



PBL Netherlands Environmental
Assessment Agency

THE EUROPEAN REGIONAL COMPETITIVENESS SCOREBOARD

Developing regional economic policy strategies using
information on competitiveness

Background report

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1 Introduction

The European regional competitiveness scoreboard is a powerful tool for analysing the competitiveness of a region and its position in global economic networks, employing regional data visualisations. The scoreboard presents the competitors of firms in a region, the position of these firms in interregional and international trade, and the performance of a region on several competitive factors compared with its competing regions.

The goal of this tool is to present the economic position of a region to enable the development of a regional economic strategy that is based on the region's specific strengths. This offers the possibility for (regional) policymakers to employ the available information and develop an evidence-based regional smart specialisation strategy. Therefore, this website forms a basis for regional, national and supra-national governments. After all, in addition to regional policies, the website can also be used in support of sector policies, such as the Dutch 'top-sector' policy, or general policy, such as maintaining the high level of connectivity of the Netherlands or investing in knowledge development.

This document provides extensive examples of regional economic policy strategies that are based on regional economic data on trade and competition. Therefore, in the comprehensive manual of the European Regional Competitiveness Scoreboard, it is discussed how the results of the visualisations could be applied for setting-up regional or national policy to shape an economic development strategy that would improve competitiveness. How this website can be consulted is illustrated in this report by presenting examples in the Dutch regions North Brabant, South Holland and North Holland.

In recent years, there has been increasing interest from supranational institutions and governments regarding the importance of regions for economic growth in the countries in which those regions are located. The World Bank (2009), for example, focuses on the strength and importance of the process of agglomeration, and the OECD (2009; 2012) emphasises the role of medium sized regions, while the European Commission (Barca, 2009, Barca et al., 2012) addresses the specific spatial context in which a region is situated. Each of these policy studies prioritises the importance of the region and its surroundings for future economic growth.

The importance of regional policy for regional and national economic development is also central to the concept of Smart Specialisation. This concept is based on (spatially) concentrating knowledge and linking this knowledge to a selective number of prioritised economic activities such that regions can improve their competitive position. Currently, having a smart specialisation strategy is a condition for receiving European subsidies from the Cohesion Fund. Smart specialisation is thus based on the development of a unique innovation strategy taking account of specific regional economic circumstances and the strength of existing economic activities.

For Europe, the availability of regional data on economic activity in and between regions was limited. Information on trade on the regional level did not even exist. As a result, it was very difficult to develop regional economic strategies.

For this reason, the European regional competitiveness scoreboard was developed by the PBL Netherlands Environmental Assessment Agency in collaboration with JRC-IPTS. JRC-IPTS is the research institute of the European Commission where regional economic research is conducted and the 'S3 smart specialisation platform' is located. The European regional competitiveness scoreboard provides the necessary basic information for developing a regional economic smart specialisation strategy where one must consider the specific regional economic situation.

In this manual, several examples illustrate how this scoreboard can be used to develop regional strategies. How the information from the scoreboard can be employed to identify

important factors that strengthen the competitive position of regions is demonstrated. In addition, this information allows an economic positioning of regions.

In the text boxes in the bottom of every window, each separate visualisation of the scoreboard (4 in total) is explained. The visualisations presented in these windows are (1) the regional exports and imports, (2) the competitiveness scores and (3) the trade network scores. They provide an enormous amount of information that is summarised in the fourth overarching visualisation: the competitiveness scoreboard. The examples in this manual present only a fraction of all the information that can be extracted from the competitiveness scoreboard. However, they provide several interesting policy questions, as is shown in the next section.

1.1 Oh no, not another ranking of regional performances!

Countries and regions are being overwhelmed with benchmark studies in which they are compared with one another. The studies are often heavily criticised because it remains unclear why one region is compared with another and why different weights are employed. In other words: regions that are economically weakly related are being compared on the basis of vague criteria.

The methodology used here was developed in 2013 by the PBL Netherlands Environmental Assessment Agency (PBL) especially to meet these criticisms and is based on the concept of 'revealed competition'. This method enables a detailed analysis of the competitive position of a specific type of economic activity in European regions. This implies that only those regions in which the same sectors export their goods and services to the same markets are being compared. Hence, only those regions whose trade flows reveal competition between them are being compared instead of an everybody-with-everybody comparison. As a result, the functioning of regions can only be considered relative to similar region-sector combinations. Each region thus has its own benchmark. The performance of each region-sector combination on the competitive factors is shown in the 'competitiveness scores'.

What is the content of the new approach of PBL? Firms from European regions that aim for the same export markets, as similar firms in Dutch regions are the competitors of those regions. The revealed competitive position of regions is linked with regional competitive factors of the most important competitors by measuring the degree in trade overlap of exporting firms in different regions. Therefore, firms from different European regions are compared to the extent that they indeed compete with one another. Every sector from every region has different competitors, which are not however always the large agglomerations in Europe.

The competitive position of a region A is determined by (1) the market shares of competitors in the region to which region A exports, weighted by (2) the importance of the destination region in total exports of region A. The importance of the competitive factors is determined by studying the scores of the most important (strongest) competitors of a region on those factors. If a specific factor is present in all those regions that have a strong competitive position in a certain sector, this factor is most likely important for the competitive position of that sector.

1.2 Policy and smart specialisation

The concept of smart specialisation is based on the spatial concentration of knowledge and links this knowledge to a limited number of prioritised economic activities, by which regions are able to improve their competitive position. Thus, regions can take advantage of their size, specialisation and spill overs from other sectors. Strategies that combine innovation

with specific strong regional factors offer a larger probability of success than just imitating other regions without considering specific regional conditions.

Smart Specialisation is thus based on developing a unique innovation strategy that considers a region's specific conditions, economic situation and the strength of existing economic activities. However, the choice for prioritising economic activities and identifying the necessary investments for these activities is difficult. Discovering the promising activities in a region is considered an 'entrepreneurial, discovering process'. The goal of this process is to discover in which activities a country or region performs best to strengthen these activities with new knowledge and innovation. The process comprises more than only analysing data. It also involves a 'trial and error' approach in new activities. Regions therefore must involve pro-active explorative/entrepreneurial actors in shaping their strategies. Policy should thus ideally be formed in a continuous process in a so-called triple or quadruple helix in which scientists, policy makers, entrepreneurs and society jointly develop a strategy. The data and analysis presented here form only one pillar (science) of the helix in which policy should be shaped, and it is thus not the goal to shape this policy solely on the basis of the competitiveness scoreboard, which would implicitly assume that policy can be imposed using a top-down approach. The analyses presented in this report are only the starting point, where the economic data are presented in an objective fashion enabling the development of a strategy with a matching policy. The other three pillars for shaping policies (society, entrepreneurs and policymakers) play an equally important role in the creation of an economic development strategy. The goal of the visualisations is thus to draw the region-specific context by which the region could analyse its specific strengths and weaknesses, and a prioritisation of the need for resources can be made. It is certainly not the case that the competitiveness scoreboard will give all answers. Much additional research is still needed to enable a high quality analysis of the regional economy. Nevertheless, the newly available data from the competitiveness scoreboard takes the possibility for a systematic analysis to the next level.

1.3 Policy questions

From the examples, it appears that the technology industry in the region North Brabant relies heavily on the most important factor for this sector: private knowledge. The relative weakness of many other factors should be regarded as a warning for this sector. Is a strong private knowledge basis sufficient to maintain or improve the competitive position of this sector-region combination, or is it necessary to improve other factors: increasing the concentration of high-tech firms or strengthening the embeddedness of high-tech firms in the local economy (the high-tech cluster)?

The financial and business services sector in Amsterdam (region North Holland) primarily competes with the large urban agglomerations in Europe. There exists a major imbalance between international exports and imports, however, for this sector. While the imports originate from the large foreign financial and business centres, the majority of the production of this sector is 'exported' to regions located within the Netherlands. Hence, the international character of this region-sector combination appears to be the result of large foreign imports only. This imbalance further increased after the start of the economic crisis. The question that might be posed is as follows: is the financial and business services sector in North Holland missing an opportunity here?

The low-tech industry is an important sector in the region of South Holland. In the course of the period 2000–2010, this industry appears to have become increasingly more international. A strong trade network of this region with the Port of Rotterdam forms a competitive advantage. The question might be raised, however, if the lack of a strong private knowledge base is not a factor that can hamper further growth of this sector in this region.

From the visualisation of regional trade, it appears that Germany is the largest export market for the Netherlands, that firms in German regions are the most important competitors for the (technical) industry and that the services economy competes with large European agglomerations. While North Brabant must focus on German regions, North Holland (Amsterdam) has to focus on European regions with large cities to improve its competitive position. Therefore, as a result of sector differences, North Holland and North Brabant compete with different regions and have different strategies. While North Holland should focus on agglomeration size, North Brabant should increase its concentration of high-tech firms, create a stronger cluster of those firms and improve accessibility. Analysing each region-sector combination separately will result in a plurality of region- and sector-specific policy questions.

The Competitiveness scoreboard

The 'Competitiveness scoreboard' consists of 4 windows with visualisations where data on the competitive position of firms in NUTS2 regions in Europe can be found. Competition is regarded as selling goods and services in different markets with several suppliers. The central focus of this website is therefore directed towards trade in goods and services on the regional level. The trade patterns that are retrieved from the visualisations will reveal which regions compete with each other. This information can be used to determine what the strengths of a region are, if a region is performing better than its competitors and which position a region takes in the European and World economy. The information described below can be found in the 4 visualisations, which are discussed individually in their text boxes.

- **Competitors and scoreboard:** in this window, all information on the competitive position of a region is centralised. General information about a region, its (top) competitors, how the region performs compared with its competitors and the strength of the regional trade network is presented.
- **Regional exports/imports:** here it is visualised where certain goods, which are being produced in a region, are being sold in Europe and the rest of the world (the exports). In addition, what the origin is of the goods that are bought by a certain region (the imports) is exhibited. Last, the production and consumption values of the regions are presented.
- **Competitiveness scores:** in this window, the relative (compared to other regions) scores of all the regions in the European Union are visualised.
- **Trade Network scores:** here the strength of the trade network of the different regions is shown. Not only information on the number of trade relations but also on the degree of clustering in the trade network is presented.

All windows are region-, sector- and year-specific. This means that all information can be retrieved not only for the entire regional economy (total production) but also for the different sectors and years. Selections can be made in the upper-left corner of each window. The respective visualisations can be found in the upper right corner.

2 Regional policy

The regional competitiveness scoreboard is developed by PBL Netherlands Environmental Assessment Agency in cooperation with JRC-IPTS to support regional economic policies in Europe. Currently, these policies must be shaped in accordance with a so-called smart specialisation strategy, where a region stimulates innovation based on its own strengths and possibilities. These strengths and possibilities must be based on economic data so that, in collaboration with company life, science and society (the triple or quadruple helix), a strategy would be based on the economic reality of a region. In other words, a strategy must be focused on the specific economic opportunities of a region. Not every region should focus its economic strategy on developing the high-tech sector, for example, considering that not all regions possess the necessary (economic) characteristics to make this sector grow.

2.1 Region- and sector-specific factors: Agglomeration strength, accessibility or investments in knowledge

In previous studies, PBL has argued that economic policy should be heterogeneous over space. It should be focused on regional specific circumstances and existing economic activities in the region. A one-size-fits all policy is therefore unthinkable. Policies that make one region flourish could result in an economic downturn in another region, and this also applies to sectors. It is often argued that all Dutch regions lack agglomeration strength. However, agglomeration strength is a general concept for a large number of processes that take place in urban areas, and therefore, more specific information is needed to shape a regional policy on this. Improving accessibility can be an alternative for increasing agglomeration size (which is difficult to realise in the short run) in a region. In addition, one could decide to improve agglomeration strength of a specific sector (specialisation) or improve the clustered agglomeration strength (improve the intensity and amount of activities between linked sectors). A completely different approach is to develop knowledge resulting in an improved innovative capability of regions. The competitiveness scoreboard is developed to organise the policy alternatives given a multitude of region- and sector-specific factors. In this way, a profile can be created for a region that can be compared with region- and sector-specific competitors, and it demonstrates how a region is embedded within dynamic European trade networks. This profile can consequently be employed in setting up a development strategy.

Visualisation: Regional exports/imports

In this window, trade between European regions and between those regions and the rest of the world is presented. These data are visualised by means of a circle that is subdivided into pieces (segments), with lines connecting those segments. All regions are represented in the circle. In the upper-left corner of the window, one can select the year and type of product or service to be visualised. Next, one can choose the preferred trade direction: exports or imports. The region of interest can be selected by just clicking the name of the region mentioned next to the circle. Optionally, one can find a region by typing the name in the 'search field' in the upper-left corner.

In the selection for exports, the circle shows total production in Europe, supplemented with exports from the rest of the world to Europe. However, if one chooses imports, the circle presents total goods and services that are used in (bought by) Europe, supplemented with goods and services that are used in the rest of the world and originate from Europe.

The size of a segment on the circle presents the share (importance) of a region in total production or use for the type of product that is selected. After the choice for a region is made, lines appear which represent the trade relations of the region under consideration. By touching the lines with the mouse cursor, the value of the trade flow is visualised.¹

On the right hand side of the window (or below the circle in case a small monitor is being used), one can find general information about the selected region and the values for total use and total production in the region.

Additionally, the value of goods and services that originate from or are destined for regions in the selected country (intra-national trade) and the value of goods and services coming from abroad or destined for abroad (international trade) is exhibited. Finally, the top-10 most important export destinations and import origins are presented.

¹ Only trade flows exceeding a value of over EUR 1 million are shown.

2.1.1 North Brabant: The technology industry

This region presents itself as being the smartest region in Europe. Its concentration on the development of knowledge is regarded indispensable for the development of the technology industry. It is therefore obvious that the position of the technology industry is dealt with first in the window 'Competitors scoreboard'. After selecting the region North Brabant, one can choose the sector high-tech manufacturing or medium-tech manufacturing. When selecting the sectors alternately, it becomes clear that the top-10 competitors are almost identical for both sectors. This implies that firms in both sectors in North Brabant compete with firms from about the same regions. At least, this was the case in 2010.

To have a good picture of the economic position of this sector in North Brabant, it is also important to study the changes in the most important competitors in the period 2000-2010. In 2000 and 2005, there was obviously still a difference between the two sectors with 3 different competitors in the top-10. The importance of the non-German competitors has decreased over time resulting in a top-10 competitors list in 2010 with solely German regions. This illustrates the success of German regions in the technology industry over this time period. The rise of the German regions can also be derived from the most important export markets for technological products. These are presented in the window 'regional exports/imports'. One can observe a shift here from destinations in the vicinity of North Brabant in the year 2000 to more distant, international destinations for the export of technological products in 2010. Parallel with this shift, there is an increase in the number of important competing German regions. It is striking that the production value of those exports decreases with time. This does not mean that profit margins are lower because this also depends on how production costs have developed. The value added data, which indicates how much is actually earned, is not presented in the current version of the competitiveness scoreboard.

The factors that are important in the market where the technology industry of North Brabant is active could have played a meaningful role in the development of these industries in the German regions. This can be analysed by opening the sub-window 'show competitiveness scores' in the middle of the window. From this list with scores, it appears that in the year 2000, the competitors in North Brabant could primarily be characterised by a good private and public knowledge infrastructure, a strong and large agglomeration and that a concentration of medium/ high tech manufacturing and a cluster orientation of those sectors played an important role, as well as a good accessibility.

On the factor 'knowledge development', North Brabant is performing better than its competitors. However, on most of the remaining factors, it performs worse. In the year 2010, public knowledge and agglomeration size became less important. The factors concentration, clustering and accessibility have, however, become more important.

These changes over time are the result of the increasing importance of the successful German regions where the technology industry is flourishing. These regions are characterised by their smaller size and strong private knowledge. The increasing importance of smaller regions in the development of the technology industry was also a research finding by OECD and is the result of the importance of clustering and concentration for this industry. It is thus important that many technology firms are located closely to one another and are tightly embedded in the local economy through many mutual deliveries. That North Brabant performs worse than its competitors on concentration and clustering is a point of interest.

Visualisation: Competitiveness scores

This window presents the performance of a region X on several competitive factors compared to competing regions. These competing regions are those regions that are most active in the same markets as region X is. In the menu in the upper-left corner, the year and sector of interest can be selected. If one is interested in a specific region, this region can be found using the 'search field'. The importance of a competitive factor for a specific region-sector combination is represented by the size of the circle while the score (of the region-sector combination compared to competing region-sector combinations) on a factor is represented by the colour of the circle. A large black circle thus indicates that the respective competitive factor is important, but at the same time, the region-sector combination is performing relatively bad on this indicator. This could be a trigger for a region to decide to invest more in this factor.

The table offers three possibilities for sorting to find the desired results:

The factors can be (vertically) sorted according to their importance by clicking on 'Importance' in the menu. If one next selects a competitive factor, the regions are ranked according to the importance of the factor for the regions. The regions with the worst score on the selected factor are placed at top of the list. In this way, it is revealed for which regions an investment in the respective factor likely results in an improved competitive position.

The factors can also be (vertically) sorted according to their score by clicking on 'score' in the menu. By consequently clicking on a regional factor, the regions are ranked on the basis of their score compared to their competitors. This indicates which regions possess a potential within the analysed region-sector context. After all, a region that performs relatively well (yellow circle) on an important factor (large circle) for a specific sector, has a potential for this sector.²

Finally, the factors can be (horizontally) ranked on their importance per region. Therefore, one must first search the region of interest in the search field, in the upper-left corner of the window. Next, by clicking on the region, the competitive factors are ranked on the basis of their importance (size of the circle) for the sector. Thus, it immediately becomes clear what factors are important, and what the relative performance on those factors is, for a specific region-sector combination.

² Note that it is difficult for a region to perform better than its competitors on important factors, because the importance of factors in a market (where goods and services are sold) is determined by focusing on those factors on which the strong regions in this market perform well. As a result, there are not many region-sector potentials.

By analysing network scores, one starts to better understand what type of clustering is present in a region. After expanding the sub-window 'show competitors' network scores' in the middle of the window, the scores of the top-10 competing regions become visible. From these scores, it appears that the trade relations network for the region-sector combination North Brabant – High-tech manufacturing is closest to the one for competition in Darmstadt (Frankfurt) and Münster. It also becomes clear that, regarding the trade relations between firms from the same sector (high-tech manufacturing in this case), North Brabant is part of a strong trade cluster. The weakness is primarily the poor embeddedness of this sector within the rest of the local economy. The technology industry thus relies primarily on the factor 'private knowledge'. Considering the increased importance of clusters (of firms within the region) and concentration and also the reduced importance of public knowledge for development of the sector between 2000 and 2010, the sole reliance on 'private knowledge' is quite worrying. The region North Brabant is more than only the technology industry, however. The results for the total economy (in 2010) of this region can be consulted by selecting 'regional production'. For that selection, it appears that for the total economy of North Brabant, public knowledge is still important, in addition to agglomeration size and connectivity. Clustering and concentration are less important for the total economy.

2.1.2 North Holland: Financial and business services in Amsterdam

From the 'competitors and scoreboard' visualisation, it appears that the financial and business services sector in North Holland mainly competes internationally with the large agglomerations in Europe. Over the course of the decade 2000-2010, the competitors have changed places, but the top-4 was stable. The competitiveness scores indicate that having a large share of foreign companies in the total number of companies is important for this sector. While in 2000 North Holland still had a larger share of foreign owned companies than its competitors, this was not the case anymore in 2010. This was the consequence of regions with many foreign owned companies becoming more important in the international markets where North Holland's financial and business services are active. It is striking that, in the trade network (the network scores), North Holland has fewer trade relations than its most important competitors. Regarding the network scores, North Holland is therefore more comparable to medium-sized competitors, such as Madrid and Oslo, than with the strongest competitors, such as Paris, London, Dublin and Luxemburg. The decline of the export power of this sector in North Holland was also visible in the period 2005-2010, after the start of the economic crisis. The most important competitive factor in this market is still the size of agglomeration, in addition to a large share of foreign owned companies, public knowledge and concentration of the sector. North Holland demonstrates reasonable to good scores on most of the factors. Only on agglomeration size, its performance lags. When analysing the export destinations of the financial and business services sector using the exports/imports visualisation, it is striking that the most important international export destinations lie outside of Europe. At the same time, the large majority of total exports of this sector remain within the country. Therefore, intra-national exports (exports to regions within the same country) are much larger than the international exports. However, the share of international imports in total imports is much larger than the share of international exports in total exports. The degree of internationalisation of this sector in Amsterdam is thus mostly present on the import-side. This raises the question if there exists a potential on the export side. Between 2000 and 2005, there was a strong increase in the value of exports in the financial and business services sector. As a result of the financial crisis, this increase has not continued, however, in the period 2005-2010. Consequently, the imbalance between imports and exports in this sector further increased after the start of the financial crisis.

Visualisation: Trade Network scores

In this window, the trade network of a region is visualised. Region-sector combinations can earn a score for the number of links they have in their network (degree), the number of links weighted for the size of the trade flows (weighted degree), the strength of the network (the size of the trade flows) and the degree to which there exist mutual trade relations within the market of a region (clustering).

The region of interest can be found by typing the name of the region in the search field in the upper-left corner. The year and sector can be selected here, as well, and the regions can be ranked on the basis of these factors.

2.1.3 South Holland: Low technology industry

In the window 'Regional Exports/Imports', the most important production values and destinations for the selected goods/services are visualised. With approximately 10% of total production value, low-tech manufacturing represents a substantial share of the economy of South Holland. This sector has a strong international focus considering the relatively high value for international exports. The most important export destinations are located outside of Europe. In part, this is the result of comparing small European regions with countries and continents in the rest of the world. Nevertheless, this is different from the situation for other types of goods considered in the visualisation. Because in 2000 European regions were the most important export destinations, one may conclude that globalisation has had a major impact on this sector.

From the 'Competitors and scoreboard' window, it appears that for 2010, the most important competitors were located on the west-east line from West Flanders to Arnsberg and in several regions in southern Germany. In the period 2000-2010, a shift of the geographical gravity point of competitors occurred, to southern Europe and northern Italy in particular. This shift went hand-in-hand with a decreasing importance of the competitive factor public knowledge, while private knowledge remains the most important factor in these regions. Rotterdam is somewhat lagging behind on the development of private knowledge. The network scores indicate that South Holland (Rotterdam) has a very strong trade network, equal to that of its top-competitors, but its exports are less than the largest regions, Lombardy (Milan) and Ile de France (Paris).

Visualisation: Competitors and scoreboard

In this window, the competitors of sectors in certain regions are visualised. In addition, the competitiveness scores and network scores are presented so that the most important elements of all available visualisations are brought together in one window.

In the upper-left corner, one can search for a region in the search field and select a sector and a year in the selection fields below. At the left of the window, there is a map with all regions for which there are data to enable the visualisations. By clicking on a region, this region is selected, and the international competitors are shown. The level of competition is represented by the colour-intensity of the regions in the map. The darker a region is, the higher the level of competition with the selected region. One can also zoom in and out. By clicking on 'show map', names of large cities are shown. It is advisable to zoom in; otherwise, the city names are difficult to read.

On the right (with a large monitor) or below the map (in case of a small monitor), one can find the actual scoreboard. Here one can find general information about the region and a link to the trade data (exports/imports). These trade data are used to determine the level of competition between the regions.

Below the general information, the ten most important competitors for the selected region are presented. On the map, those 10 top-competitors have the darkest colour. By clicking on 'show competitiveness scores', there is a visualisation of how the region performs on several competitive factors in comparison to the most important competitors. These factors are ranked according to their importance in the market of the selected region-sector combination. Only the 10 most important factors are exhibited. If the selected region performs better than its competitors on a certain factor, the circle is yellow. If the selected region performs worse, the circle is black. Thus, it can be immediately seen which important factors are eligible for investments to improve the competitive position of this sector in the selected region. By clicking on 'show competitors network scores', the network scores of the most important competitors are presented. The score of the selected region-sector combination can be compared with the scores of the top competitors. This is an informal way to compare the network scores of the strongest competitors.

2.2 What is new?

The competitiveness scoreboard is partially based on previous PBL publications. Hence, it is important to mention what is new. The most important innovation is the added time dimension. Previous analyses studied which regions were the most important competitors. Often these are the regions with large agglomerations, whose success can mainly be attributed to long historical development.

There is usually much interest in the effects of policies in the short run. It is therefore important to see how the level of competition changes over time. This provides tools for observing which factors are important for strengthening the competitive position. In the analyses described here, this is done employing descriptive statistics. Sophisticated analytical research is not conducted. In a later stage, the current analyses can be extended with econometric analyses so that more knowledge can be obtained about the degree to which competitive factors contribute to an improved competitive position and economic growth.

The current analysis also contains a more in-depth study of the trade networks of regions. This provides knowledge on the level of embeddedness of a region in a local regional economy or the entire European economy. This may reveal if a region has trade relations with many other regions or with just one important region. This so-called network analysis is additional to the previous ones that primarily focused on the embeddedness in the total economy (comprising all sectors), while here it is possible to study the trade network of specific sectors. A strong cluster orientation (one of the factors in the competitiveness scores) indicates that the sector is well embedded within the local industrial complex with many trade relations with other sectors in the economy. However, a strong network cluster only implies that there exists a strong regional cluster of trade relations within one sector.

Finally, with the visualisations, many data become publicly available for the studied regions and sectors. An interactive web publication is the only means by which this can be done, given the numerous selections and combinations of regions and sectors possible. At the moment, the selection of sectors is determined by which sectors are considered important in Europe. This selection therefore differs from the key-sectors which play an important role in Dutch (spatial) economic policy and which were used in previous PBL publications.

2.2.1 The importance of competitiveness over time

It is important to focus not only on the importance of factors for the most important competitors but also to look at the change in competitors and, with that, the change in the importance of factors over time. Firms often dominate markets as a result of many decades of development. However, for policymaking, it is important to know which current policy measures and competitive factors affect the competitiveness of regions in the short run.

Changes over time can therefore be demonstrated by the European regional competitiveness scoreboard. These changes concern only developments in regional economic growth and trade keeping the regional factors constant. The reason for keeping these factors constant is because they do not change that much in the short run and because quite some time is needed before a change in regional factors will have an economic effect. In addition, there exist several methodological problems (such as endogeneity) that we will not discuss here. Why one should analyse changes in factors or trade can be illustrated with the next example concerning the stars: looking at the stars for 5 minutes, one could assume that the planet earth is standing still. When looking for several hours one must consider the fact that the planet rotates around its axis. Finally, looking for several months, one also has to consider that earth is spinning around the sun.

3 (Supra-) National policy

In recent years, there has been increasing interest from international policy institutes and governments in the importance of regional factors for economic growth. This concerns not only economic growth of regions but also, primarily, the leading role of important regions for national economies. Therefore, the World Bank (2009) focuses on agglomeration strength, the OECD (2009; 2012) emphasises the role of medium-sized regions while the European Commission (Barca, 2009 en Barca et al., 2012) addresses the specific spatial context in which a region is situated. Each of these policy studies prioritises the importance of the region and its surroundings for future economic success of those regions and the countries in which they are located.

This website therefore forms, as well, a basis for policies of national and supra-national governments. It may be employed in supporting policies aimed at specific sectors (such as the Dutch 'top sector policy'), or more general national policies, on accessibility and knowledge development, for example. In addition to these national policies, which will have different economic effects across regions and sectors (that will, in their turn affect national economic developments), support from the national government is needed for regional economic policies. First, there lies a coordinating task that ensures that not every region adheres to the same policies. If regions all strive for the same policy goals, this is likely to result in overinvestment because only a few regions would be able to achieve these goals. For example, previously it was discussed that for the technology sector, concentration and clustering of certain types of economic activity may be important for growth of this sector. However, clustering and concentration should not take place everywhere (i.e., in all regions). Therefore, a national government may prioritise a limited number of locations where more concentration and clustering of a specific economic activity is desirable.

A second task is to provide information (of which this website forms one part). After all, not every region possesses the means to gather all the information necessary to shape their policies. However, if a supra-regional (national) government provides this information, regional governments are better able to make the right decisions. This will likely reduce government failure on the regional level.

3.1 Strengthen where needed

National policies can be shaped around factors, such as improving accessibility or public knowledge. However, considering that the amount of available means is limited, one has to prioritise investments. The competitiveness scores (one of the windows of the European regional competitiveness scoreboard) may play a supporting role here.

This can best be explained using an example. Suppose that the government wants to improve the connectivity of the Netherlands. The result of such a policy goal would vary across regions and sectors, regarding their competitiveness and economic growth. These various outcomes can be explained by the fact that some regions (1) have high concentrations of sectors for which connectivity is important and (2) are already well connected relative to their competitors, resulting in limited marginal benefits of extra

investments in connectivity. Both elements can be found in the visualisation of the 'competitiveness scores'.

As an illustration, the competitiveness scores are ranked according to their importance by clicking on the button 'importance'. Next, one must select a regional factor to effectuate the ranking. By clicking on 'connectivity by road and rail', the regions are ranked on the basis of the importance of this factor. The importance is represented by the size of the circles, and the largest circles are presented on top. The second criterion on which the regions are ranked is their score on the factor 'connectivity by road and rail', which is represented by the colour of the circle. Black indicates a low score, and yellow a high score, and the worst scoring regions are ranked highest. Therefore, the regions for which a factor is important and on which they have a low score are ranked highest. Thus, in the example, the regions for which 'connectivity by road and rail' is very important and that are much worse connected than their competitors are placed on top. In other words, it may be expected that investments in connectivity generate most benefits in those regions that are presented on top of the list.

A regional prioritisation is thus facilitated by observing the list from top to bottom. By doing this for 'regional production' (to be selected in the 'select sector' dropdown menu), it appears that Groningen is ranked highest of all Dutch regions with an importance of 4 and a score of 0.54 on the factor 'connectivity by road and rail'. A score of 0.54 implies that the performance of Groningen is approximately one half as good as the score of the most important international competitors. Many other Dutch regions are ranked just below Groningen. For those regions, connectivity is as important as it is for Groningen; however, they have a better score compared to their competitors.

In the 'Randstad' region Utrecht, North Holland and South Holland, the importance of the factor 'connectivity by road and rail' remains constant over time (2000-2010), in a fourth place. A double conclusion can therefore be drawn: in peripheral regions, an improvement of the connectivity by road and rail may induce a strengthening of the competitiveness of those regions, but the importance of connectivity by road and rail over time for the Randstad area suggests that this improvement may not go at the expense of the connectivity of this area.

3.2 Strengthening sectors

The 'top-sector policy' of the Dutch government is an example of a sector-oriented policy. The strengthening of sectors on the regional level will not be the result of a spatial homogeneous policy, however. After all, not all factors are equally important for all (Dutch) regions, and in addition, there are differences in regional scores on factors.

To further explain this, the food industry serves as an example. First, one has to select 'food' in the 'select sector' dropdown menu in the window 'competitiveness scores'. By consecutively clicking on the different factors, it appears that for the different regions in Europe, different factors are relevant. This implies that for the food industry, tailor made regional policies are required: depending on the functioning of a regional market, specific factors are important for a sector in a specific region.

In this case, it appears important to first find a region where the food sector is important before one starts to search for region- and sector-specific important factors. By selecting the sector 'food' in the visualisation 'Regional Exports/Imports' and then touching the region names next to the circle, the production values for those regions are presented.

In the Netherlands, the food sector is largest in the region North Brabant, having a production value of more than EUR 16 billion in 2010. Therefore, it is now known in which Dutch region this sector is important; this region-sector combination can be analysed in more detail in the window 'competitiveness scores'. In this visualisation, the region North Brabant can easily be found by typing the region name in the search field. After North

Brabant is found and selected by clicking on the region name, the factors can be ranked according to their importance for this region. The result is that 'agglomeration size' is the most important factor for many competitors of North Brabant and North Brabant itself, but North Brabant performs worse than its competitors on this factor. Regarding the remaining important factors, North Brabant scores equally well or better than its competitors. All factors thus seem to be reasonably well developed. It is striking that 'public knowledge' is a factor that is very important for the sector under consideration. It might therefore be possible to generate benefits for other Dutch regions through investments in public knowledge in those regions. This can be analysed by selecting this factor in the visualisation 'competitiveness scores', resulting in a ranking of scores according to the importance of public knowledge.

From the list that includes the regions, it now appears that this factor is also important for the food industry in other Dutch regions, where Friesland, Drenthe and Zeeland perform badly. The production value of the food sector in these regions can be found in the 'regional exports/imports' visualisation. From this visualisation, it can be derived that with a production value of EUR 4 billion, Friesland is a big player in this sector. An improvement of the factor public knowledge in Friesland (or a better link with public knowledge development in the region North Holland) might generate more benefits for the food sector than investing in public knowledge in North Brabant, where it is already well developed.

An alternative strategy for shaping policies is to study all regions individually for one specific sector: how large (in absolute and relative terms) is this sector in every region, which factors are important and what are the regional scores on these factors? This corresponds with inventorying all regional development strategies for a sector. Examples have been discussed in the previous chapter.

3.3 Looking for opportunities

A completely different economic development strategy is aimed at finding opportunities for regions. In this case, one is not going to look for those things a region is doing well, but instead try to identify, on the basis of competitive factors and market circumstances, what a region *could* do well. Such an analysis of opportunities for regions can be performed by employing the 'competitiveness scores' visualisation. The best performing regions on specific factors (compared to their competitors) must be identified by clicking on 'Score' and selecting a specific sector and factor. After these choices have been made, the regions are ranked according to their score. For example, after having selected the food sector and the factor public knowledge, it appears that many Dutch regions are ranked high on the list. Therefore, many Dutch regions perform better than their competitors on public knowledge (yellow colour) and, in addition, this factor is very important for this sector (a large circle). Focusing on the region North Brabant, it appears that its score on 'agglomeration size' is worse than that of its competitors but that, at the same time, on the remaining factors, North Brabant scores equally good or better. North Brabant is thus performing well in the food sector compared to its competitors. Additionally, for the regions North Holland, Utrecht and Limburg (in the rows) there are many yellow circles. This suggests that there may be opportunities for the food sector in these three regions. This is confirmed when the factors (in the columns) are selected consecutively, each time arranging the regions according to the score on each factor. The three regions North Holland, Utrecht and Limburg are often placed high on the list with relatively large, yellow circles. This means those regions have a high score on important factors for this sector. The production value of the food sector (in the window 'regional exports/imports') as a proportion of total regional production is low in the three mentioned regions (approximately 5%) while it is relatively high in Friesland (almost

10%). So, it appears that there are opportunities for the food industry in these three regions.

4 Limitations

This document provides detailed examples for the development of regional economic policy strategies based on regional economic data on trade and competition. This is, therefore, a manual for the European regional competitiveness scoreboard. It is demonstrated how the results from the various visualisations can be used for developing regional or national policies to strengthen the competitive position. This document does not explain the scientific and methodological background. This information can be found in Thissen et al. (2013) and Gianelle et al. (2014).

The data on which the competitiveness scoreboard is based are estimated by extrapolating regional trade data for the year 2000 using trade data for countries and (regional) economic data for the period 2000-2010. Over time, the amount of available data decreases because they are published with a delay by the various statistical bureaus. As a result, the data for 2000 is more reliable than the data for 2010. The 2010 data should therefore also be regarded as preliminary estimated data.

The competitiveness scoreboard allows for an analysis of the international competitive position of European regions. However, for the development of many economic activities, information about competition with regions from the same country is also relevant. A more in-depth analysis that considers regional competition within countries is therefore also important for developing regional strategies.

A common criticism about the analysis presented here is that the employed factors have an abstract and aggregate character. This is primarily caused by the difficulty of finding good quality data for all 256 European (NUTS2) regions. Additionally, the factors must be sufficiently distinct. If not, they measure the same phenomenon. Because several of the original factors were similar, they are aggregated in the analysis presented here (see Thissen et al., 2013 for more details).

When building a regional strategy, data on all regions are not required. Only data on the competitors of a certain region must be considered. These competitors are included in the scoreboard. It is thus relatively simple for a policymaker of a region to focus on the performance (of important factors) of only the competing regions.

5 References

Use of data from the European regional competitiveness scoreboard

When using data from the European regional competitiveness scoreboard, please refer to:

M.J.P.M. Thissen and C. Gianelle (2014), EU regional competitiveness scoreboard
<http://themasites.pbl.nl/eu-trade/> PBL Netherlands Environmental Assessment Agency
and <http://s3platform.jrc.ec.europa.eu/s3-tools> European Commission, Joint Re-search
Centre, Institute for Prospective Technological Studies.

References for the trade data and methodology

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