* also influence the *BB* cultivators choice of trade partners. To be able to calculate this significance the suppliers and customers the cultivators have been separated from other trade partners. This significance is in this case expressed in the *p*-value as shown in the bottom row. Together with the value for *Cramers V* this will give a description of the presumed relationship.

**Table 4.1: Distribution of outgoing transactions of cultivators in the *Betuwse Bloem* (in %)**

Destination (suppliers)	Cultivator	Other
<i>Betuwse Bloem</i>	57.2	56.4
Elsewhere	42.8	43.6
Total	100	100
Total N	11,188	76,013
$Chi^2 = 2.404$	$p = 0.121$	$Cramers V = 0.005$

**Table 4.2: Distribution of incoming transaction of cultivators in the *Betuwse Bloem* (in %)**

Origin (customers)	Cultivator	Other
<i>Betuwse Bloem</i>	68.7	46.1
Elsewhere	31.3	53.9
Total	100	100
Total N	9,311	32,364
$Chi^2 = 1472.037$	$p = 0.000$	$Cramers V = 0.188$

The distribution of the incoming and outgoing transactions as shown above shows that the location of the cultivators actually does matter in the choice of trade partner for those located in the *BB* (table 4.1 and 4.2). However this appears only to be true for one side of the transactions. When the cultivators choose customers, whether the customer is located in the *BB* or not seems to be a determining factor ( $p=0.000$ ). However, the connection between the two is not a very strong one (*Cramers V* = 0.188). When the cultivators in the *BB* have to choose where to find their suppliers among other cultivators, the location does not seem to matter as it does for the suppliers ( $p=0.121$ ). In addition the strength of the relation is close to non-existing (*Cramers V* = 0.005).

Following these results we can make some judgements on hypotheses 3.1 and 3.2. Both hypotheses presumed no significant connection between the physical proximity of the supplier or customer to the *BB* cultivators and engaging in a trade relationship. Although the evidence is not very convincing, a significant connection does exist between the locations of the customer and whether they are trading with cultivators. Thus, the physical proximity of the customer is of significant importance when the *BB* cultivators decide whether to sell their goods to customers within or outside the *BB*. Hypothesis 3.1 will be adopted. In case of the location of the supplier, the physical proximity of the supplier does not seem to matter when the *BB* cultivators are choosing where to buy their supplies. The connection between the location of the suppliers and whether the *BB* cultivators trade more with suppliers within or outside the *BB* is not significant. Therefore hypothesis 3.2 will be rejected.

H3.1 | Cultivators in the *Betuwse Bloem* trade significantly more with **customers** inside, rather than outside the area of the *Betuwse Bloem*

H3.2 | Cultivators in the *Betuwse Bloem* trade significantly more with **suppliers** inside, rather than outside the area of the *Betuwse Bloem*

### 4.3| Network analysis

In order to identify the business network, a cluster analysis was carried out as described in §3.4. For this part of the research the data file was filtered in order to prevent distortion of the results of the hierarchical cluster analysis (§3.3). Even though in statistical terms it is called a cluster analysis, in fact it has no link with any spatial or geographical aspects and is merely able to identify similarity among data, in this case the transactions which together would construct the inter-firm networks. The results show that 97.4% of all businesses in the filtered data file have been assigned to the four largest networks. Of the remaining businesses 14,858 have been assigned to smaller networks and 5,090 have not been assigned to any network. The latter concerns businesses which were unintentionally not included in the hierarchical cluster analysis (see footnote 2). In total 5,329 inter-firm networks have been designated of which 1,639 exist of merely one business. These businesses often only carried out one transaction taken up in dataset.

In appendix VII an overview can be found of the sector distribution over the different inter-firm networks. There the networks have been included which contain a cultivator of the *BB*, which leaves 6 inter-firm networks in the overview. In addition only the sectors have been included which count for at least 500 businesses as well as all the horticulture sectors, to keep the overview containable. One might argue that this way the nodes with a lot of connections which are few in its kind might be overlooked. However, in this case the focus is the final composition of the networks and not the connections between businesses that led to this composition.

Over 97% of the businesses have been assigned to four of the networks; network ID's {1}, {0}, {3} and {2}. Some of these networks consist of over 150,000 businesses which makes it very hard to draw some quick conclusions on their composition. By looking at the composition of these four networks in the overview it becomes clear that the different sectors are rather evenly distributed. There is no case where one sector was completely assigned to one network or where businesses of a sector were not at all assigned to one of the four clusters.

Out of the 906 cultivators in the *Betuwse Bloem* included in the sample, 900 were assigned to an inter-firm network. The remaining six have not been taken up. These businesses made only one transaction with businesses that were filtered out of the initial dataset. Therefore they did not occur again in the final dataset and could not be assigned to an inter-firm network. The remaining 900 cultivators were assigned to seven different networks with various sizes, but almost all *BB* cultivators were

assigned to the four largest networks (table 4.3). The majority (87,7%) of the cultivators has been assigned to network {1}, the biggest network in the analysis. With this information the hypothesis 5 can be adopted, the majority of the cultivators in the *BB* cultivators belong to the same inter-firm trade network.

H4 | Bases on their formal economic relationships, the majority of the cultivators in the *Betuwise Bloem* belong to the same inter-firm trade network

When taking into account all the cultivators in the Netherlands included in the transactions file, the total amount of horticulture businesses is 9,462. The last column in table 4.3 shows the distribution of the majority of these businesses over the inter-firm networks. The remaining 24 businesses belong to 19 smaller sized clusters without representation from the *Betuwise Bloem* and therefore not taken into account further in this research.

Where looking at the composition of the clusters as a whole did not give any notable results, we will take a closer look at the distribution of the cultivators over the networks. The distribution of cultivators as shown in table 4.3 tells us that the cultivators of the Netherlands belong for the most part to the same network. Of all cultivators in the Netherlands 78.3% has been assigned to the biggest network in the classification, network {1}. When looking just at the cultivators in the *BB* over 87.7% of them have been assigned to network {1}.

**TABLE 4.3: Distribution of cultivators in the *Betuwise Bloem* and the Netherlands\* over the inter-firm networks**

Inter-firm network		<i>Betuwise Bloem</i>		Netherlands* (incl. BB)	
<i>Network ID</i>	<i>Network size</i>	<i>Frequency</i>	<i>Percent</i>	<i>Frequency</i>	<i>Percent</i>
{1}	191,646	789	87.7	7,413	78.3
{0}	180,791	52	5.8	1,311	13.9
{3}	155,960	50	5.6	624	6.6
{2}	38,605	6	0.7	87	0.9
{185}	6	1	0.1	1	0
{807}	3	1	0.1	1	0
{1849}	2	1	0.1	1	0
...	...			...	...
<b>Total</b>		<b>900</b>	<b>100</b>	<b>9,462</b>	<b>100</b>

\* included only when network contained a cultivator of the *Betuwise Bloem* as well

Comparing the cultivators of the *BB* and the Netherlands in the classification the biggest difference can be seen for the assignment to network {1}. However, looking at the percentages assigned to each network another difference can be seen for network {0}. Compared to the cultivators of the *BB* a rather sizable share of cultivators in the entire Netherlands has been assigned to network {0}. For the networks {2} and {3} the shares are again more equal between the two groups.

Of the cultivators in the Netherlands outside the *BB* 24 businesses are not represented in table 4.3. They belong to networks where no cultivator of the *BB* is included. Together with the three small networks where the *BB* is represented, networks {185}, {807} and {1849}, a total of 27 cultivators are not assigned to one of the four big networks. These 27 businesses are thus distributed over 22 smaller networks ranging in size from 2 till 10 businesses.

## CHAPTER 5 | CONCLUSION

Throughout the last chapters many aspects of the cultivators of the *Betuws Bloem (BB)* have been addressed. These different aspects were derived from the sub questions as drafted in the introduction. The research question for this study was as follows:

*Do clusters and inter-firm trade networks of horticulturists regionally overlap in the Betuwse Bloem and could therefore a place-based policy to stimulate regional and local economy be plausible?*

In chapter 4 we have seen many different aspects of the interaction of cultivators in the *BB* with their customers and suppliers. We started out by determining the spatial concentration of horticulture businesses, which showed us that the *BB* as a whole has a slightly higher concentration than the national average. In particular the fruit and mushroom cultivation had a representation of respectively five and four times the average for that cultivation. The tree and plant, flower and vegetable cultivations in the *BB* had a concentration much closer to the national average.

A notable result regarding the concentration of horticulture businesses was the lack of horticulture businesses in the eastern municipalities of the area. Doesburg and Westervoort lack horticulture all together and in figures 4.1-4.6 the lacking of many of the cultivations in the east of the *BB* becomes clear. In the intermezzo the areas of the *Betuwe* and the *Betuws Bloem* were shown separately and in many cases the groups of municipalities with high concentration of horticulture businesses are more in line with the area of the first. Judging just by the maps on the location quotients in chapter four, the area of the *Betuwe* supplemented with the municipalities of *Zaltbommel*, *Maasdriel* and *West Maas en Waal* would be a more logical area to determine as a Greenport. Maybe the reason to include municipalities with bigger cities like *Nijmegen* and *Arnhem* was to have some institutional heavyweights involved with the project. In addition it might be possible that these municipalities provide room for expansion of the horticulture in the future.

Even though some of the municipalities in the *BB* have no horticulture representation, many of the transactions remain within the area, including the municipalities in the eastern part. The cultivators in the *BB* have thus very strong links with suppliers and customers in their immediate environment. However, they do tend to sell their goods in a more centralized manner when compared to all cultivators in the Netherlands. Of the transactions with customers of the *BB* cultivators 43.9% is accounted for by centralized points of sale, compared to 35.7% for cultivators nationwide. When looking at locally oriented points of sale the *BB* cultivators have 5.6% of their transactions with more local customers, compared to 8% for cultivators nationwide. Noted should be that this concerns the number of transactions, which does not give any information on value of that transaction.

There could be several explanations for the different division of centralized and local points of sale between cultivators in the *BB* and in the entire Netherlands. First of all, because of the central position of the *BB* in the Netherlands, many areas are easily accessible and therefore many centralized point of sale as well. It is possible that cultivators who are located more in far corners of the country are more inclined to turn to local points of sale or even places just over the national border in view of transportation costs. Another explanation might be found in the customers that can be found outside of the Netherlands, especially since the Dutch horticulture is a strong exportation sector. Even though international transactions were not included in this research these customers might be indirectly included through sale on auctions of horticulture products. Over 25% of the incoming transactions originate in this sector. Buying these products on an auction might be simpler for foreign customers, because crossing fiscal and institutional borders is easier when dealing with a big institute with lots of experience rather than with the cultivator themselves. In addition, buying goods abroad is more profitable when buying them in large quantities, which again is easier to achieve at an auction.

A last point that should be addressed concerning the spatial distribution of the transactions is the fact that the municipality of *Westland* (in Greenport Westland-Oostland) was so well represented among the suppliers but in particular the customers. As we saw in figures 4.8 and 4.9 the many of the transactions are concentrated within the *BB* and many of the surrounding municipalities. But *Westland* was the only municipality located further from the *BB* with such an interaction with the *BB* cultivators. Over 16% of transactions with customers take place with *Westland*. The biggest uninterrupted area of greenhouse cultivation can be found in *Westland*. In addition an important horticulture auction center of Flora Holland is located in this municipality. Because it is not the only big horticulture auction location both previous arguments cannot fully explain the strong interaction between the *BB* and *Westland*.

We have already seen that many of the municipalities in the *BB* know a very high concentration of cultivators, each of the cultivations is well represented in parts of the *BB*. In addition over half of all transactions made by the *BB* cultivators remain within the area, suggesting strong local links between cultivators and their suppliers and customers. To start answering the question to what extent the cluster the *BB* exist, we can conclude there is evidence to be found in the concentration index and the transactions of cultivators in the area that the *BB* is a cluster with a strong cohesion amongst its businesses. A large part of all their transactions remain within the municipality (28.9%) and over half of their transactions remain within the *BB* (52.4%). Of the transactions that cross the border of the *BB* the majority is concerned with municipalities adjacent to the *BB*.

The idea of a strong local links is strengthened when taking into account the results of the hierarchical cluster analysis, showing that 87.7% of the *BB* cultivators belong to the same inter-firm network. When looking at all cultivators in the Netherlands, they

are not as centrally allocated in one inter-firm networks as the cultivators of the *BB* are. This means that when you look further than just the relationships of the *BB* cultivators with just their customers and suppliers and take into account all the trade relationships in the transactions file, the cultivators of the *BB* enjoy stronger cohesions compared to all cultivators in the Netherlands. Apparently the cultivators of the *BB* have relationships in such a way that they have many direct and indirect links to each other, making the majority belong to the same inter-firm trade network and showing stronger trade cohesion when compared to all cultivators in the Netherlands.

Because the co-location, the incoming and outgoing relationships and the inter-firm trade network have all been studied as separate aspects, it is difficult to draw any conclusions on whether the cluster fosters the inter-firm network and therefore it there is a causal relationship. The *BB* cluster and the inter-firm trade network to which the *BB* cultivators belong correspond to a certain extent, 87% of the *BB* cultivators belong to the same inter-firm network. In addition over half of the transactions made by the *BB* cultivators remain within the cluster. A big part of the remaining transactions is made with suppliers and customers in adjacent municipalities to the *BB*. Though it is impossible to determine whether a causal relationship exists in this static study, the fact that the cluster and the inter-firm network largely overlap could make further longitudinal research into this causality very interesting.

## 5.1 | Policy implications

The *BB* is in institutional terms a rather young project being initiated in 2006 and carrying out its first policy in 2009. Now six years later during this research we did not come across any extraordinary policy measures to strengthen and improve the cluster. The only straightforward policy that has been examined was the funding for moving greenhouse businesses to the central location of Bergerden. This project turned out to be a failure in a practical and financial way, because as we set out before, most cultivators have mixed activities and will not be inclined to move only a part of their activities.

The Greenport structure in the Netherlands consists of six Greenports and several smaller satellite and development areas. The *BB* is one of those satellite areas, but has the ambition to become an important link in the Greenport structure of the Netherlands. When looking at the results as shown in figures 4.8 and 4.9 we can see that the cultivators in the *BB* do not really interact more with the Greenports than as they do with other municipalities. With of course the exception of *Westland*. This shows that most relationships maintained by the *BB* cultivators are not motivated by the fact that the trade partner is located in a Greenport, but rather because he is located nearby. It is a rather self-contained cluster based on the trade relationships.



Whether the *BB* should become a part of the Greenport Holland structure is a highly subjective topic. The Greenport Holland structure at this moment consists of six Greenports and several smaller areas, the satellite areas. Two locations within the *BB* are part of the Greenport Holland structure as satellite areas. As can be clearly seen in the maps of the Netherlands in chapter four the area of the *BB* is rather big when compared to the Greenports. Greenport *Noord-Holland Noord* and *Greenport Venlo* have a large surface area compared to the four Greenports in the west, but the area of the *BB* is even bigger than those two. The information on the Greenport Holland structure indicates that the Greenports are areas with concentrations of businesses that have strong links with each other (Greenport Holland, n.d.). In chapter four it was stated that there is indeed a concentration of horticulture businesses in the *BB*. When looking at figures 4.1 to 4.6 it becomes clear that for the horticulture overall there is a concentration of businesses in the *BB*, but it is not as clear as it is in the Greenports. For the fruit cultivation however there is a very high concentration in the *BB*, much higher than for the rest of the Netherlands. Like *Greenport Boskoop* is specialised in tree and plant cultivation, the *BB* could be a Greenport specialised in the fruit cultivation. It is not necessary for each cultivation to be represented for a Greenport to be part of the Greenport Holland structure. So in that aspect the *BB* could be a part of this structure.

In addition Greenport Holland describes the businesses in the Greenports as having strong links with each other. The analyses in chapter four have shown that there are strong local trade relations and that many of the transactions remain within the *BB*. With the other Greenports there is no particular high interaction, with the exception of *Greenport Westland-Oostland*. Whether this is sufficient for the *BB* to become a part of the Greenport Holland structure could be a very interesting topic for further research.

While finishing this report the *Betuwse Bloem* has changed its name to *Greenport Gelderland*, including the launch of a new website and logo. According to the website the main reason for this change was the fact that a bigger area than the *Betuwe* is part of the cluster and they wanted to appeal more to an international audience. And even though this was found out while the report still was not finished, the choice was made to remain with the *BB* throughout this research for two reasons. First of all, the project was called the *BB* for close to ten years and has presented itself as such. Secondly, when browsing on the new website of *Greenport Gelderland* it became clear that nothing much has changed besides the name and the logo. Much information was lacking on the website and for many topics there was an exact copy of the information that could be found on the website of the *BB*. Although the style and image of *Greenport Gelderland* carry out a more professional and international message than the *BB*, the website, news items and projects seem to be in its infancy.

## CHAPTER 6 | DISCUSSION

For every decision that is made in a research another possible way of studying the subject has been shut off. It is therefore important to reflect on the decisions made in this research and its shortcomings. As well as it is important to explore possible other ways to study this topic.

To study the transactions behaviour of the cultivators in the *BB* the already much covered transactions has been used. This secondary data file covered the transactions between clients of the Rabobank in the months March through December of 2011. And even though this file contains a lot of valuable information and was very useful in conducting this research, it had some shortcomings.

First of all, the transactions file did not contain any information on international payment traffic. Because in our world international trade is still growing each day a study which only takes into account the national transactions gives hardly a realistic picture of *all* the trade partners of cultivators in the *BB*. The Dutch economy is by tradition an export economy, which became painfully clear when the European Union (EU) started to impose sanction on Russia in July 2014 following the unrest in Ukraine. Russia imports for billions of fruits and vegetables from the EU each year and many cultivators in the Netherlands were unable to export to Russia. The damages were estimated at billion euros for the Dutch economy alone, let alone the jobs involved with the sector. An interesting and important topic for further research would be to what extent the cultivators in the *BB* in particular are embedded in these international networks and how strongly they are dependent on their international customers.

Another point that should be addressed concerning the transactions file is that it contains transaction over a period of only ten months. These transactions already added up to a few million to analyse and therefore aplenty for this research. However, the file that was used in this research was supposedly the first of many to be created by the Rabobank and it would be very interesting to carry out a longitudinal study on the subject. This way the changes over time can be studied, including the behaviour of the cultivators in periods of economic boom and downturn.

An additional reason why a longitudinal study would be interesting is because the project of the *BB* is a relatively young project. The project started formally in 2006 and carried out the first policies under its name in 2009, which makes the time span to the year of the transactions file quite small. When studying the *BB* over a longer period of time it would be possible to study the effect of potential policies. In addition it could provide a deeper insight in the differences and developments among the Greenports depending on the 'age' of the cluster.

The last point of discussion regarding the transactions file is the fact that only client of the Rabobank are included. As stated in chapter 3 the Rabobank accounts for 85% of all agro- and horticulture businesses in the Netherlands and over 50% of the cultivators in the *BB* was included in the research, which are a considerable shares. It is possible that being a client at the same bank, these cultivators might meet at events or meetings initiated by the Rabobank, which can bring about relationships between these cultivators and thereby strengthening their network. Even though it would be practically close to impossible, it would be interesting to include all cultivators in the Netherlands, even if client at another bank. What would that mean for the strong relationships among *BB* cultivators as we have seen in the previous chapters? This might show the importance of being clients at the same financial institution.

Moving on from the remarks regarding the transactions file, we will now discuss some more fundamental shortcomings of this research. The first one regards the feasibility to actually study the spatial behaviour of greenhouse cultivation and open field cultivation. The main reason why the fruit cultivation is so well represented in the *BB* is because of its natural endowments. It is for such reasons that open field cultivation and to a lesser extent the greenhouse cultivation are not as flexible in their spatial behaviour as most businesses are. They are dependent on the soil and cannot just pack up and leave for another location. The horticulture sector might therefore not be the most grateful subject in an inter-firm network study.

In addition, treating the open field cultivation and the greenhouse cultivation as one category might not be correct. Both are dependent on the soil and other natural resources, but the greenhouse cultivation to a far lesser extent. For this division different sources that gather information on the horticulture sector do not use the same grouping of businesses, which makes it hard to study them separately. The SN for example treats the two as one group, where research institute LEI developed its own classification and distinguished between greenhouse and open field cultivation. But even though this makes studying the horticulture less straightforward, a solution might be hard to find. The policy measure mentioned in the introduction, regarding the funding for greenhouse cultivators to move to a central location, showed us that many of these greenhouse cultivators are not very likely to move. Even though they could easily move their greenhouse activities, most cultivators have a combination of open field and greenhouse cultivation (Berkhout et al., 2013). This makes it also difficult to attribute one code to a business with mixed activities like that.

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## APPENDIX I | SIC codes excluded from the data file

SIC-CODE	DESCRIPTION*
Codes filtered when either the <i>sender</i> or the <i>recipient</i> had one of the following codes:	
6411	Centrale banken
64191	Coöperatief georganiseerde banken
64192	Effectenkredietinstellingen
64193	Spaarbanken
64194	Algemene banken
6420	Financiële holdings
64301	Beleggingsinstellingen in financiële activa
64302	Beleggingsinstellingen in vaste activa
64303	Beleggingsinstellingen met beperkte toetreding
6491	Financiële lease
64921	Hypotheekbanken en bouwfondsen
64922	Volkskredietbanken en commerciële financieringsmaatschappijen
64923	Participatiemaatschappijen
64924	Wisselmakelaars en overige kredietverstrekking
6499	Overige financiële intermediatie
65111	Levensverzekeringen (geen herverzekering)
65112	Naturaverzekeringen
65113	Spaarkassen
6512	Schadeverzekeringen (geen herverzekering)
6520	Herverzekering
652001	Herverzekering van levensverzekeringen
652002	Herverzekering van schadeverzekeringen
65301	Bedrijfspensioenfondsen
65302	Ondernemingspensioenfondsen en -spaarfondsen
65303	Beroepspensioenfondsen
65309	Overige pensioenfondsen
6611	Beheer van financiële markten
6612	Commissionairs en makelaars in effecten, beleggingsadviseurs e.d.
66191	Administratiekantoren voor aandelen en obligaties
66192	Marketmakers
66193	Hypotheek- en kredietbemiddeling, geldwisselkantoren, bank- en spaaragentschappen e.d.
6621	Risicoanalisten en schadetaxateurs
6622	Assurantietussenpersonen
66291	Verzekeringsbeurzen
66292	Actuariële en pensioenadviesbureaus; beheer en administratie van pensioenvermogens
66293	Waarborgfondsen
66299	Overige dienstverlening op het gebied van verzekeringen en pensioenfondsen n.e.g.
6630	Vermogensbeheer
8291	Kredietinformatie- en incassobureaus
When only the <i>recipient</i> had one of the following codes:	
9411	Bedrijfs- en werkgeversorganisaties
8411	Algemeen overheidsbestuur
8412	Openbaar bestuur op het gebied van gezondheidszorg, onderwijs, cultuur en welzijn
8413	Openbaar bestuur op het gebied van het bedrijfsleven
8421	Buitenlandse zaken
8422	Defensie
84231	Rechtspraak
84232	Ministerie van Justitie en gevangeniswezen
8424	Politie
8425	Brandweer
8430	Verplichte sociale verzekeringen
843002	Verplichte sociale inkomensdervingsverzekeringen
843003	Verplichte sociale demografische verzekeringen
843004	Overige verplichte sociale verzekeringen

\* Only in Dutch

## APPENDIX II | Location Quotients for the horticulture

→ cultivation Municipality ↓	Flowers	Trees and plants	Vegetables	Fruit	Mushrooms	Horticulture
<b>Betuwse Bloem</b>	1.1937	1.2441	0.8774	5.3719	4.4365	1.7704
Arnhem	0.0389	0.0544	0.0780	0.3099	0	0.0933
Beuningen	0.5886	0.3294	1.2586	5.6260	0	1.4529
Buren	0.0769	3.1233	1.2345	29.9573	0	5.6214
Culemborg	0	0.1378	0	1.3451	0	0.2364
Doesburg	0	0	0	0	0	0
Druten	0.4577	1.4942	0.8156	6.2498	0	1.6738
Duiven	0.7415	0.5186	1.9817	1.6873	4.2723	1.1650
Groesbeek	0.3381	1.6555	2.4851	3.8471	0	1.7387
Geldermalsen	1.0937	0.8743	0.8352	18.8446	5.4016	3.6691
Heumen	0.5327	1.9874	0.2373	1.2123	6.1393	0.9436
Lingewaal	0	0.3145	0	7.1622	0	1.1560
Lingewaard	6.8371	2.3187	2.0303	5.8147	0	4.3088
Maasdriel	3.0356	0.9800	4.0566	12.2216	96.8723	4.6429
Millingen a/d Rijn	0	0	0	3.2059	0	0.4829
Neder-Betuwe	0.8411	16.3263	1.5454	13.1588	0	6.6679
Neerijnen	5.2832	1.3042	4.5682	28.9951	5.3719	7.6973
Nijmegen	0.2027	0.1417	0.0541	0.1383	0	0.1389
Overbetuwe	1.3004	1.8193	0.7899	7.8019	0	2.2696
Renkum	0.0852	0.2384	0	0.1939	0	0.1168
Rheden	0.1509	0.3167	0	0.1717	0	0.1552
Rijnwaarden	0.2799	0	0	4.4586	0	0.7676
Tiel	0.0705	0.2961	0.6600	5.1381	0	1.0401
Ubbergen	0.3040	0	0.8126	4.1516	0	0.9381
West Maas en Waal	0.3622	1.5204	1.2909	11.8162	4.1747	2.6287
Westervoort	0	0	0	0	0	0
Wijchen	0.4312	1.1061	0.9605	1.6356	0	0.9117
Zaltbommel	10.8683	2.1398	2.4743	3.8471	2.7831	5.4782
Zevenaar	0.2007	0.8426	0.6707	0.4569	0	0.5162
Aa en Hunze	0.3218	1.0504	0.8601	0.7323		0.6987
Aalburg	0.3276	2.2917	1.0945	1.8639	0	1.2355
Aalsmeer	6.4633	2.9462	0.2911	0.1652	0	3.0372
Aalten	1.2267	1.2480	0.8941	1.0150	0	1.1086
Achtkarspelen	0.2087	0.7299	0.2789	0.7124	0	0.4293
Alblasserdam	0	0	0	0	0	0
Albrandswaard	0.3925	0	2.6229	1.1910	0	0.9868
Alkmaar	0.0917	0	0.0817	0	0	0.0524
Almelo	0.1397	0.6519	0.0622	0	0	0.2236
Almere	0.6364	0	0.1149	0	0	0.2476
Alphen aan den Rijn	0.5227	0.6751	0.1074	0.1830	0	0.3997
Alphen-Chaam	3.2512	6.2539	9.5039	0.4623	7.0247	5.1896



Ameland	0	0	0	0	0	0
Amersfoort	0.0380	0.0799	0.0254	0	0	0.0391
Amstelveen	1.0896	0.2771	0	0.0751	0	0.4527
Amsterdam	0.0070	0.0066	0.0284	0.0107	0	0.0129
Anna Paulowna	20.3429	1.1051	1.5835	0	0	7.6508
Apeldoorn	0.2728	0.4361	0.2083	0.0886	0	0.2672
Appingedam	0	0	0	0	0	0
Assen	0.2341	0.1637	0	0	0	0.1204
Asten	0.4038	2.4479	7.0151	0	0	2.5379
Baarle-Nassau	0.2561	2.8668	2.0538	0.5829	0	1.4050
Baarn	0	0.2374	0.2268	0	0	0.1163
Barendrecht	0.1125	0	1.4289	0.2561	0	0.4437
Barneveld	0.1198	1.0618	0.1601	0.2727	0	0.3834
Bedum	0.6986	0	1.4003	0	0	0.5987
Beek	0.3177	0	0.2123	2.1694	0	0.4902
Beemster	4.2715	0	2.4034	6.6506	0	3.0828
Beesel	1.0566	2.9563	4.2360	3.6067	0	2.7167
Bellingwedde	0	3.5835	1.7115	0	11.0693	1.3720
Bergambacht	0	0.3478	0	1.1315	0	0.2556
Bergeijk	0.1170	6.0601	0.7822	0.5328	0	1.8061
Bergen (L.)	5.5735	5.8478	11.7926	2.1138	0	6.6873
Bergen (NH.)	1.6393	0.2991	0.2857	0	0	0.7085
Bergen op Zoom	0.5283	0.0671	1.7971	0.9836	1.6604	0.8150
Berkelland	0.8264	1.3212	0.2366	0.8059	0	0.7892
Bernheze	0.8722	1.1093	1.5895	1.0826	8.2241	1.1825
Bernisse	0	0.3111	2.3781	1.0124	0	0.8388
Best	0.3833	1.7429	0.7684	0	0	0.7556
Beverwijk	0.8992	0.8087	0.0858	0	0	0.5284
het Bildt	0.2726	0.3814	0.3643	2.4820	0	0.6543
De Bilt	0.2221	0.3884	0.4453	0.2527	0	0.3236
Binnenmaas	1.4961	0.2616	5.6230	2.3406	0	2.3721
Bladel	0.1112	2.4895	0.5945	0.2531	0	0.8388
Blaricum	0	0.5712	0.2728	0	0	0.2099
Bloemendaal	0.0958	0.1340	0	0	0	0.0657
Boarnsterhim	0	0	0	0	0	0
Bodegraven-Reeuwijk	0.2658	6.1359	0	0.1512	0	1.6175
Boekel	2.1239	4.7539	3.9735	0.4833	102.7950	3.4948
Ten Boer	0	0	0	0	0	0
Borger-Odoorn	0.4216	0.4423	0.5633	0.4796	0	0.4697
Borne	0	1.2995	0	0	0	0.3184
Borsele	1.2807	2.2804	0.6223	31.7946	0	5.9473
Boskoop	3.9081	80.3895	0	0	0	21.0391
Boxmeer	1.6534	5.7826	3.4523	0.4703	14.2900	3.0112
Boxtel	0.1857	2.3391	0.6206	0.6341	3.2113	0.9075

Breda	0.3275	0.7705	1.6711	0.3387	0.5146	0.7834
Brielle	3.0926	0.4807	7.1174	1.5638	0	3.2394
Bronckhorst	1.1897	1.8395	0.8367	0.8549	0	1.2020
Brummen	0.7212	0	0.5783	0	0	0.3956
Brunssum	0.3214	0.2248	0	0	0	0.1652
Bunnik	0	0.4300	0.8215	9.4430	0	1.7387
Bunschoten	0	0	0.1623	0.2763	0	0.0832
Bussum	0	0.0816	0	0	0	0.0200
Capelle aan den IJssel	0.0470	0.0658	0	0	0	0.032
Castricum	2.4716	0.5762	0.2201	0	0	1.0450
Coevorden	0.7057	0.9872	0.5239	0.5353	0	0.6989
Cranendonck	0.9213	2.0944	3.5396	1.0482	0	1.8950
Cromstrijen	0.3612	0	2.4137	5.7542	0	1.6099
Cuijk	0.4077	5.7036	1.0896	0.6185	0	1.9101
Dalfsen	0.9738	1.2261	0.5205	0.4432	0	0.8346
Dantumadiel	0	0	0	0.4110	0	0.0619
Delft	0.0330	0	0	0	0	0.0113
Delfzijl	0.5367	0.1877	0.7172	0.9159	0	0.5519
Deurne	1.0623	3.3969	4.7658	1.2087	5.2465	2.6273
Deventer	0.1357	0.3324	0.4536	0.2317	0	0.2793
Diemen	0	0	0	0	0	0
Dinkelland	0.2744	4.7353	0.7335	0.4163	3.1626	1.5210
Dirksland	5.4187	2.0214	4.3446	4.1102	0	4.0866
Doetinchem	0.1516	0.7072	0.1351	0.4601	0	0.3293
Dongen	0.9113	4.4624	3.8059	1.8146	11.8152	2.7142
Dongeradeel	0.9944	0	3.4885	0.2828	0	1.2784
Dordrecht	0	0	0.1820	0	0	0.0467
Drechterland	10.2842	1.4036	5.8659	11.9866	0	7.1801
Drimmelen	1.9704	2.0674	4.4763	0.6725	3.4059	2.4486
Dronten	1.4201	1.6082	4.0666	6.0015	0	2.8282
Echt-Susteren	0.6087	0.6083	4.9972	1.9789	0	1.9378
Edam-Volendam	0	0	0	0	0	0
Ede	0.1687	1.0118	0.1610	0.3840	0	0.4050
Eemnes	0	0.6033	0	0	0	0.1478
Eemmond	1.4147	0.7421	2.3632	0.4024	0	1.3337
Eersel	0.6107	6.4938	0.4897	0	0	1.9263
Eijsden-Margraten	0	0.8327	3.0229	23.0287	0	4.4487
Eindhoven	0.0128	0.0897	0.0686	0.0292	0	0.0484
Elburg	0	1.0229	1.1726	0	0	0.5514
Emmen	1.1674	0.7956	0.8400	0.2724	0	0.8517
Enkhuisen	1.3249	0.3707	0.5311	0	0	0.6813
Enschede	0.0432	0.1816	0.0578	0.0492	0	0.0816
Epe	0.2551	1.6655	0.7955	0.5805	0	0.7871
Ermelo	0.1984	0.2775	0	0	0	0.1360

Etten-Leur	0.3516	1.0822	6.2965	1.1202	2.4312	2.1818
Ferwerderadiel	0.9829	0	0.8756	0.7455	0	0.6739
Franekeradeel	0.5730	0.4008	2.1060	0.6520	0	0.9332
Gaasterlan-Sleat	0.2272	0.6357	0.3036	0	0	0.3115
Geertruidenberg	0	0.1699	0.9738	0.2763	0	0.3330
Geldrop-Mierlo	0.0795	0.2227	0.8509	0.7245	0	0.4092
Gemert-Bakel	1.7930	2.8668	5.1346	0.7772	17.7110	2.8392
Gennep	0.7133	1.9958	2.3831	0	6.1652	1.3755
Giessenlanden	0	0.4193	0	2.3874	0	0.4624
Gilze en Rijen	1.1392	1.4343	2.4358	0.7777	0	1.4840
Goedereede	5.8877	0.5883	0.5619	0	0	2.3067
Goes	0.2976	0.4163	0.3977	4.0638	0	0.9183
Goirle	0	0.1765	0.5057	0.5742	4.3616	0.2811
Gorinchem	0	0	0	0.3636	0	0.0547
Gouda	0.0456	0.1917	0.0610	0.1039	0	0.0939
Graafstroom	0	1.5980	0	1.0397	0	0.5482
Graft-De Rijp	1.0566	0	0.4706	0.8014	0	0.6037
Grave	0.5316	3.3468	1.4208	1.2097	0	1.5491
s-Gravenhage	0.0687	0.0073	0.0494	0	0	0.0380
Groningen	0.0323	0.0452	0.0431	0.0367	0	0.0387
Groote gast	0.2387	0.3340	0	0	0	0.1637
Gulpen-Wittem	0	0.2651	0.5065	7.3320	0	1.2994
Haaksbergen	0.1148	1.6067	0	0	0	0.4331
Haaren	1.7813	15.8580	3.0296	1.10550	0	5.4403
Haarlem	0.2010	0.0234	0.0447	0.0381	0	0.0918
Haarlemmerliede	0	0	0	0	0	0
Haarlemmermeer	2.4805	0.6940	0.2566	0.1820	0.5532	1.1164
Halderberge	1.0610	6.3086	6.0261	0.8048	0	3.5768
Hardenberg	0.7610	1.9165	0.3390	0.4618	0	0.8870
Harderwijk	0.1359	0.1901	0	0	0	0.0931
Hardinxveld-Giess..	0	0	0	0	0	0
Haren	0.1542	0.4315	0	0	0	0.1586
Harenkarspel	6.5443	0	17.1263	0.6205	0	6.7304
Harlingen	0.6578	0.6902	0.2197	0	0	0.4510
Hatterij	0.2658	1.1156	0	0	0	0.3645
Heemskerk	8.0143	3.2033	1.2749	0	0	3.8594
Heemstede	0.2663	0.2484	0	0	0	0.1521
Heerde	0.5372	2.0043	0.4786	3.6678	0	1.3506
Heerenveen	0.2609	0.0912	0.2614	0	0	0.1788
Heerhugowaard	3.2047	0.5075	2.6664	0	0	1.9070
Heerlen	0	0	0.0574	0.2935	0	0.0589
Heeze-Leende	0.4372	2.6505	3.1161	0.9949	10.0769	1.7986
Heiloo	1.6854	0.1813	0.1732	0.2950	0	0.7111
Den Helder	3.1699	0	0	0	0	1.0866
Hellendoorn	0.3732	0.2610	0	0	0	0.1919

Hellevoetsluis	0.0937	0	0.6261	0	0	0.1927
Helmond	0.0356	0.3486	0.4758	0.0810	0	0.2319
Hendrik-Ido-Ambacht	0.3454	0	1.6928	0	0	0.5527
Hengelo	0.1549	0.0541	0.0517	0	0	0.0796
's-Hertogenbosch	0.0333	0.1397	0.1335	0.0378	0	0.0856
Heusden	0.4214	1.6003	2.9769	0.4110	0	1.3622
Hillegom	7.8914	4.1164	0.1787	0	0	3.7598
Hilvarenbeek	0.4226	5.5185	1.3178	0.6411	4.8705	1.9560
Hilversum	0	0	0	0	0	0
Hof van Twente	0.4688	0.4685	0.2685	0.7621	0	0.4592
Hoogeveen	0.1763	0.4934	0.3927	0.2675	2.0322	0.3325
Hoogezand-Sappemeer	1.2322	0.8619	0.4940	0	0	0.7603
Hoorn	0.3344	0	0.1675	0.9513	0	0.3009
Horst aan de Maas	5.5100	15.0404	13.9181	4.5872	32.5218	9.9973
Houten	0.1145	0.1602	0.6122	7.2981	0	1.3350
Huizen	0	0.4106	0	0	0	0.1006
Hulst	0.9471	0.1656	1.8985	6.4658	0	1.8263
IJsselstein	0	0	0.1131	1.5419	0	0.2613
Kaag en Braassem	12.6087	3.2296	1.4238	0.2020	0	5.5095
Kampen	0.5903	0.3303	2.6031	0.2686	0	0.9915
Kapelle	1.4010	0	2.4963	27.6315	0	5.2833
Katwijk	5.3406	0.4016	0.2302	0	0	1.9883
Kerkrade	0.0903	0.1263	0	0	0	0.0619
Koggenland	11.2498	1.1766	0.9834	0.7177	0	4.5053
Kollumerland en Nieuwkruisland	1.1361	1.9073	1.2146	0.5170	0	1.2463
Korendijk	0	0	4.1718	6.0111	0	1.9758
Krimpen a/d IJssel	0	0	0	0	0	0
Laarbeek	1.3023	2.6499	3.3223	0.8082	12.2786	2.1307
Landerd	1.0877	2.1738	5.6065	0.7071	21.4876	2.5569
Landgraaf	0	0.1699	0.4869	0.2763	0	0.2081
Landsmeer	0	0	0	0	0	0
Langedijk	0.5080	0	2.7154	0.2311	0	0.9055
Lansingerland	5.4315	0.5108	5.7334	0	0	3.4580
Laren	0	0.1770	0	0	0	0.0433
Leek	0	1.0301	0.3935	0.3351	0	0.4038
Leerdam	0.1498	0.4193	0.6008	7.5033	0	1.4386
Leeuwarden	0.1752	0	0	0.0797	0	0.0720
Leeuwarderadeel	0.3551	0	0	0	0	0.1217
Leiden	0.0525	0.0367	0	0	0	0.0270
Leiderdorp	0.3925	0	0	0	0	0.1345
Leidschendam-Voorburg	0.4853	0.0617	0.2358	0	0	0.2419
Lelystad	0.4762	0.2220	0.7955	0.3612	0	0.4761
Lemsterland	0.1553	0	0	0	0	0.0532

Leudal	3.3663	4.0813	12.1958	5.6175	2.5861	6.1418
Leusden	0.0860	0.2408	0.1150	0.1958	0	0.1475
Liesveld	0.4858	0.3398	0	2.7637	0	0.6661
Lisse	5.4460	1.6562	0	0	0	2.2728
Littenseradiel	0	0	0	0	0	0
Lochem	0.1381	0.7729	0.2768	0.9429	0	0.4498
Loon op Zand	0.5590	2.0334	0.7470	0.5088	0	0.9582
Lopik	0	0	0.2091	11.0427	0	1.7172
Loppersum	1.0632	0	1.0656	0	0	0.6378
Losser	0.7139	1.5980	0.3816	0.6498	0	0.8321
Maasdonk	0.3659	1.7917	0.4890	0.4163	6.3253	0.7840
Maasgouw	0.6835	0.4781	2.5880	1.2962	0	1.2106
Maassluis	0.2401	0	0	0	0	0.0823
Maastricht	0	0	0.2763	0.7647	0	0.1861
De Marne	2.0451	1.2715	0.9109	2.0683	0	1.5579
Marum	1.0907	1.1444	0.7287	0	9.4268	0.8880
Medemblik	8.7879	0.8781	7.0600	4.8803	0	5.7741
Meerssen	0	0.2282	0.4361	4.4561	0	0.8391
Menameradiel	0.6569	0.3063	3.8043	0	0	1.2762
Menterwolde	1.9464	1.9449	3.7158	4.4292	0	2.7643
Meppel	0.0914	0.2559	0.3667	0	0	0.1881
Middelburg	0.4320	0.2014	0.6735	0.8192	0	0.4936
Middelharnis	3.4944	0.2327	0.8894	1.1359	0	1.6542
Midden-Delfland	5.1404	0.1997	4.9611	0.9747	0	3.2307
Midden-Drenthe	2.3527	1.6457	1.1228	0.3824	0	1.5555
Mill en Sint Hubert	3.5592	3.1119	2.6754	0.5062	7.6903	2.7834
Moerdijk	0.3140	0.1757	2.1820	2.4294	6.5133	1.1087
Montferland	0.0820	0.6888	0.4386	0.1867	2.8372	0.3516
Montfoort	0	0.2384	0	3.4903	0	0.5842
Mook en Middelaar	0	1.4078	0	0	0	0.3449
Muiden	0	0	0	0	0	0
Naarden	0	0.2849	0	0	0	0.0698
Nederlek	0.1886	0.5279	0	0.4293	6.5230	0.2910
Nederweert	1.7387	5.6133	4.1109	2.1305	18.4956	3.4388
Niedorp	5.2832	0	4.7826	1.9390	0	3.3301
Nieuwegein	0.0485	0	0.0648	0.6625	0	0.1330
Nieuwkoop	16.6997	5.6598	0.6901	0.3917	0	7.3478
Nieuw-Lekkerland	0.4064	0.5685	0	0	0	0.2786
Nijkerk	0.0588	0.1647	0.0786	0.1339	0	0.1009
Noord-Beveland	0.8287	0	1.1074	9.4293	0	1.9887
Noordenveld	0.2805	0.3924	0.3748	0.2127	0	0.3205
Noordoostpolder	8.7992	2.9045	2.9726	4.4995	0	5.1686
Noordwijk	7.3466	2.4107	0	0	0	3.1092
Noordwijkerhout	30.6274	6.6411	0.2046	0	0	12.1793
Nuenen. Gerwen ...	0.4164	1.0194	1.2520	1.1844	0	0.8921

Nunspeet	0.2036	1.2822	0	0	0	0.3840
Nuth	0.1861	1.0418	0.9952	5.931	0	1.4680
Oegstgeest	2.3159	0	0	0	0	0.7939
Oirschot	0.3675	7.1981	2.4556	0.8363	0	2.6458
Oisterwijk	0.1607	1.7985	0.5368	0	2.7778	0.6473
Oldambt	0.0873	0.9773	0.3500	0.1987	0	0.3891
Oldebroek	0.1316	0.5525	0.5278	0	0	0.3159
Oldenzaal	0.2732	0	0	0.2072	0	0.1249
Olst-Wijhe	0.8521	1.1920	0.4554	3.4903	0	1.2269
Ommen	0.5524	1.1593	0.1845	0.6286	0	0.6155
Onderbanken	0	0	0.6804	1.1587	0	0.3491
Oost Gelre	1.3663	1.1468	0.3651	0.6218	3.1490	0.9524
Oosterhout	0.4523	0.7030	0.9402	0.1143	0	0.5857
Oostflakkee	4.4490	0.6915	5.9453	3.3746	0	3.7282
Ooststellingwerf	0.3169	0.8869	0.4236	0.4808	0	0.5071
Oostzaan	0	0	0	0	0	0
Opmeer	4.9841	0.8367	2.3977	1.3610	0	2.7338
Opsterland	0.2744	0.6399	0	0	0	0.2508
Oss	0.1645	0.4144	0.4838	0.6741	2.2759	0.3949
Oud-Beijerland	0	0.1611	1.3850	0.7862	0	0.5132
Oude IJsselstreek	1.0691	1.0968	0.3809	0.8109	0	0.8551
Ouder-Amstel	0	0.1802	0	0	0	0.0441
Ouderkerk	0	0	0	0	0	0
Oudewater	0	0.2750	0.5254	2.2367	0	0.5391
Papendrecht	0	0	0.1426	0.4857	0	0.1097
Peel en Maas	3.3316	5.3004	15.8879	2.8244	24.8419	7.0654
Pekela	0	0	2.3147	0	0	0.5938
Pijnacker-Nootdorp	6.4555	0.8519	4.0692	0	0	3.4657
Purmerend	0	0	0	0	0	0
Putten	0.0930	1.0418	0	0.2118	0	0.3191
Raalte	0.7415	0.8068	0.7706	0.9374	0	0.7908
Reimerswaal	1.5557	1.2696	2.4255	19.1767	4.4820	4.3778
Renswoude	0	1.5837	0	0	0	0.3881
Reusel-De Mierden	0.8916	6.2371	2.6214	0.4058	6.1652	2.5982
Rhemen	0.2709	2.0846	0	0	0	0.6037
Ridderkerk	0.3907	0.1822	6.0048	0.1481	0	1.7413
Rijnwoude	2.0007	34.8119	1.5039	0.5691	0	9.6880
Rijssen-Holten	0	0.1092	0.1044	0	0	0.0535
Rijswijk	0.6622	0.1684	0	0	0	0.2683
Roerdalen	0.9462	1.1031	13.9094	2.8710	5.4520	4.6224
Roermond	0.2189	0.7659	0.5852	0.8720	0	0.5442
De Ronde Venen	1.0694	1.6912	0.3728	0.3174	0	0.9245
Roosendaal	0.8992	1.8597	2.7169	1.0676	0	1.6218
Rotterdam	0.0892	0.0394	0.1317	0	0	0.0740
Rozendaal	0	1.9709	0	0	0	0.4829

Rucphen	1.9067	8.1504	8.3517	0.4820	0	4.8660
Schagen	0.1447	0	0	0	0	0.0496
Schermer	3.6124	1.0107	48274	0	0	2.7244
Scherpenzeel	0.2744	0	0.3667	0.6245	0	0.2822
Schiedam	0	0	0	0	0	0
Schiermonnikoog	0	0	0	0	0	0
Schijndel	0.3959	0.6923	0.9259	0.2252	0	0.5768
Schinnen	0	0	0	2.2367	0	0.3369
Schoonhoven	0	0	0	0.5170	0	0.0778
Schouwen-Duiveland	1.9099	0.4309	3.7873	2.8040	0	2.1543
Simpelveld	0	0	0	0.8511	0	0.1282
Sint Anthonis	2.3700	8.8415	4.7507	0.4494	13.655	4.3332
Sint-Michielsgestel	0.5801	2.4346	1.9934	0.9429	2.8650	1.4631
Sint-Oedenrode	0.5107	5.0017	2.0476	1.4528	4.4143	2.1668
Sittard-Geleen	0.0358	0.3011	0.1438	0.4082	0	0.1844
Skarsterlan	0	0	0	0.1882	0	0.0283
Sliedrecht	0	0.1791	0	0	0	0.0439
Slochteren	1.2225	0.9773	1.4003	0.7948	0	1.1375
Sluis	0.8750	0.6120	1.1693	5.5755	0	1.5899
Smallingerland	0.0595	0.0832	0	0.1354	0	0.0612
Soest	0	0	0.0662	0	0	0.0169
Someren	0.9340	3.1033	4.5246	1.3284	4.0363	2.4615
Son en Breugel	0.1408	1.1825	0.9413	0.3205	0	0.6278
Spijkenisse	0	0	0	0	0	0
Stadskanaal	0.5055	0.5658	0.2702	0	0	0.3812
Staphorst	0	2.0180	0.9638	1.3130	0	0.9395
Stede Broec	6.9901	0.6822	4.7791	0	0	3.7894
Steenbergen	1.4613	2.2015	3.7553	6.3948	0	2.9672
Steenwijkerland	0.2894	0.7289	0.1547	0	0	0.3175
Stein	0	0	0.1995	0.6797	0	0.1535
Stichtse Vecht	0.3458	0.4837	0.4107	0.6994	0	0.4478
Strijen	1.0566	1.1086	4.9420	1.2022	0	2.0828
Sudwest-Fryslan	0.0597	0.0835	0.3592	0.1359	0	0.1535
Terneuzen	0.6423	0.7188	0.2575	3.0695	0	0.9248
Terschelling	0.3302	0	0	1.5027	0	0.3395
Texel	5.8702	0.8212	1.8826	0.8014	0	2.8173
Teylingen	10.0332	1.4367	0	0	0	3.7915
Tholen	7.6252	1.0667	3.6392	6.9407	0	4.8546
Tilburg	0.0154	0.8013	0.1034	0.0704	0	0.2388
Tubbergen	0.5532	1.8574	0.4435	1.0071	3.8250	0.9292
Twenterand	0.6864	0.5487	0.3931	0.8926	0	0.6051
Tynaarlo	0.5750	1.0726	0.3842	0	0	0.5585
Tytsjerksteradiel	0.3077	0.7175	0.2741	0.7003	0	0.4571
Uden	0.2906	1.4639	1.3207	0	16.0787	0.8769
Uitgeest	1.4246	0.3321	0	0	0	0.5698

Uithoorn	7.9987	3.3060	0.6073	0	0	3.7079
Urk	0.1542	0	0.2061	0	0	0.1057
Utrecht	0.0082	0.0115	0.0330	0.1873	0	0.0423
Utrechtse Heuvelrug	0.1837	0.7712	0.3069	0.8363	0	0.4567
Vaals	0	0.4846	0	3.1534	0	0.5938
Valkenburg a/d Geul	0	0.8269	0.5924	5.0443	0	1.1145
Valkenswaard	0.3136	1.4260	0.4191	0.1784	0	0.5913
Veendam	0.1324	0.5560	0.8852	0	0	0.4087
Veenendaal	0.0886	0.1239	0.0592	0	0	0.0759
Veere	3.8329	1.0144	3.7376	2.8287	0	2.9475
Veghel	0.9937	1.3901	3.0984	1.0552	16.0315	1.7146
Veldhoven	0.1404	0.8839	0.2814	0	0	0.3369
Velsen	0.2289	0.0640	0	0	0	0.0941
Venlo	1.3098	1.2066	3.5860	0.5815	0	1.7522
Venray	4.9298	6.1866	7.4597	2.3096	10.0250	5.5173
Vianen	0.1333	0.3730	0.3563	2.7306	0	0.6399
Vlaardingen	0	0	0	0	0	0
Vlagtwedde	0.7103	0.9937	1.6611	0.4041	0	0.9740
Vlieland	0	0	0	0	0	0
Vlissingen	0.0973	0.1362	0.5205	0	0	0.2003
Vlist	0.2189	0.3063	2.0485	0.4983	0	0.7507
Voerendaal	0.5061	0.3540	2.0292	8.6388	0	2.0822
Voorschoten	0.7900	0.7367	0	0	0	0.4513
Voorst	2.3543	2.5094	1.3483	2.5511	0	2.1522
Vught	0	0.3995	0.3816	0.2166	0	0.2284
Waalre	0	0.4269	0.2039	0	0	0.1569
Waalwijk	0.2092	0.2927	0.6291	0.3570	0	0.3586
Waddinxveen	1.4756	5.7505	0.5633	0	0	2.0595
Wageningen	0.3931	0.1375	1.0508	0.8946	0	0.5728
Wassenaar	1.1841	0.2548	0.1217	0	0	0.4996
Waterland	0	0	0	0.6411	0	0.0965
Weert	0.5936	0.6643	2.2211	0.5403	6.1565	1.0480
Weesp	0.1180	0.1651	0	0	0	0.0809
Werkendam	0.3450	0.2413	0.9221	0.9814	0	0.5618
Westerveld	1.5463	1.8026	0.8609	2.0525	0	1.5019
Westland	13.5683	1.1478	6.5787	0.2276	0	6.6546
Weststellingwerf	0.2935	0.5474	0.3922	0.2226	0	0.3689
Westvoorne	2.5359	1.1825	10.8442	1.9235	0	4.2308
Wierden	0.4735	0.4968	0.1582	0.2694	0	0.3652
Wieringen	0.5250	0	0	0	0	0.1799
Wieringermeer	8.1858	1.6359	9.3762	0	5.7753	5.6410
Wijdmeren	0.6685	0.4156	0.3970	0.3380	0	0.4838
Wijk bij Duurstede	0.2207	0.1543	0.2949	10.2959	0	1.7402
Winsum	0.2236	0.3128	0.2988	1.0177	0	0.3833
Winterswijk	0.9519	0.6658	0.1272	0.8664	0	0.6526



Woensdrecht	0.5692	0.9954	7.9871	1.2953	14.7591	2.7563
Woerden	0.3918	0.4795	0.5890	2.0060	0	0.7051
De Wolden	0.3913	1.5055	0.7844	0.8905	0	0.8384
Wormerland	0.3464	0	0	0.3941	0	0.1781
Woudenberg	0.4402	0	0	1.0018	0	0.3018
Woudrichem	1.6510	2.7716	2.4269	3.0055	0	2.3205
Zaanstad	0.0619	0	0.0551	0	0	0.0353
Zandvoort	0	0	0	0	0	0
Zederik	0	0.9202	0	16.8406	0	2.7625
Zeevang	0.3276	0	0	0	0	0.1123
Zeewolde	2.2192	0.4233	3.2351	3.6727	0	2.2477
Zeist	0	0.0553	0	0.2699	0	0.0542
Zijpe	14.8111	1.0107	0	0	0	5.3250
Zoetermeer	0.0308	0.0430	0	0.0701	0	0.0316
Zoeterwoude	0	1.8830	0.7194	0	0	0.6460
Zuidhorn	0	0.6822	0	0.3699	0	0.2229
Zuidplas	4.0863	1.4504	1.9560	0.6939	0	2.3625
Zundert	3.2182	51.4742	11.3248	1.7087	11.1255	16.9347
Zutphen	0.2068	0.0964	0.3685	0	0	0.1890
Zwartewaterland	0	0.1689	0	0.2747	0	0.0827
Zwijndrecht	0.1462	0	1.4657	0.1663	0	0.4512
Zwolle	0.1112	0.0778	0.1487	0.1266	0	0.1144


## APPENDIX III | Outgoing transactions: spatial distribution (N = 87,201)

No.	Frequency	Percentage	Municipality code	Municipality	Greenport
1	9037	10.4	263	Maasdriel	<i>Betuwse Bloem</i>
2	7078	8.2	297	Zaltbommel	<i>Betuwse Bloem</i>
3	6179	7.2	1740	Neder-Betuwe	<i>Betuwse Bloem</i>
4	4705	5.2	236	Geldermalsen	<i>Betuwse Bloem</i>
5	4091	4.7	304	Neerijnen	<i>Betuwse Bloem</i>
6	3849	4.4	1705	Lingewaard	<i>Betuwse Bloem</i>
7	3656	4.2	289	Wageningen	(adjecent to the BB)
8	2977	3.4	214	Buren	<i>Betuwse Bloem</i>
9	2770	3.2	1783	Westland	Westland-Oostland
10	2633	3.0	668	West Maas en Waal	<i>Betuwse Bloem</i>
11	1903	2.2	202	Arnhem	<i>Betuwse Bloem</i>
12	1533	1.8	281	Tiel	<i>Betuwse Bloem</i>
13	1474	1.7	262	Lochem	-
14	1468	1.7	1734	Overbetuwe	<i>Betuwse Bloem</i>
15	1128	1.3	797	Heusden	(adjecent to the BB)
16	961	1.1	1621	Lansingerland	Westland-Oostland
17	779	0.9	344	Utrecht	-
18	776	0.9	860	Veghel	-
19	756	0.9	228	Ede	(adjecent to the BB)
20	728	0.8	772	Eindhoven	-
21	722	0.8	796	s-Hertogenbosch	(adjecent to the BB)
22	713	0.8	637	Zoetermeer	-
23	649	0.7	268	Nijmegen	<i>Betuwse Bloem</i>
24	646	0.7	345	Veenendaal	-
25	640	0.7	907	Gennep	Venlo
26	634	0.7	1684	Cuijk	(adjecent to the BB)
27	620	0.7	296	Wijchen	<i>Betuwse Bloem</i>
28	620	0.7	1598	Koggenland	Noord-Holland Noord
29	604	0.7	879	Zundert	-
30	593	0.7	499	Boskoop	Boskoop
31	590	0.7	738	Aalburg	(adjecent to the BB)
32	576	0.7	855	Tilburg	-
33	568	0.7	160	Hardenberg	-
34	561	0.6	518	s-Gravenhage	-
35	555	0.6	225	Druten	<i>Betuwse Bloem</i>
36	509	0.6	537	Katwijk	Duin- en Bollenstreek
37	503	0.6	597	Ridderkerk	-
38	502	0.6	1884	Kaag en Brassem	Aalsmeer
39	478	0.6	512	Gorinchem	(adjecent to the BB)
40	456	0.5	1507	Horst aan de Maas	Venlo
41	451	0.5	867	Waalwijk	-
42	433	0.5	694	Liesveld	-
43	381	0.4	299	Zevenaar	<i>Betuwse Bloem</i>
44	369	0.4	209	Beuningen	<i>Betuwse Bloem</i>
45	341	0.4	489	Barendrecht	-
46	329	0.4	984	Venray	Venlo
47	311	0.4	531	Hendrik Ido-Ambacht	-
48	309	0.4	321	Houten	(adjecent to the BB)
49	304	0.4	226	Duiven	<i>Betuwse Bloem</i>
50	304	0.4	394	Haarlemmermeer	Aalsmeer
...	...	...	...	...	...

## APPENDIX IV | Incoming transactions: spatial distribution (N =41,675)

No.	Frequency	Percentage	Municipality code	Municipality	Greenport
1	6849	16.6	1783	Westland	Westland-Oostland
2	3649	8.8	236	Geldermalsen	<i>Betuwse Bloem</i>
3	3270	7.9	1740	Neder-Betuwe	<i>Betuwse Bloem</i>
4	3096	7.5	297	Zaltbommel	<i>Betuwse Bloem</i>
5	2895	7.0	263	Maasdriel	<i>Betuwse Bloem</i>
6	1451	3.5	738	Aalburg	(adjecent to the BB)
7	1436	3.5	214	Buren	<i>Betuwse Bloem</i>
8	1120	2.7	499	Boskoop	Boskoop
9	1070	2.6	1705	Lingewaard	<i>Betuwse Bloem</i>
10	994	2.4	1734	Overbetuwe	<i>Betuwse Bloem</i>
11	901	2.2	304	Neerijnen	<i>Betuwse Bloem</i>
12	895	2.2	268	Nijmegen	<i>Betuwse Bloem</i>
13	539	1.3	668	Westmaas en waal	<i>Betuwse Bloem</i>
14	438	1.1	225	Druten	<i>Betuwse Bloem</i>
15	399	1.0	907	Gennep	Venlo
16	349	0.8	537	Katwijk	Duin- en Bollenstreek
17	340	0.8	512	Gorinchem	(adjecent to the BB)
18	329	0.8	797	Heusden	(adjecent to the BB)
19	318	0.8	281	Tiel	<i>Betuwse Bloem</i>
20	287	0.7	1684	Cuijk	(adjecent to the BB)
21	286	0.7	296	Wijchn	<i>Betuwse Bloem</i>
22	248	0.6	209	Beuningen	<i>Betuwse Bloem</i>
23	243	0.6	983	Venlo	Venlo
24	240	0.6	196	Rijnwaarden	<i>Betuwse Bloem</i>
25	239	0.6	226	Duiven	<i>Betuwse Bloem</i>
26	237	0.6	363	Amsterdam	-
27	234	0.6	879	Zundert	-
28	210	0.5	289	Wageningen	(adjecent to the BB)
29	197	0.5	1509	Oude Ijsselstreek	-
30	194	0.5	232	Epe	-
31	173	0.4	1955	Montferland	(adjecent to the BB)
32	169	0.4	788	Haaren	-
33	167	0.4	299	Zevenaar	<i>Betuwse Bloem</i>
34	166	0.4	1507	Horst aan de Maas	Venlo
35	165	0.4	796	s-Hertogenbosch	(adjecent to the BB)
36	148	0.4	166	Kampen	-
37	139	0.3	1672	Rijnwoude	Boskoop
38	137	0.3	228	Ede	(adjecent to the BB)
39	130	0.3	610	Sliedrecht	-
40	121	0.3	274	Renkum	<i>Betuwse Bloem</i>
41	117	0.3	844	Schijndel	-
42	116	0.3	860	Veghel	-
43	114	0.3	453	Velsen	-
44	114	0.3	689	Giessenlanden	-
45	112	0.3	216	Culemborg	<i>Betuwse Bloem</i>
46	112	0.3	252	Heumen	<i>Betuwse Bloem</i>
47	112	0.3	344	Utrecht	-
48	111	0.3	1640	Leudal	-
49	103	0.2	241	Groesbeek	<i>Betuwse Bloem</i>
50	99	0.2	1621	Lansingerland	Westland-Oostland
...	...	...	...	...	...


## APPENDIX V | Outgoing transactions: sector distribution (N = 87,201)

 = segment of the horticulture sector

No.	SIC code	Frequency	Percentage	SIC description*
1	161	4439	5,1	Services for agri- and horticulture
2	46752	3913	4,5	Wholesale of pesticides and fertilizers
3	13002	3705	4,2	Cultivation of ornamental trees and bushes
4	70221	3504	4,0	Organizational consultants
5	4622	2569	2,9	Wholesale of flowers and plants
6	4941	2485	2,8	Freight transport by road
7	11301	2424	2,8	Cultivation of vegetables and mushrooms
8	46218	2339	2,7	Wholesale of agricultural products
9	13001	2193	2,5	Cultivation of ornamental plants
10	45112	2068	2,4	Trade and repair of passenger cars and light commercial vehicles
11	82991	1949	2,2	Auction of agricultural and horticultural products
12	4661	1890	2,2	Wholesale of agricultural machinery, equipment and tractors
13	46738	1762	2,0	Wholesale specialized in other building materials
14	4730	1721	2,0	Petrol station
15	69202	1717	2,0	Accounting consultants
16	9411	1712	2,0	Business and employers organizations
17	331231	1566	1,8	Repair and maintenance of machinery and equipment for agriculture
18	78202	1552	1,8	Lending agencies
19	11901	1524	1,7	Flower cultivation
20	72191	1381	1,6	Research and development in agriculture and fisheries
21	124	1263	1,4	Cultivation of pomes and stone fruits
22	46311	1122	1,3	Wholesale of vegetables and fruit
23	6420	1075	1,2	Financial holding
24	70102	1014	1,2	Holdings (non financial)
25	78201	966	1,1	Employment agencies
...	...	...	...	...

\* = freely translated from dutch


## APPENDIX VI | Incoming transactions; sector distribution (N=41,675)

 = segment of the horticulture sector

No.	SIC code	Frequency	Percentage	SIC description*
1	82991	10505	25,2	Auction of agricultural and horticultural products
2	4622	4421	10,6	Wholesale of flowers and plants
3	13002	3591	8,6	Cultivation of ornamental trees and bushes
4	46311	3391	8,1	Wholesale of vegetables and fruit
5	11301	2463	5,9	Cultivation of vegetables and mushrooms
6	8130	2118	5,1	Landscaping
7	124	1218	2,9	Cultivation of pomes and stone fruits
8	13001	1164	2,8	Cultivation of ornamental plants
9	161	855	2,1	Services for agro- and horticulture
10	64191	759	1,8	Cooperatively organized banks
11	11901	734	1,8	Flower cultivation
12	9411	685	1,6	Business and employers organizations
13	47762	577	1,4	Garden centers
14	4721	572	1,4	Stores in potatoes, vegetables and fruit
15	46752	394	0,9	Wholesale of pesticides and fertilizer
16	6420	353	0,8	Financial holdings
17	210	338	0,8	Forestry
18	150	324	0,8	Agri- and/or horticulture in combination with breeding/keeping of animals
19	4711	297	0,7	Stores with a general range of foods, beverages and tobacco
20	4941	252	0,6	Freight transport by road
21	46312	235	0,6	Wholesale of ware potatoes
22	47811	234	0,6	Market trade in potatoes, vegetables and fruit
23	47761	191	0,5	Stores in flowers and plants, seeds and garden supplies
24	4120	187	0,4	General civil construction
25	46218	168	0,4	Wholesale in agricultural products and cattle feed
...	...	...	...	...

\* = freely translated from dutch

# APPENDIX VII | Inter-firm network overview (frequency businesses)

 = included in top 25 of sector distribution (appendix V & VI)

Cells display the frequency of businesses

→ Network ID	{1}	{0}	{3}	{2}	{185}	{807}	{1849}	Total	SIC-description (only in Dutch)
↓ SIC-code									
124	823	166	102	27	1	0	0	1,119	Teelt van pit- en steenvruchten
125	119	40	11	0	0	0	0	170	Teelt van overige boomvruchten, kleinfruit en ...
11301	1,337	618	104	15	0	0	0	2,074	Teelt van groenten en champignons
11901	1,860	104	107	17	0	0	1	2,089	Bloementeelt
12802	12	5	4	0	0	0	0	21	Teelt van specerij- en aromatische gewassen
13001	1,944	139	137	18	0	0	0	2,238	Teelt van sierplanten
13002	1,318	239	159	10	0	1	0	1,727	Teelt van sierbomen en -struiken
	7,413	1,311	624	87	1	1	1		Total horticulture
70221	5,080	10,610	4,139	3,035	1	0	0	22,865	Organisatie-adviesbureaus
4120	9,108	4,203	6,244	1,621	0	0	0	21,176	Algemene burgerlijke en utiliteitsbouw
94997	6,490	4,403	4,282	1,612	0	0	0	16,787	Overige belangenbehartiging n.e.g.
141	3,181	1,957	7,996	65	0	0	0	13,199	Fokken en houden van melkvee
70102	5,268	3,186	2,968	1,146	0	0	1	12,569	Holdings
45112	3,363	2,011	3,190	309	0	0	0	8,873	Handel in personenauto's en lichte bedrijfs ...
90011	1,868	3,078	2,931	302	0	0	0	8,179	Beoefening van podiumkunst
4332	3,782	1,589	1,918	532	0	0	0	7,821	Bouwtimmeren
96021	1,226	3,546	1,657	489	0	0	0	6,918	Haarverzorging
731101	1,660	3,088	1,367	418	0	0	0	6,533	Reclame-ontwerp- en -adviesbureaus
889931	1,430	2,399	2,397	241	0	0	0	6,467	Sociaal-cultureel werk
94991	1,635	2,710	1,784	217	0	0	0	6,346	Gezelligheidsverenigingen
620102	1,164	3,289	1,166	493	0	0	0	6,112	Ontwikkelen en produceren van maatwerk ...
4791	870	3,658	1,146	427	0	0	0	6,101	Detailhandel via postorder en internet
4334	2,572	1,222	1,835	375	0	0	0	6,004	Schilderen en glaszetten
96022	495	4,319	809	214	0	0	0	5,837	Schoonheidsverzorging, visagie, pedicures ...
56101	2,376	1,335	1,588	464	0	0	0	5,763	Restaurants
4941	3,322	935	1,315	174	0	0	0	5,746	Goederenvervoer over de weg
161	2,642	720	1,574	165	0	0	0	5,101	Dienstverlening voor de akker- en/of tuinbouw
5630	1,787	1,612	1,398	302	0	0	0	5,099	Café's
94993	1,250	1,640	1,975	224	0	0	0	5,089	Steunfondsen
69203	1,546	1,502	1,171	759	0	0	0	4,978	Boekhoudkantoren
9002	1,134	2,118	1,160	261	0	0	0	4,673	Dienstverlening voor uitvoerende kunst
8130	2,200	781	1,261	112	0	0	0	4,354	Landschapsverzorging
620202	889	2,256	682	470	0	0	0	4,297	Software consultancy
85592	815	2,050	838	390	0	0	0	4,093	Bedrijfsopleiding en -training
6810	1,753	772	949	514	0	0	0	3,988	Handel in eigen onroerend goed

711201	1,484	1,073	994	356	0	0	0	3,907	Technische ontwerp- adviesbureaus voor ...
56102	1,396	1,107	1,060	336	0	0	0	3,899	Cafeteria's, lunchrooms, snackbars, ijssalons, ...
111	1,353	614	1,542	354	0	0	0	3,863	Teelt van granen, peulvruchten en oliehoude ...
432101	1,721	908	890	158	0	0	0	3,677	Installatie van verlichting, telecom en alarm in ...
6831	1,285	963	967	451	0	0	0	3,666	Bemiddeling bij handel, huur of verhuur van ...
869199	470	2,216	750	228	0	0	0	3,664	Overige paramedische praktijken en alternati...
68204	1,558	863	950	253	0	1	0	3,625	Verhuur van onroerend goed
93299	1,051	1,241	1,056	164	0	0	0	3,512	Overige recreatie n.e.g.
70222	897	1,341	654	493	0	0	0	3,385	Advisering op het gebied van management en ...
94992	810	1,131	1,152	148	0	0	0	3,241	Hobbyclubs
4333	1,214	915	915	193	0	0	0	3,237	Afwerking van vloeren en wanden
6832	1,404	555	872	244	1	1	0	3,077	Beheer van onroerend goed
4110	1,118	725	836	313	0	0	0	2,992	Projectontwikkeling
7410	729	1,385	546	280	0	0	0	2,940	Industrieel ontwerp en vormgeving
7490	901	1,121	637	277	0	0	0	2,936	Overige specialistische zakelijke dienstverlening
146	263	1,436	1,102	8	0	0	0	2,809	Fokken en houden van varkens
43993	957	830	850	119	0	0	0	2,756	Metselen en voegen
9411	925	710	891	131	0	0	0	2,657	Bedrijfs- en werkgeversorganisaties
742012	417	1,525	492	170	0	0	0	2,604	Fotografie
889994	598	903	836	164	0	0	0	2,501	Overkoepelende organen, samenwerkings- en ...
2562	1,232	585	574	103	0	0	0	2,494	Algemene metaalbewerking
142	437	333	1,521	28	0	0	0	2,319	Fokken en houden van runderen
4331	970	659	527	154	0	0	0	2,310	Stukadoren
4312	1,158	446	611	84	0	0	0	2,299	Grondverzet
8121	987	514	471	251	0	0	0	2,223	Interieurreiniging van gebouwen
93125	558	629	944	54	0	0	0	2,185	Paardensport en maneges
69101	552	857	379	350	0	0	0	2,138	Advocatenkantoren
439999	984	479	522	149	0	0	0	2,134	Overige gespecialiseerde werkzaamheden in ...
7320	483	1,131	258	225	0	0	0	2,097	Markt- en opinieonderzoekbureaus
42112	767	444	757	113	0	0	0	2,081	Stratenmaken
88911	509	770	551	246	0	0	0	2,076	Kinderopvang
900302	422	1,082	399	173	0	0	0	2,076	Scheppende kunst en documentaire schrijvers
69209	608	611	527	326	1	0	0	2,073	Overige administratiekantoren
7810	471	989	365	235	0	0	0	2,060	Arbeidsbemiddeling
8553	509	665	532	350	0	0	0	2,056	Auto- en motorrij scholen
93121	662	526	710	56	0	0	0	1,954	Veldvoetbal
78201	825	522	437	166	0	0	0	1,950	Uitzendbureaus
86913	214	1,106	353	198	0	0	0	1,871	Praktijken van psychotherapeuten en psycho ...
4622	1,573	116	125	26	0	0	0	1,840	Groothandel in bloemen en planten
94996	482	551	616	143	0	0	0	1,792	Overige ideële organisaties n.e.g.
47761	762	425	544	56	0	0	0	1,787	Winkels in bloemen en planten, zaden en ..
9609	376	609	425	375	0	0	0	1,785	Overige dienstverlening n.e.g.
43222	819	404	391	72	0	0	0	1,686	Installatie van verwarmings- en ...
86912	367	727	440	121	0	0	0	1,655	Praktijken van fysiotherapeuten
4651	544	636	322	117	0	0	0	1,619	Groothandel in computers, randapparatuur ...

5621	612	472	386	134	0	0	0	1,604	Eventcatering
31011	677	438	413	72	0	0	0	1,600	Interieurbouw
69202	469	460	411	231	0	0	0	1,571	Accountants-administratieconsulenten
7111	495	553	342	176	0	0	0	1,566	Architecten
85519	405	624	386	141	0	0	0	1,556	Overig sport- en recreatieonderwijs
50401	1,304	50	100	51	0	0	0	1,505	Binnenvaart
93141	431	388	639	47	0	0	0	1,505	Individuele zaalsport
11302	479	170	744	101	0	0	0	1,494	Teelt van aardappels, suikerbieten en overige ...
93195	501	439	480	62	0	0	0	1,482	Organiseren van sportevenementen
4391	506	402	514	58	0	0	0	1,480	Dakdekken en bouwen van dakconstructies
731102	546	524	303	96	0	0	0	1,469	Overige reclamediensdiensten
711207	538	569	246	115	0	0	0	1,468	Technisch ontwerp en advies niet ...
53202	460	416	335	231	0	0	0	1,442	Koeriers
93129	321	471	582	57	0	0	0	1,431	Overige buitensport
47712	281	722	332	87	0	0	0	1,422	Winkels in dameskleding
711204	579	459	265	96	0	0	0	1,399	Technisch ontwerp en advies voor elektro-, ...
59111	121	970	180	123	0	0	0	1,394	Productie van films (geen televisiefilms)
4711	510	292	454	132	0	0	0	1,388	Supermarkten en dergelijke winkels met een ...
889993	311	454	586	20	0	0	0	1,371	Exploitatie van gemeenschapshuizen
85599	253	682	295	115	0	0	0	1,345	Studiebegeleiding, vorming en onderwijs
47713	282	625	334	87	0	0	0	1,328	Winkels in bovenkleding en mode-artikelen
464999	445	505	304	72	0	0	0	1,326	Groothandel in overige consumentenartikelen
47641	417	329	495	78	0	0	0	1,319	Winkels in fietsen en bromfietsen
869299	379	435	429	65	0	0	0	1,308	Overige gezondheidszorgondersteunende ...
9103	377	354	475	93	0	0	0	1,299	Monumentenzorg
711205	633	340	273	53	0	0	0	1,299	Technisch ontwerp en advies voor werktuig-, ...
150	436	438	369	42	0	0	0	1,285	Akker- en/of tuinbouw in combinatie met het ...
85201	390	284	543	68	0	0	0	1,285	Basisonderwijs voor leerplichtigen
93124	467	364	420	34	0	0	0	1,285	Tennis
47789	302	541	343	79	0	0	0	1,265	Winkels gespecialiseerd in overige artikelen
2511	599	257	358	40	0	0	0	1,254	Vervaardiging van metalen constructiewerken ...
162	254	295	670	33	0	0	0	1,252	Dienstverlening voor het fokken en houden...
5530	344	233	623	42	0	0	0	1,242	Kampeerterrainen
94911	342	217	554	122	0	0	0	1,235	Religieuze organisaties
52291	881	166	122	59	0	0	0	1,228	Expeditie, cargadoors, bevrachters en ...
1071	476	312	377	57	0	0	0	1,222	Vervaardiging van brood en vers ...
86231	224	597	300	80	0	0	0	1,201	Praktijken van tandartsen
711208	422	371	300	103	0	0	0	1,196	Overig technisch ontwerp en advies
47221	494	295	339	42	0	0	0	1,170	Winkels in vlees en vleeswaren
47999	397	315	382	73	1	0	0	1,168	Detailhandel via overige distributievormen
69204	302	436	220	199	0	0	0	1,157	Belastingconsulenten
145	412	236	488	12	0	0	0	1,148	Fokken en houden van schapen en geiten
147	91	473	574	9	0	0	0	1,147	Fokken en houden van pluimvee
711202	373	374	313	86	1	0	0	1,147	Technisch ontwerp en advies voor stedenb ...
45204	463	266	386	27	0	0	0	1,142	Carrosserieherstel



4932	394	345	215	180	0	0	0	1,134	Vervoer per taxi
93142	326	333	436	30	0	0	0	1,125	Zaalsport in teamverband
8621	216	486	362	51	0	0	0	1,115	Praktijken van huisartsen
78202	437	342	191	125	0	0	0	1,095	Uitleenbureaus
620101	264	550	172	104	0	0	0	1,090	Ontwikkelen, produceren en uitgeven van ...
4652	549	249	194	63	0	0	0	1,055	Groothandel in elektronische en ...
47591	331	321	320	79	0	0	0	1,051	Winkels in meubels
93122	385	284	355	22	0	0	0	1,046	Veldsport in teamverband
85522	234	458	286	60	0	0	0	1,038	Kunstzinnige vorming van amateurs
94994	239	395	357	43	0	0	0	1,034	Vriendenkringen op het gebied van cultuur, ...
88101	172	426	254	180	0	0	0	1,032	Thuiszorg
69102	196	492	193	148	0	0	0	1,029	Rechtskundige adviesbureaus
46738	450	249	291	38	0	0	0	1,028	Groothandel gespecialiseerd in overige ...
46231	239	217	520	23	0	0	0	999	Groothandel in levend vee
55101	351	248	345	48	0	0	0	992	Hotel-restaurants
47819	341	150	287	184	0	0	0	962	Markthandel in overige voedings- en ...
96031	307	109	516	15	0	0	0	947	Uitvaartverzorging
8010	349	296	197	102	0	0	0	944	Particuliere beveiliging
620909	195	493	169	85	0	0	0	942	Overige dienstverlenende activiteiten op het ...
69103	321	212	295	109	0	0	0	937	Notariskantoren
6312	121	593	149	70	0	0	0	933	Webportals
812201	399	204	229	85	0	0	0	917	Gespecialiseerde reiniging van gebouwen
4661	342	146	389	13	0	0	0	890	Groothandel in landbouwmachines, werktuig ...
45311	437	185	207	30	0	0	0	859	Groothandel en handelsbemiddeling in auto- ...
4618	214	339	238	63	0	0	0	854	Handelsbemiddeling gespecialiseerd in overi...
93128	288	60	481	13	0	0	0	842	Wintersport
4614	369	212	201	47	0	0	0	829	Handelsbemiddeling in machines, technische ...
47593	288	235	234	55	0	0	0	812	Winkels in artikelen voor woninginrichting ...
46901	266	255	217	62	0	0	0	800	Niet-gespecialiseerde groothandel in ...
69201	268	262	167	101	0	0	0	798	Registeraccountants
18129	312	217	242	25	0	0	0	796	Overige drukkerijen n.e.g.
9604	168	407	151	58	0	0	0	784	Sauna's, solaría, baden e.d.
862211	110	439	148	87	0	0	0	784	Praktijken van medisch specialisten
94995	219	288	227	39	0	0	0	773	Overkoepelende organen en samenwerkings- ...
7911	187	329	164	78	0	0	0	758	Reisbemiddeling
5629	265	146	308	36	0	0	0	755	Kantines en contractcatering
7021	167	365	133	85	0	0	0	750	Public relationsbureaus
55201	186	177	347	39	0	0	0	749	Verhuur van vakantiehuisjes en appartementen
47721	130	403	181	29	0	0	0	743	Winkels in schoenen
331231	301	137	293	10	0	0	0	741	Reparatie en onderhoud van machines en ...
6311	124	410	132	72	0	0	0	738	Gegevensverwerking, webhosting en ...
711203	350	166	169	53	0	0	0	738	Technisch ontwerp en advies voor grond-, ...
86922	205	294	161	69	0	0	0	729	Arbobegeleiding en reïntegratie
47763	202	206	237	74	0	0	0	719	Winkels in dieren, dierbenodigdheden en ...
9529	205	232	215	66	0	0	0	718	Reparatie van overige consumentenartikelen

466991	408	126	160	23	0	0	0	717	Groothandel in overige machines en appar...
46471	241	202	196	70	0	0	0	709	Groothandel in huismeubilair
77299	229	239	215	25	0	0	0	708	Verhuur van overige consumentenartikelen
46421	178	340	128	61	0	0	0	707	Groothandel in bovenkleding
90013	140	392	140	32	0	0	0	704	Circus en vari��t��
7430	109	383	100	109	0	0	0	701	Vertalers en tolken
4777	67	462	136	26	0	0	0	691	Winkels in juweliersartikelen en uurwerken
93126	185	248	230	28	0	0	0	691	Wielersport
9313	189	237	225	29	0	0	0	680	Fitnesscentra
7500	143	173	326	36	0	0	0	678	Veterinaire dienstverlening
4634	279	220	120	49	0	0	0	668	Groothandel in dranken
439993	357	109	178	23	0	0	0	667	Verhuur van bouw- en sloopmachines met ...
55102	192	197	216	53	0	0	0	658	Hotels (geen hotel-restaurants), pensions en ...
889999	129	268	196	63	0	0	0	656	Overige maatschappelijke dienstverlening,...
93119	253	177	203	22	0	0	0	655	Overige sportaccommodaties
310902	243	179	198	30	0	0	0	650	Vervaardiging van woon- en slaapkamer...
4339	253	211	151	34	0	0	0	649	Overige afwerking van gebouwen
42111	338	124	165	22	0	0	0	649	Wegenbouw
620201	140	330	94	79	0	0	0	643	Hardware consultancy
4730	241	183	196	22	0	0	0	642	Benzinestations
46311	484	94	39	12	0	0	0	629	Groothandel in groenten en fruit
47643	192	196	214	27	0	0	0	629	Winkels in sportartikelen
93144	234	153	212	26	0	0	0	625	Bowlen, kegelen, biljarten e.d.
47782	144	267	173	28	0	0	0	612	Winkels in optische artikelen
8219	151	236	135	89	0	0	0	611	Secretariele dienstverlening
93145	230	184	176	15	0	0	0	605	Denksport
46731	245	145	196	16	0	0	0	602	Groothandel in hout en plaatmateriaal
47899	137	235	145	82	0	0	0	599	Markthandel in overige goederen
4725	261	167	144	23	0	0	0	595	Winkels in dranken
45192	300	131	148	15	0	0	0	594	Handel in en reparatie van zwaardere bedrijfs...
900301	79	328	112	67	0	0	0	586	Journalistiek
93127	143	189	221	27	0	0	0	580	Auto- en motorsport
4639	255	149	114	60	0	0	0	578	Groothandel in voedings- en genotmiddelen ...
4721	255	142	148	31	0	0	0	576	Winkels in aardappelen, groenten en fruit
47528	224	142	193	13	0	0	0	572	Bouwmarkten en andere winkels in ...
46739	235	133	181	18	0	0	0	567	Groothandel in bouwmaterialen algemeen ...
7732	279	104	153	16	0	0	0	552	Verhuur en lease van machines en installaties...
581101	107	289	124	30	0	0	0	550	Uitgeverijen van boeken
9492	144	194	181	29	0	0	0	548	Politieke organisaties
46462	150	266	88	44	0	0	0	548	Groothandel in medische en tandheelkundige ...
773999	160	216	152	15	0	0	0	543	Verhuur en lease van overige machines en ...
68203	228	128	133	52	0	0	0	541	Verhuur van overige woonruimte
47741	91	59	369	18	0	0	0	537	Winkels in drogisterij-artikelen
93149	155	179	190	13	0	0	0	537	Overige binnensport en omnisport
45402	173	136	203	20	0	0	0	532	Detailhandel in en reparatie van motorfietsen ...

8230	157	172	157	38	0	0	0	524	Organiseren van congressen en beurzen
93192	158	163	183	20	0	0	0	524	Hengelsport
4782	80	225	121	96	0	0	0	522	Markthandel in textiel, kleding en schoenen
47793	145	161	174	42	0	0	0	522	Winkels in tweedehands goederen
16231	173	160	159	12	0	0	0	504	Vervaardiging van deuren, ramen en kozijnen ...
86923	120	220	124	39	0	0	0	503	Preventieve gezondheidszorg
46696	277	101	102	21	0	0	0	501	Groothandel in emballage
46496	148	187	142	23	0	0	0	500	Groothandel in sportartikelen
...	...	...	...	...	...	...	...	...	...
	189,304	179,722	154,557	38,413	6	3	2	562,007	Total inter-firm network size