BSR STARS
Innovation in the Baltic Sea Region

Regional & Cluster Competitiveness in the Baltic Sea Region

www.bsrstars.se

Regional & Cluster Competitiveness in the Baltic Sea Region

Date of submission: 1 October 2013

Electronic format available on:
www.clusterobservatory.eu
www.vinnova.se

The Cluster Observatory
c/o The Center for Strategy and Competitiveness
Stockholm School of Economics
Box 6501
SE 113 83 Stockholm
Sweden
www.hhs.se/csc

The Cluster Observatory

The Cluster Observatory – www.clusterobservatory.eu – offers guidance for **fact-based microeconomic policies in Europe**, through a user-friendly, web-based **knowledge platform** in the following four areas:

1. Cluster and industry employment and competitiveness
2. Cluster organisations and related organisations
3. National and regional economic framework conditions
4. National and regional competitiveness

Since 2007, the Cluster Observatory has provided policymakers, public officials, practitioners and researchers with a range of **services**:

1. An official **European cluster mapping tool** for all sectors and regions, including employment and performance statistics
2. Unique access to a broad range of **national and regional business environment data and analysis**
3. A **virtual library** of cluster-related documents, and access to educational videos
4. Fact-based policy advice targeting **macro regions** (e.g. Baltic Sea, Mediterranean and Danube regions), **smart specialisation** data for regions, and **priority sectors** (e.g. Cultural and Creative Industries and KIBS).

Since early 2013, the Cluster Observatory also offers a **mobile app** that provides immediate access to:

1. The latest **news** and **events** about competitiveness and clusters
2. A library of **topical books and reports**
3. Access to educational **videos**, and
4. At a glance indicators for all **regions and sectors** of Europe

The mobile app is available for **free** for both iPhone and Android. Search for Cluster Observatory.

Executive Summary

This report covers the Baltic Sea Region, including **56 regions in 11 countries**, and focuses on **clusters in four sectors**: ICT, Cleantech, Healthcare and Maritime.

Among the **top-100 clusters in the European Union** (Cluster Observatory ranking), BSR clusters **occupy 15 places**.

Over the last decade, as a result of regional integration with the EU, we have witnessed how all **BSR regions have** grown, and that they have **converged** in terms of overall economic prosperity. Whereas a decade ago the richest regions were six times as prosperous as the transition regions, they are now only four times as prosperous due to the later regions' faster development.

The top five regions in terms of c**ompetitiveness drivers**, which are subject to policy intervention in the medium term, are the five capital regions: Copenhagen, Stockholm, Berlin, Oslo and Helsinki. The top BSR regions score very high in our European ranking. On the other hand, the Eastern European BSR regions score poorly on these metrics.

Hamburg, Oslo og Akershus, and Trøndelag (Trondheim) are the most industrially **specialised regions** in the BSR region. Leading regions within BSR have specialised in a range of industries, with the top regions having strong presence in 50-70 industries out of a total of almost 350 traded industries.

ICT cluster performance

- The Baltic Sea Region is a strong performer in ICT. The total share of employment in ICT sectors is close to 2.7% in the BSR, compared to 2.6% in EU-27 and 2.4% in Europe as a whole, suggesting a slightly higher level of ICT specialisation in the BSR.

- There has been a convergence in terms of specialisation between ICT clusters in the eastern regions and ICT clusters in the innovative leader regions in the

west. The bottom 5 regional clusters have doubled their degree of specialisation over the last decade, whereas the top clusters have been flat.

- The Top-10 ICT clusters in BSR we find in the most advanced city regions in Sweden and Finland. However, all urban regions like Copenhagen, Oslo, Berlin, Hamburg and St. Petersburg perform well. Highly ranked clusters are typically not the largest ones. The Oslo & Akershus ICT cluster takes the lead in the cluster competitiveness rank (CC rank) both in BSR as well as in Europe.

- Leading ICT manufacturing subclusters are mostly concentrated to Finland, and to a lesser degree in Sweden. However, the three service-oriented subclusters display a very different pattern; they are by far most prevalent in dense urban regions, with Oslo, Stockholm and Copenhagen claiming the top three spots in each category.

Cleantech cluster performance

- The Baltic Sea Region is a strong performer in Cleantech. The total share of employment in Cleantech sectors is close to 1.1%, considerably larger than 0.78% in EU-27 and 0.92% in Europé as a whole

- There has been a convergence in terms of specialisation between Cleantech clusters in the eastern regions and Cleantech clusters in the innovative leader regions in the west.

- The cluster patterns in Cleantech depend drastically on whether or not wage data is included in the analysis. While the regions with the highest concentration of clean technology are in the east, particularly Poland and Russia, the differences in wages among the countries in the BSR are staggering. Taking wages into account results in a completely different pattern of cluster competitiveness. The most competitive Cleantech clusters we find in Norway, Denmark, Sweden and Germany.

- Nord-Norge with Tromsø as the hub is the leading Cleantech cluster in the BSR, and has an impressive number 4 position in Europe.

- Cleantech is a broad sector comprising many different types of activities, including Sewerage, Water treatment and Waste management. Top BSR subcluster positions are held by the Nordjylland sewerage cluster in Denmark, the Swietokrzyskie water treatment cluster in Poland, and the waste management cluster in Nordnorge in Norway.

Health care cluster performance

- The Baltic Sea Region is a relatively weak performer in Healthcare. The total share of employment in Healthcare sectors in BSR is 7.5%, while the regions in Europe have close to 9% share

- The largest Healthcare clusters we find in Germany and Russia. The Berlin healthcare cluster takes the top position in terms of size, and is also one of the most specialised ones.

- With addition of the Icelandic healthcare cluster, the clusters with the highest degrees of specialisation we find in Germany and Russia.

- Polish and German clusters take the top positions in the Human health subcluster. The most specialised subclusters in residential care are located in Russia and Iceland, and social work subclusters in Iceland and Germany.

Maritime cluster performance

- The Baltic Sea Region is a world-leading performer in the Maritime sector. The total share of employment in Maritime sectors in BSR is 1.4%, which is more than double that in Europe (0.6%) and even substantially larger than in Japan (0.8%)

- There has neither been a convergence or divergence across clusters in terms of regional specialisation.

- Vestlandet in Norway exhibits the largest maritime cluster in overall employment. Other large clusters we find in Russia and Poland, but when controlling for wage differences they are far down the BSR list in terms of competitiveness.

- Five Norwegian maritime clusters plus the Icelandic one hold the top BSR spots in the cluster competitiveness ranking (CC rank), and interestingly enough the maritime clusters in Vestlandet (Bergen), Nord-Norge (Tromsø) and Agder og Rogaland (Kristiansand) also take the top European and Transatlantic spots.

- Maritime is a broad sector comprised of many different types of activities, including Fisheries, Shipbuilding and Water transportation and logistics. The top spots for all subclusters are held by Norwegian and Icelandic clusters.

Table of Contents

The following appendices can be downloaded from www.bsrstars.se/reports

Figures and Tables

Chapter 1 Introduction

During the last two decades the Baltic Sea Region (BSR) has undergone a tremendous transformation, and is now an integral part of the European Union and its market economy. We think it is even fair to say that the Baltic Sea Region has become an innovation engine for Europe, with complementary strengths in the east and west. This would not have happened unless a large part of the eastern BSR countries had joined the EU in 2004. As EU members a great deal has been done to address weaknesses in national business environments, particularly in the transition countries, both at the macro- and the microeconomic levels. However, weaknesses still remain and our data point to the fact that the eastern regions still perform poorly on competitiveness drivers (see Chapter 2). In recent years we can witness an increased interest in regional coordination, particularly since the BSR was appointed the first macro-region within the EU.

Regional integration means structural change across the region. Politicians and labor union officials in the west often ask – so why should we be involved? – It only means loss of jobs to lower cost locations and structural adjustments! Surely, forces of globalisation and regional integration, through trade, cross-border investment and migration, imply more competition between labor forces and between firms, and in the end more competitition among regions for inward flows of capital, people and firms. Also, politicians and business leaders in the east raise questions regarding macro-regional strategies; what is the value of a regional strategy when we want to hook up to global markets? And by increasing intra-regional flows of goods, services, capital and people, competition will heaten up to the detriment of our region!

Yes, regional integration means strenous structural adjustments, but protection or lack of regional initiatives can never be the answer in today´s global world; so an active macro-regional strategy is to prefer. People, firms and other organisations in any region today must be prepared for a future, where prosperity is based on innovation, upgrading of firms´competitive advantages, and enhanced regional attractiveness. Thus, we argue that the macro-regional initiatives now being implemented within the BSR macro-region have a lot to offer, where:

1. Geographical **proximity** will enhance daily contacts between firms and people and is a good learning step to global markets, particularly for SMEs, and where

2. Increased levels of **competition** and an **enlarged market** within the region will lead to raised productivity and higher living standards, and where
3. Increased visibility and dynamism will enhance **attractiveness** on capital (FDI, venture capital etc.), firms and people from outside the region

In a world of global markets, even today, most trade is among neighboring regions. Such intra-regional trade and patterns of mobility are driven by limited cultural distances, low transportation costs and institutional arrangements favoring neighboring nations and regions (e.g. NAFTA, The Nordic Council).

The second argument is related to market enlargement, leading to improved economies of scale, which can be utilised by firms in a proximate setting. When firms, particularly SMEs with little export experience, are becoming more active in neighboring markets, competition will increase, which in turn will put pressure on specialisation among the 56 regions of the BSR. And specialisation in turn will allow for innovation and product upgrading, and increased trade.

The third argument on enhanced attractiveness will work in several areas. A more visible and competitive region will help bring FDI from multinational corporations from around the world, including inward investments in production, R&D, design, sales and service activities, and regional headquarter functions. A dynamic and attractive macro-region also brings other types of investments such as venture capital and private equity from overseas. Finally, increased attractiveness will also bring new people, new skills and technologies.

A range of "BSR strategies" are necessary to increase global visibility, and it can be done in different sectors and areas of activity[1]. One way forward is to stimulate cooperation across clusters in the region. Cluster initiatives have proven to enhance innovation among involved firms, and can significantly improve collaboration between firms (e.g. between SMEs and large firms), as well as close other "cluster gaps"[2]. Cluster organisations can help to change the mindsets among firms; from short-term opportunistic strategies and public subsidies to upgrading of competitive advantages and internationalisation.

Regional Strategies within the BSR

In spite of troubled times, the BSR has been doing well as a macro region for more than a decade, and lagging regions within BSR are catching up. Since 2004, this macro- and microeconomic transformation has been reported in the yearly **State of the Region Report,** under leadership of Dr Christian Ketels[3].

[1] See for example the recent BCG report on making BSR the "blue and green technology hub", http://www.wwf.se/source.php/1536768/Ostersjorapporten%202013%20-%20BCG%20Turning%20Adversity%20into%20Opportunity%20Aug%202013.pdf

[2] See Sölvell, Ö & Williams, M (2013) "Building the Cluster Commons". Stockholm: Ivory Tower Publishers.

[3] Yearly reports can be downloaded at: www.bdforum.org/activities/reports-publications/state-of-the-region-reports/

Beginning in 2009, the EU introduced its strategy for macro regions, and BSR was the first one out. The core idea of the **EU Strategy for the Baltic Sea Region** (EUSBSR)[4], was to take advantage of the particular economies offered through cooperation across proximate regions. The EUSBSR now includes a total of over 80 cross-border projects, formed around the themes of: 1) saving the sea, 2) connecting the region economically, socially, culturally etc., and 3) increasing prosperity throughout the region. The EUSBSR has put particular emphasis on innovation programmes, built up from the following four principles:

- Projects should build sector strengths in the macro region
- Projects are set up around the cluster concept
- Strategies follow the S3 model of smart specialisation
- Focus is on BSR as a home market and a macro region connected to global markets and value chains.

Historically, EU microeconomic policies were typically implemented with little regard for the potential economic benefits of cooperation between neighbouring regions. But such interaction in close proximity of more and less developed regions holds particular promise, not the least when it comes to **innovation and cluster cooperation**:

- Through mobility and cross-border exchange, proximity increases the potential pay-off to improvements in the regional microeconomic business environment (human capital, science base etc.)
- Proximity allows for easy cross-border networking and enables meaningful cooperation among clusters along the value chain, where typically some focus more upstream and others more downstream, and in different manufacturing and service activities and niches
- Proximity strengthens the visibility of competition and rivalry between firms based in neighbouring regional clusters, and
- Proximity enables countries to jointly market the attractiveness of the macro region to the outside world, as one clearly identifiable spot in the global marketplace

However, in order for such regional proximity effects to materialise, regional institutions and governance are required to guide the process. One such important initiative is the **BSR Stars**, a flagship programme within the EUSBSR. BSR Stars works to strengthen the competitiveness and economic growth in the Baltic Sea Region, by promoting cross-border innovation linkages between clusters. Through close

[4] http://eu.baltic.net/Baltic_Sea_Region_Strategy.7428.html

cooperation with public organisations across BSR countries, the BSR Stars has developed into an innovation programme, built on existing cluster strengths and competencies around the Baltic Sea Region.

The ultimate aim of BSR Stars, with Vinnova in Sweden as the lead partner, is to promote sustainable growth and prosperity throughout the macro region. A number of funds are involved, including structural funds. The innovation project **StarDust** is part of the BSR Stars programme, and has a total budget of 6,5 million euros. The goal of StarDust is to address grand challenges around BSR, by contributing to competitiveness within five areas:

- Cleantech and future energy — Project: Clean Water
- ICT — Project: Mobile Vikings
- Healthcare and general wellbeing — Project: Active for Life
- Future transportation — Project: MarChain
- Aging population — Project: Comfort in Living

The BSR region is home to a range of leading clusters, across sectors and technologies, including ICT, paper products, logistical services, construction, processed food, automotive, cleantech and many other fields. Among the **Top-100 clusters** in innovative regions in the European Union, **BSR occupies 15 places**[5].

Aim and Content of The Report

This report aims to give a comprehensive review of the competitiveness of the Baltic Sea Region, focussing on four cluster areas: ICT, Cleantech, Healthcare and Maritime. With solid facts[6] covering regional framework conditions and cluster strengths and weaknesses, policymakers and practitioners can develop better strategies, and ultimately build more successful innovation projects within BSR.

Figure 1. Phases of the Stardust Project

[5]www.clusterobservatory.eu/common/galleries/downloads/Strong_Clusters_in_Innovative_Regions_Report.pdf

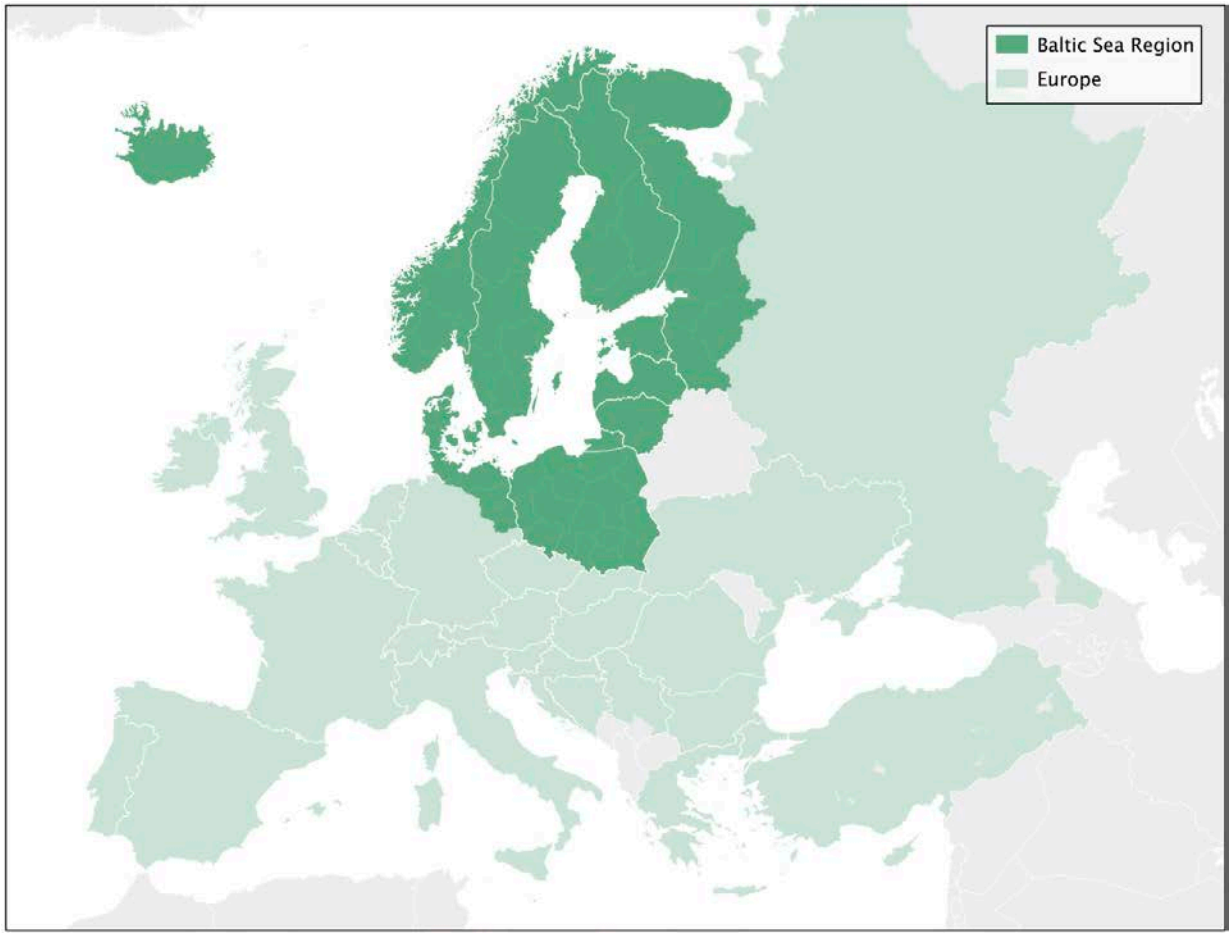
[6] Data in this report originates from National Statistical Offices in Europe and the U.S.

Figure: Implementation phases.

This Regional & Cluster Competitiveness Monitor has been commissioned by Vinnova, and is part of the Stardust project under leadership of Ms. Karin Nygård Skalman, coming into the second mobilisation phase of the project (Figure 1).

Within the EU it is now expected that every region and cluster programme be built from a base of economic facts. This series of **Regional & Cluster Competitiveness Monitor** reports is aimed at supporting such fact-based policy and smart specialisation in Europe.

Figure 2. Map of the BSR Macro Region



All regions in BSR correspond to NUTS 2, except for merged DE41 and 42, as well as FI18 and FI20. Europe denotes the regions that are used for European ranks (Canary islands, Azores and Madeira are also included, but not shown). Transatlantic comparisons also include United States Economic Areas and, if wage data is not of essence, Japanese prefectures.

The analysis of the report builds on territorial data (regions and nations) and sector data (industries and clusters). The BSR covers 56 regions in 11 nations, see Table 1 and Figure 2.

Table 1. The 56 Regions in BSR

NUTS	Region Name	Largest city
Germany		
DE30	Berlin	Berlin
DE40	Brandenburg	Potsdam
DE60	Hamburg	Hamburg
DE80	Mecklenburg-Vorpommern	Rostock
DEF0	Schleswig-Holstein	Kiel
Denmark		
DK01	Hovedstaden	Copenhagen

DK02	Sjælland	Roskilde
DK03	Syddanmark	Odense
DK04	Midtjylland	Aarhus
DK05	Nordjylland	Aalborg
Estonia		
EE00	Eesti	Tallinn
Finland		
FI13	Itä-Suomi	Kuopio
FI18/FI20	Etelä-Suomi/Åland	Helsinki
FI19	Länsi-Suomi	Turku
FI1A	Pohjois-Suomi	Oulu
Iceland		
IS00	Ísland	Reykjavik
Lithuania		
LT00	Lietuva	Vilnius
Latvia		
LV00	Latvija	Riga
Norway		
NO01	Oslo og Akershus	Oslo
NO02	Hedmark og Oppland	Lillehammer
NO03	Sør-Østlandet	Skien
NO04	Agder og Rogaland	Kristiansand
NO05	Vestlandet	Bergen
NO06	Trøndelag	Trondheim
NO07	Nord-Norge	Tromsø
Poland		
PL11	Łódzkie	Lodz
PL12	Mazowieckie	Warszawa
PL21	Małopolskie	Kraków
PL22	□l□skie	Katowice
PL31	Lubelskie	Lublin
PL32	Podkarpackie	Rzeszów
PL33	□wi□tokrzyskie	Kielce
PL34	Podlaskie	Bialystok
PL41	Wielkopolskie	Poznan

PL42	Zachodniopomorskie	Szczecin
PL43	Lubuskie	Gorzów Wielkopolski
PL51	Dolno□□skie	Wroclaw
PL52	Opolskie	Opole
PL61	Kujawsko-Pomorskie	Bydgoszcz
PL62	Warmi□sko-Mazurskie	Olsztyn
PL63	Pomorskie	Gdansk
Russia		
RU81	Leningradskaya oblast'	Gatchina
RU82	Novgorodskaya oblast'	Novgorod
RU83	Pskovskaya oblast'	Pskov
RU84	St Petersburg	St Petersburg
RUB2	Respublika Kareliya	Petrozavodsk
RUB4	Murmanskaya oblast'	Murmansk
RUC0	Kaliningradskaya oblast'	Kaliningrad
Sweden		
SE11	Stockholm	Stockholm
SE12	Östra Mellansverige	Uppsala
SE21	Småland med öarna	Jönköping
SE22	Sydsverige	Malmö
SE23	Västsverige	Göteborg
SE31	Norra Mellansverige	Gävle
SE32	Mellersta Norrland	Sundsvall
SE33	Övre Norrland	Umeå

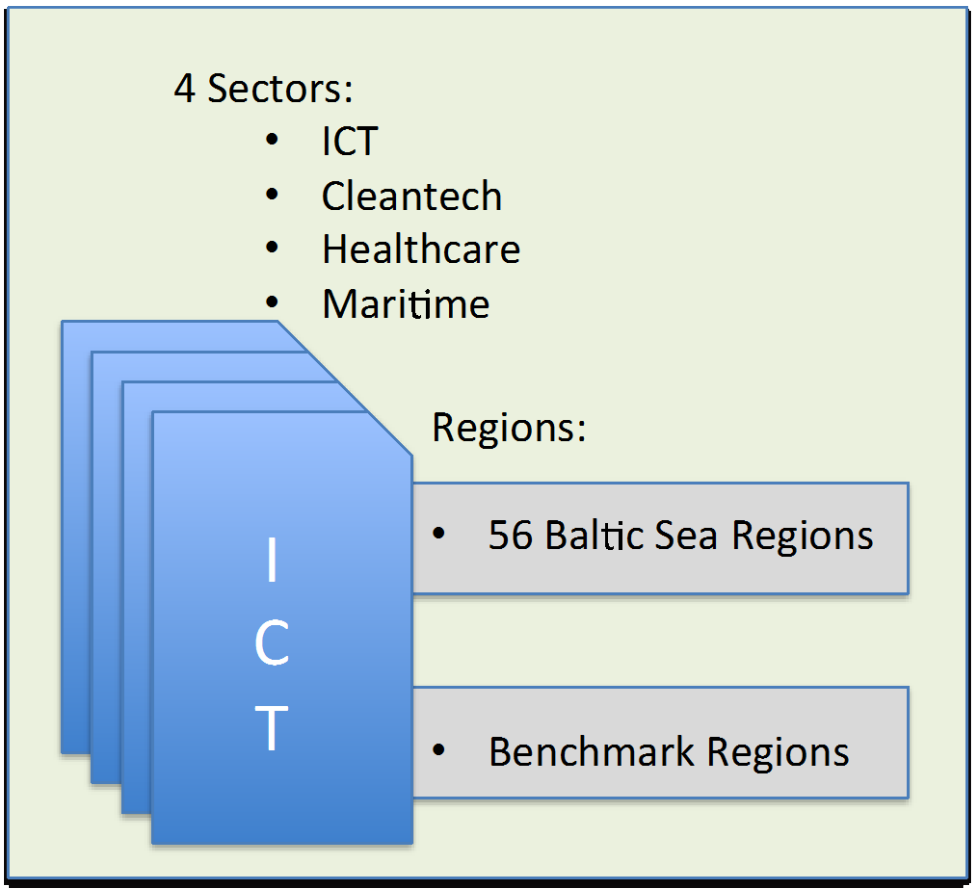
In addition to the 56 BSR regions, the report is also using benchmarking data for **Europe**, covering 36 nations with **385 regions**, as well as the **Transatlantic Economy**, bringing in **179 regions** from the U.S. The sector data covers 4 cluster categories, each of which includes several industries. To calculate cluster data we use the following method. The statistical data for one of the four sectors (e.g. ICT), limited to one of the 56 regions (e.g. Hamburg), is referred to as a **regional cluster** (Hamburg ICT). All statistical data originate from official sources, and are compiled by the Cluster Observatory[7]. In total there are **224 BSR clusters** (56 regions times 4 sectors), see Figure 3. The data for each cluster, used in this report, includes (see Appendix 2 for more details):

[7] For methodology please refer to: www.clusterobservatory.eu

- Employment size
- Employment growth
- Degree of cluster specialisation, LQ (measured as location quotients)
- Regional cluster competitiveness, CC (measured as degree of specialisation weighted by average cluster wages)
- BSR competitiveness rank (CC Rank 1 through 56)
- European competitiveness rank (CC Rank 1 through 385)
- Transatlantic competitiveness rank (CC Rank 1 through 564)

The structure of this report is as follows. First, we present a detailed account of the strengths and weaknesses for the 56 separate regions (Chapter 2). Here we present data on regional performance, drivers of competitiveness and regional fundamentals based on population. For practical purposes most of the data is shown in appendices. The chapter also includes a presentation of the most industrially specialised regions. In chapters 3-6 we present our data and analysis of the four cluster studies: ICT (Chapter 3), Cleantech (Chapter 4), Healthcare (Chapter 5), and Maritime (Chapter 6).

Figure 3. Overview of Data in the Report



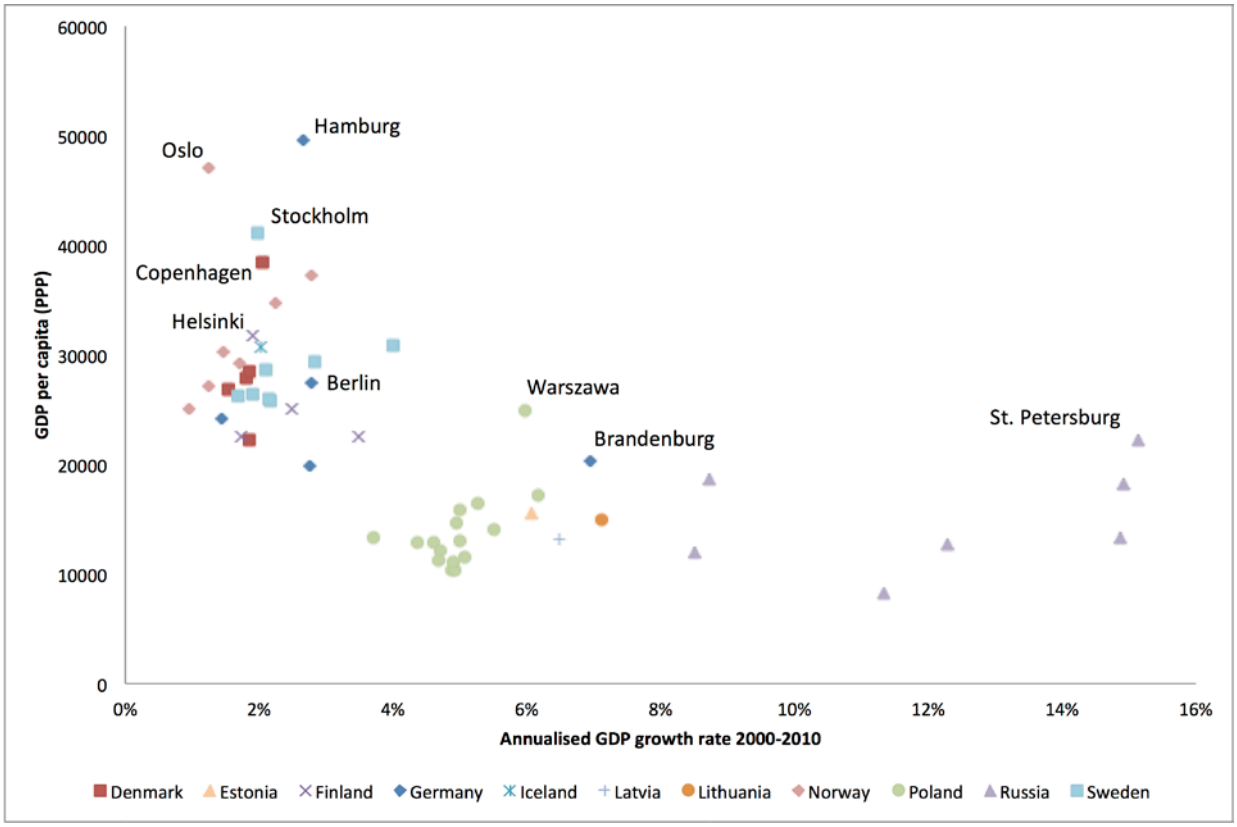
In each chapter we take a look at:

- Convergence vs divergence of clusters throughout the BSR macro region
- Cluster competitiveness rankings
- Subcluster rankings
- Cluster growth and decline, and
- Cluster organisations

Chapter 2 Regional Framework Conditions

Overall, The Baltic Sea Region is composed of a total of 56 regions. These regions vary considerably in terms of economic, technological and social conditions, and thus offer widely different framework conditions for the success or failure of firms and clusters. The fact that there are large intra-regional differences means that the economic potential in a macro-regional strategy is large.

Figure 4. GDP Levels and Growth in BSR Regions (2000 – 2010)

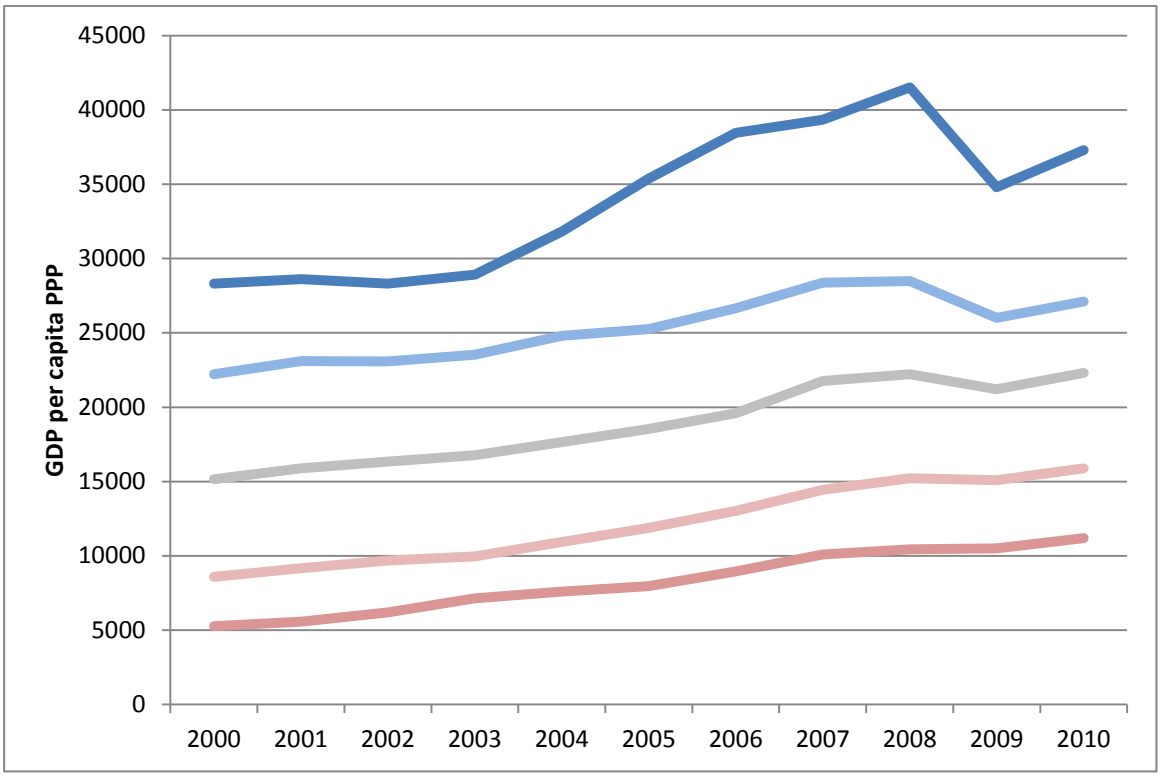


In terms of GDP, there is a clear and expected pattern that the regions with lowest levels are also the fastest growing ones (Figure 4). In BSR, all of the fastet growing regions are located in Russia followed by the Baltic States and Poland. The Western regions are in general rather similar and all show GDP of close to 30 000 EUR and the annualised growth rate of around 2%. The capital regions are usually significantly

richer; however in Germany this pattern is defied as Berlin is in the middle of the pack while Hamburg is the richest region in BSR. This is due to the processes of integrating Berlin into unified Germany, which is also the cause for Brandenburg being much more similar to Polish regions than to other German ones.

Over the last decade, we have witnessed that these regions have converged in terms of economic prosperity. The richer regions are now some 25% richer than they were a decade ago, whereas the transition regions more than doubled their level of prosperity (Figure 5). The richer regions were most affected by the 2008/2009 recession.

Figure 5. GDP Convergence in BSR Regions (2000 – 2010)

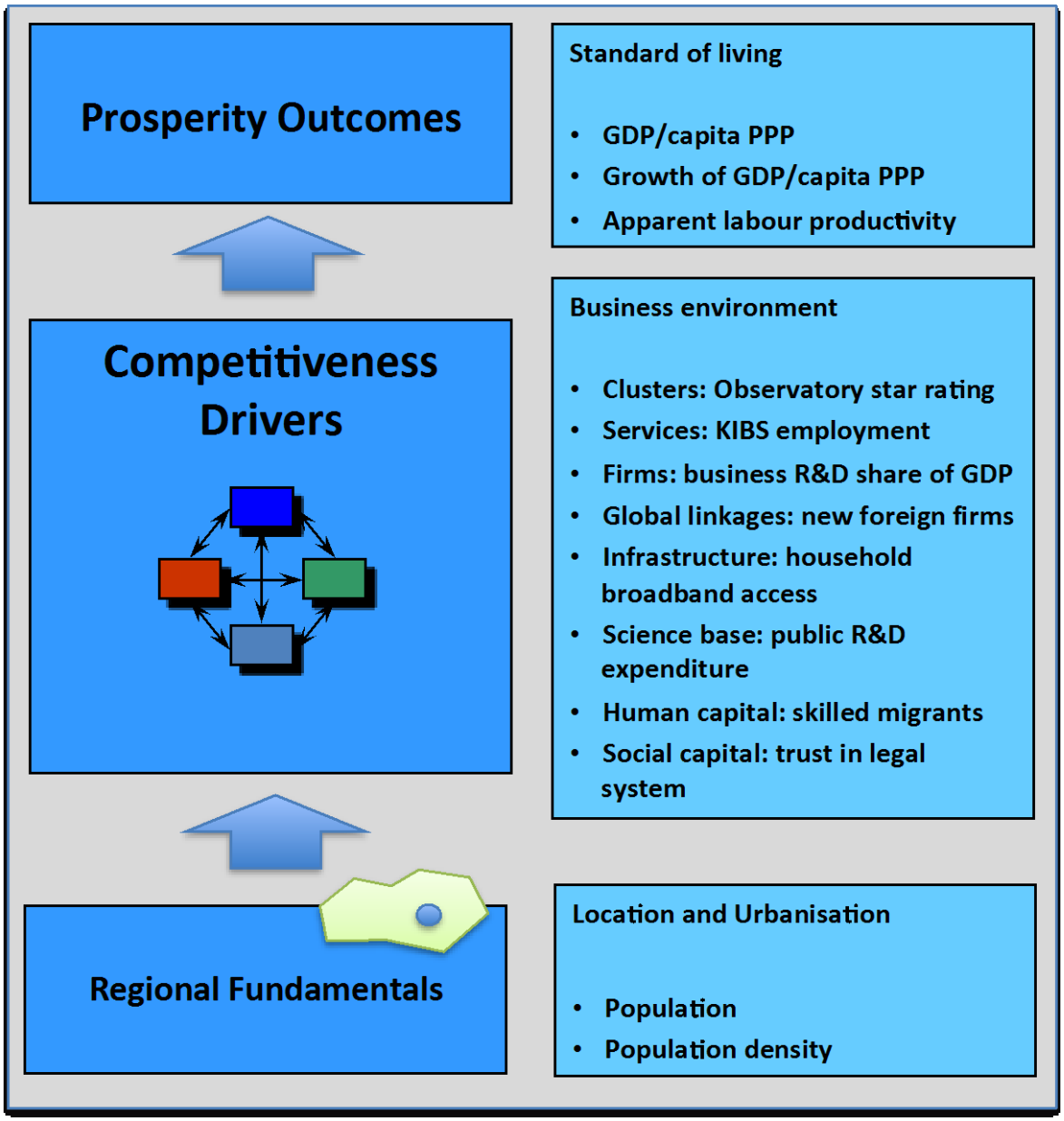


The lines represent the values of 10th, 30th, 50th, 70th and 90th percentile of GDP per capita PPP respectively

Regional Performance and Competitiveness Drivers

Regional framework conditions are crucial for all firms and clusters in a particular location. Processes of innovation and successful entrepreneurship are shaped by the quality of the regional environment; including regional fundamentals and competitiveness drivers such as hard and soft infrastructure, sophistication and specialisation of human capital, access to a regional science base and so forth.

Figure 6. Three Layers of Regional Framework Conditions



Source: Adapted from Christian Ketels, State of The Region Report 2011. Copenhagen: Baltic Development Forum.

Throughout this report we use data at three levels, describing the regional framework conditions for firms and cluster formation: regional fundamentals, competitiveness drivers and prosperity outcomes (Figure 6). The level of regional prosperity is measured as standard of living and productivity. The fundamentals, dealing with population, are largely given and not subject to competitiveness policies. The competitiveness drivers, on the other hand, include a wide range of microeconomic fundamentals (inspired by the so called Diamond model developed by Professor Michael Porter), and are subject to policy intervention.

Table 2. BSR Regional Ranking by Competitiveness Drivers (excluding Russia) [8]

Region and Country	City	Rank BSR	Rank Europe
Hovedstaden, Denmark	Copenhagen	1	3
Stockholm, Sweden	Stockholm	2	4
Berlin, Germany	Berlin	3	7
Oslo og Akershus, Norway	Oslo	4	8
Etelä-Suomi/Åland, Finland	Helsinki	5	17
Trøndelag, Norway	Trondheim	6	18
Östra Mellansverige, Sweden	Uppsala	7	25
Hamburg, Germany	Hamburg	8	26
Vestlandet, Norway	Bergen	9	27
Sydsverige, Sweden	Malmö	10	28
Västsverige, Sweden	Göteborg	11	32
Ísland, Iceland	Reykjavik	12	40
Nord-Norge, Norway	Tromsø	13	49
Pohjois-Suomi, Finland	Oulu	14	53
Länsi-Suomi, Finland	Turku	15	60
Övre Norrland, Sweden	Umeå	16	62
Sør-Østlandet, Norway	Skien	17	64
Midtjylland, Denmark	Aarhus	18	65
Agder og Rogaland, Norway	Kristiansand	19	74
Småland med öarna, Sweden	Jönköping	20	85
Eesti, Estonia	Tallinn	21	90
Hedmark og Oppland, Norway	Lillehammer	22	95
Schleswig-Holstein, Germany	Kiel	23	101
Norra Mellansverige, Sweden	Gävle	24	104
Mazowieckie, Poland	Warszawa	25	114
Syddanmark, Denmark	Odense	26	118
Itä-Suomi, Finland	Kuopio	27	126
Sjælland, Denmark	Roskilde	28	127
Mellersta Norrland, Sweden	Sundsvall	29	128
Nordjylland, Denmark	Aalborg	30	140
Brandenburg, Germany	Potsdam	31	152
Mecklenburg-Vorpommern, Germany	Rostock	32	170
Lietuva, Lithuania	Vilnius	33	174
Dolnośląskie, Poland	Wroclaw	34	187
Latvija, Latvia	Riga	35	189
Śląskie, Poland	Katowice	36	210
Warmińsko-Mazurskie, Poland	Olsztyn	37	215
Wielkopolskie, Poland	Poznan	38	217
Łódzkie, Poland	Lodz	39	218
Pomorskie, Poland	Gdansk	40	219
Małopolskie, Poland	Kraków	41	222
Lubelskie, Poland	Lublin	42	235
Opolskie, Poland	Opole	43	237
Lubuskie, Poland	Gorzów Wielkopolski	44	240
Zachodniopomorskie, Poland	Szczecin	45	241
Podlaskie, Poland	Bialystok	46	242
Podkarpackie, Poland	Rzeszów	47	243

[8] The overall data represents 268 regions in EU27 + Norway, Switzerland and Iceland and does not cover Russia.

Kujawsko-Pomorskie, Poland	Bydgoszcz	48	245
Świętokrzyskie, Poland	Kielce	49	251

The competitiveness drives are crucial for a region's development and incorporate the overall business environment indicators, as well as firm behaviour and sectoral composition. Here we have created a composite indicator for competiveness drivers based on the eight variables mentioned in Figure 6[9]. Table 2 presents the ranking of regions within the BSR according to this metric, and also a region's relative position in Europe. More detailed data on each of the constituent indicators is available in Appendix 1. The most pervasive competitiveness drivers we find in the capital regions of the four largest Nordic countries plus Germany. A second group includes other large city regions such as Trondheim, Uppsala, Hamburg, Bergen and Malmö and Göteborg.

As one can judge from the Table, the BSR regions, and in particular the capitals and other large urban regions, score very high on regional competitiveness drivers in Europe. In fact, Copenhagen and Stockholm are only outcompeted by London and Paris, while Berlin, Oslo and Helsinki follow closely. On the other hand, the Eastern European regions score rather poorly on these metrics with the best one, Estonia, in the middle of the BSR group, and in 90th position in Europe.

Smart Specialization for BSR Regions

The concept of "smart specialisation" has become a tool to maximise the impact of EU regional policy, in combination with other EU innovation policies and programmes[10]. Thus, the Commission encourages each nation and region to draw up innovation strategies for smart specialisation as a means to ensure more efficient use of EU structural funds, and to stimulate private sector involvement. Within the framework of the European Research Area (ERA) it was argued that policy initiatives have been too fragmented, and that there has been too much duplication of public R&D investment. Regions were put in focus within the framework of the so called "knowledge economy", involving clusters, open innovation processes and R&D programmes. A critical part of the smart specialisation agenda is thus for each region to assess its own strengths and weaknesses, and to make sure that they build strength from strength. This means that historical industry composition and research strengths

[9] We used a simple technique of taking the average of standardized logs of the original raw variables and using mean imputation where data was not available.

[10] See: Regional Policy contributing to smart growth in Europe 2020. http://ec.europa.eu/regional_policy/sources/docoffic/official/communic/smart_growth/comm2010_553_en.pdf

play an increasingly important role when building future regional innovation agendas[11].

In this report we calculate the strength of a region's specialisation in an industry as the location quotient (LQ), i.e. the share of the industry in the region's economy compared to the share of this industry across all regions. For example an LQ of 2 would imply that a region has twice as many employees in an industry compared to the average region.

Based on these calculations, we define an industry as "strong" in a region if it satisfies these two criteria: a) the LQ is in top 20% *within this industry in Europe* (to allow the cut-off to vary by sector), and b) number of employees is in top 80% *within the industry in Europe* (to avoid spurious very small clusters), see Table 3.

It is revealing to assess the overall strength of the local industrial portfolio in each region. We compute three measures to assess the strength of specialisation for a particular region: the number of strong industries according to the above definition, share of employment in these strong industries, and share of total wages in these strong industries. The measures are computed relative to all of Europe using 345 traded 4-digit industries (where traded means that in general the output of an industry can be consumed in another region). Stronger BSR regions have focussed on a range of some 50 – 70 industries out of these 345 traded industries, or around 20% of the total. These 50 – 70 industries cover some 70% of employment and wages.

Table 3. Degree of Smart Specialisation at the Industry Level for BSR Regions

NUTS	Region	City	Number Industries	Employment share	Wage share
DE60	Hamburg, DE	Hamburg	72	0.70	0.75
NO01	Oslo og Akershus, NO	Oslo	64	0.72	0.74
NO06	Trøndelag, NO	Trondheim	55	0.73	0.73
NO07	Nord-Norge, NO	Tromsø	45	0.73	0.73
NO04	Agder og Rogaland, NO	Kristiansand	42	0.71	0.72
FI18/FI20	Etelä-Suomi/Åland, FI	Helsinki	84	0.69	0.71
RU81	Leningradskaya oblast', RU	Gatchina	68	0.64	0.69
NO02	Hedmark og Oppland, NO	Lillehammer	44	0.70	0.69
PL61	Kujawsko-Pomorskie, PL	Bydgoszcz	82	0.62	0.68
SE31	Norra Mellansverige, SE	Gävle	59	0.63	0.68
PL62	Warmińsko-Mazurskie, PL	Olsztyn	45	0.65	0.67
NO05	Vestlandet, NO	Bergen	43	0.66	0.66
SE21	Småland med öarna, SE	Jönköping	76	0.63	0.66
SE11	Stockholm, SE	Stockholm	69	0.66	0.65
PL32	Podkarpackie, PL	Rzeszów	61	0.59	0.65

[11] Connecting Smart and Sustainable Growth through Smart Specialisation: A practical guide for ERDF managing authorities. http://www.technopolis-group.com/cms.cgi/site/news/archives_2012.htm

FI19	Länsi-Suomi, FI	Turku	73	0.64	0.65
PL43	Lubuskie, PL	Gorzów Wielkop.	62	0.59	0.65
SE32	Mellersta Norrland, SE	Sundsvall	59	0.62	0.64
RUB2	Respublika Kareliya, RU	Petrozavodsk	42	0.60	0.64
FI1A	Pohjois-Suomi, FI	Oulu	51	0.63	0.64
PL33	Świętokrzyskie, PL	Kielce	64	0.63	0.64
RUC0	Kaliningradskaya oblast', RU	Kaliningrad	49	0.63	0.63
SE33	Övre Norrland, SE	Umeå	58	0.59	0.63
RU83	Pskovskaya oblast', RU	Pskov	53	0.70	0.63
SE22	Sydsverige, SE	Malmö	93	0.57	0.63
SE23	Västsverige, SE	Göteborg	83	0.55	0.61
DK01	Hovedstaden, DK	Copenhagen	63	0.66	0.61
PL41	Wielkopolskie, PL	Poznan	75	0.58	0.61
PL63	Pomorskie, PL	Gdansk	75	0.56	0.61
PL52	Opolskie, PL	Opole	71	0.57	0.61
RU84	St Petersburg, RU	St Petersburg	51	0.62	0.60
EE00	Eesti, EE	Tallinn	81	0.59	0.60
PL12	Mazowieckie, PL	Warszawa	66	0.59	0.59
SE12	Östra Mellansverige, SE	Uppsala	69	0.53	0.59
RUB4	Murmanskaya oblast', RU	Murmansk	26	0.58	0.59
LT00	Lietuva, LT	Vilnius	80	0.64	0.58
PL34	Podlaskie, PL	Bialystok	43	0.57	0.58
RU82	Novgorodskaya oblast', RU	Novgorod	53	0.59	0.56
DE30	Berlin, DE	Berlin	46	0.53	0.55
FI13	Itä-Suomi, FI	Kuopio	63	0.59	0.54
NO03	Sør-Østlandet, NO	Skien	60	0.55	0.54
PL22	Śląskie, PL	Katowice	52	0.46	0.53
PL11	Łódzkie, PL	Lodz	67	0.54	0.52
PL51	Dolnośląskie, PL	Wroclaw	58	0.54	0.52
DK04	Midtjylland, DK	Aarhus	57	0.42	0.48
PL42	Zachodniopomorskie, PL	Szczecin	63	0.48	0.48
PL31	Lubelskie, PL	Lublin	52	0.58	0.48
PL21	Małopolskie, PL	Kraków	78	0.53	0.46
DK05	Nordjylland, DK	Aalborg	60	0.53	0.44
DEF0	Schleswig-Holstein, DE	Kiel	50	0.40	0.43
IS00	Ísland, IS	Reykjavik	52	0.55	0.43
DK03	Syddanmark, DK	Odense	59	0.39	0.43
DE40	Brandenburg, DE	Potsdam	46	0.35	0.42
DE80	Mecklenburg-Vorpommern, DE	Rostock	39	0.41	0.37
LV00	Latvija, LV	Riga	47	0.37	0.36
DK02	Sjælland, DK	Roskilde	40	0.30	0.28

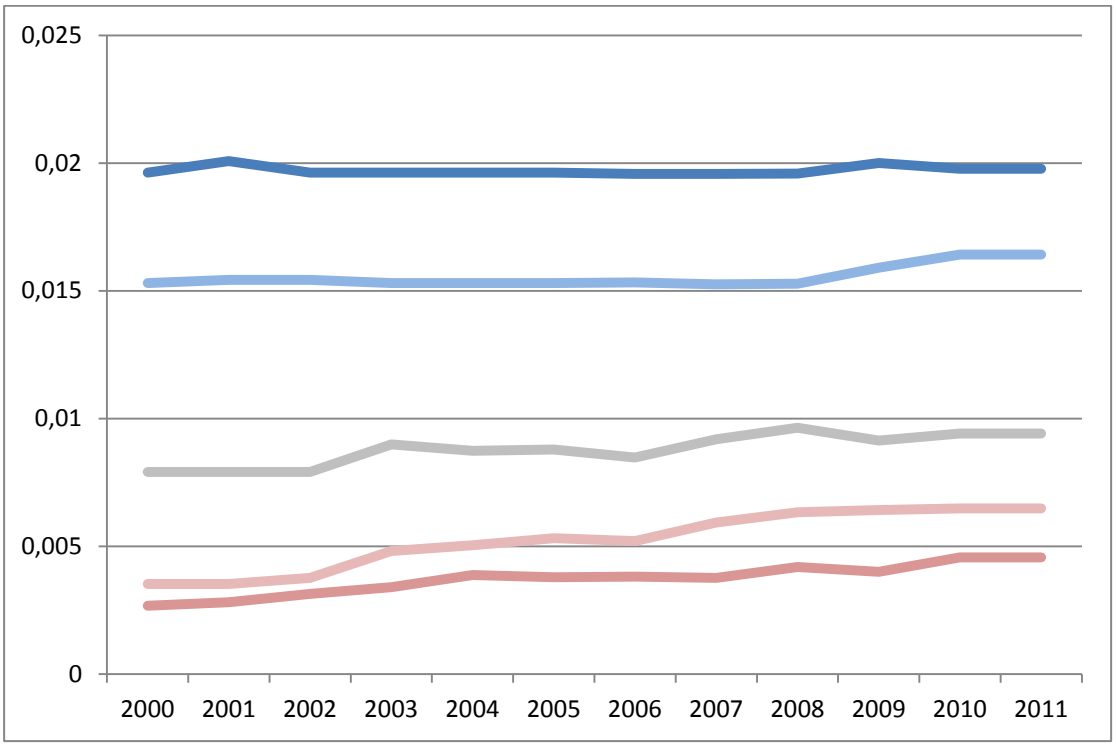
We present detailed data on the industrial composition for each BSR region, showing the top-10 industries in terms of regional specialisation, in Appendix 1.

Chapter 3 ICT Clusters in BSR

The Baltic Sea Region has a strong ICT sector. The total share of employment for ICT clusters in the 55 regions is close to 2.7%, compared to 2.6% in EU-27 and 2.4% in Europe as a whole, suggesting a slightly higher level of ICT specialisation in the BSR. On the other hand, the corresponding shares are 3.3% in United States and 3.1% in Japan, indicating that in a global setting the BSR is still lagging leading ICT nations.

If we take a closer look at the ICT sector in BSR we can see that there has been a convergence in specialisation between the transition regions and the innovative leader regions (Figure 7), where the Y-axis represents degree of regional specialisation in ICT. The bottom clusters have increased ICT specialisation, whereas the top clusters (dark blue line representing the top-10%) have been flat. In fact, the bottom 5 regional clusters have doubled their degree of specialisation over the last decade.

Figure 7. Convergence of ICT Cluster Specialisation (LQ) in BSR (2000 – 2011)



The lines represent the values of 10th, 30th, 50th, 70th and 90th percentile of specialization in ICT

Regional cluster competitiveness

In order to rank clusters we use three measures: employment size, degree of specialisation (LQ) and degree of competitiveness (CC).

- LQ: Degree of specialisation is measured as the location quotient, where values over 1 for a region indicate that the region employs more people in ICT than expected, given its population size.

- CC: Degree of competitiveness is measured as degree of specialisation weighed by wages, which is an indication of productivity levels, a common used measure for competitiveness.

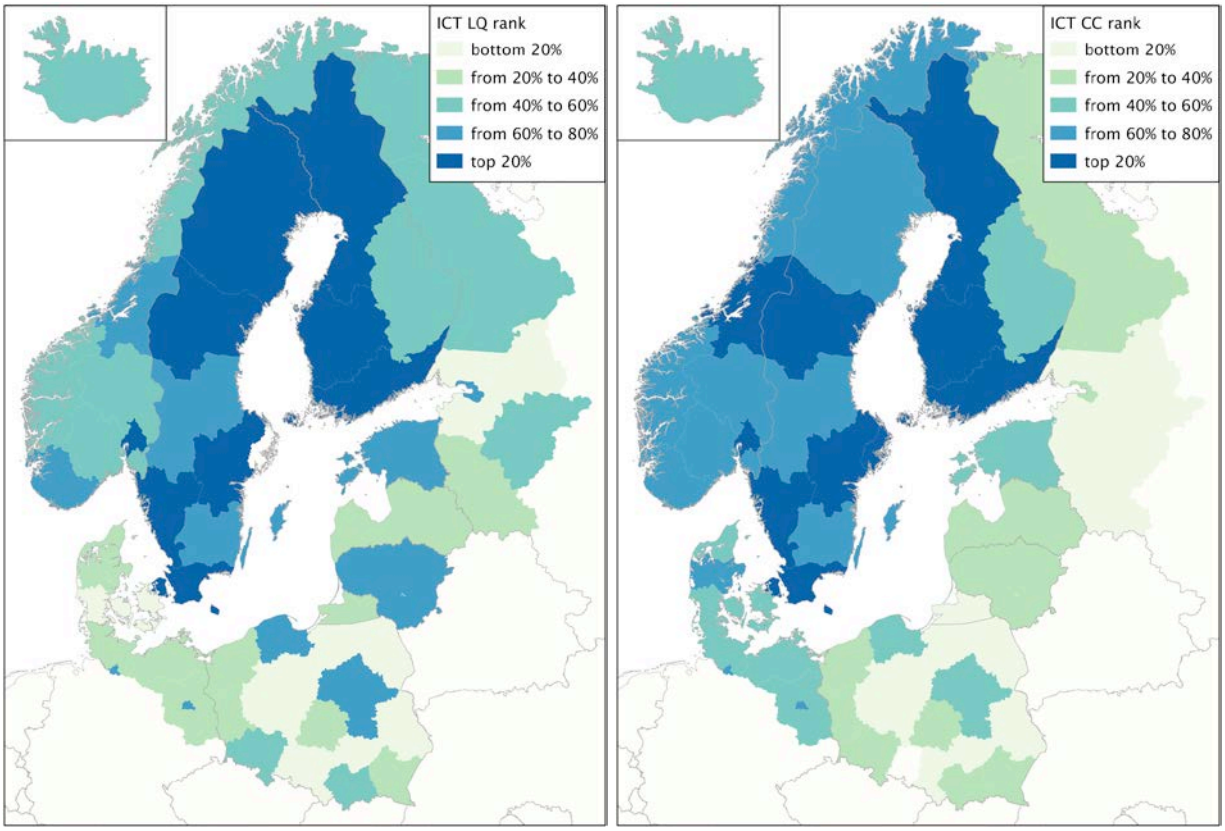
The Top-10 ICT clusters in BSR (LQ and CC) include the most advanced city regions in Sweden and Finland. However, all urban regions like Copenhagen, Oslo, Berlin, Hamburg and St. Petersburg perform well. Highly ranked clusters are typically not the largest ones see Table 4.

Table 4. Top-10 ICT Clusters in BSR by Employment and CC Rank

Regional Cluster	Largest city in region	Number of employees	BSR CC Rank
Mazowieckie, Poland	Warszawa	69 368	25
Stockholm, Sweden	Stockholm	58 247	2
Hovedstaden, Denmark	Copenhagen	47 805	3
Etelä-Suomi/Åland, Finland	Helsinki	46 375	4
Berlin, Germany	Berlin	39 015	19
St Petersburg, Russia	St Petersburg	37 927	34
Oslo og Akershus, Norway	Oslo	30 320	1
Hamburg, Germany	Hamburg	28 381	14
Västsverige, Sweden	Göteborg	22 938	6
Lietuva, Lithuania	Vilnius	15 568	33

Based on the two measures: 1) cluster specialisation (LQ,) and 2) cluster competitiveness (CC), we divide all 56 regional clusters into five groups (quintiles), each represented by its own colour, see map in Figure 8.

Figure 8. ICT Specialisation and Competitiveness in BSR



Left: location quotient, Right: wage-adjusted location quotient.

In Table 5 below we show all the 56 regional clusters and their rankings. In the first column we show the ranking within the BSR region (1 through 56), in the second column the European rank (1 through 385), and in the third column the transatlantic ranking (1 through 748). The Oslo & Akershus ICT cluster takes the lead both in BSR as well as in Europe, and is the 6th leding cluster in the Transatlantic ranking.

Table 5. ICT Cluster Competitiveness (CC) Ranking

Cluster	Largest city in region	BSR CC Rank	Europe CC Rank	Transatl. CC Rank
Oslo og Akershus, Norway	Oslo	1	1	6
Stockholm, Sweden	Stockholm	2	2	11
Hovedstaden, Denmark	Copenhagen	3	6	23
Etelä-Suomi/Åland, Finland	Helsinki	4	7	25
Pohjois-Suomi, Finland	Oulu	5	8	26
Västsverige, Sweden	Göteborg	6	16	46
Trøndelag, Norway	Trondheim	7	17	47
Länsi-Suomi, Finland	Turku	8	18	49

Sydsverige, Sweden	Malmö	9	20	57
Mellersta Norrland, Sweden	Sundsvall	10	22	60
Östra Mellansverige, Sweden	Uppsala	11	25	70
Agder og Rogaland, Norway	Kristiansand	12	28	74
Övre Norrland, Sweden	Umeå	13	30	79
Hamburg, Germany	Hamburg	14	40	111
Vestlandet, Norway	Bergen	15	44	121
Sør-Østlandet, Norway	Skien	16	48	132
Hedmark og Oppland, Norway	Lillehammer	17	50	136
Nord-Norge, Norway	Tromsø	18	51	137
Berlin, Germany	Berlin	19	53	149
Midtjylland, Denmark	Aarhus	20	58	162
Norra Mellansverige, Sweden	Gävle	21	63	176
Småland med öarna, Sweden	Jönköping	22	64	179
Nordjylland, Denmark	Aalborg	23	72	208
Itä-Suomi, Finland	Kuopio	24	82	233
Mazowieckie, Poland	Warszawa	25	102	288
Schleswig-Holstein, Germany	Kiel	26	123	340
Syddanmark, Denmark	Odense	27	137	370
Sjælland, Denmark	Roskilde	28	152	429
Eesti, Estonia	Tallinn	29	175	484
Brandenburg, Germany	Potsdam	30	177	488
Mecklenburg-Vorpommern, Germany	Rostock	31	189	522
Pomorskie, Poland	Gdansk	32	195	529
Lietuva, Lithuania	Vilnius	33	197	533
St Petersburg, Russia	St Petersburg	34	205	547
Małopolskie, Poland	Kraków	35	207	551
Latvija, Latvia	Riga	36	219	573
Dolnośląskie, Poland	Wroclaw	37	223	578
Murmanskaya oblast', Russia	Murmansk	38	237	607
Łódzkie, Poland	Lodz	39	242	615
Zachodniopomorskie, Poland	Szczecin	40	246	622
Podkarpackie, Poland	Rzeszów	41	247	623
Respublika Kareliya, Russia	Petrozavodsk	42	248	625
Lubuskie, Poland	Gorzów Wielkopolski	43	249	627
Novgorodskaya oblast', Russia	Novgorod	44	258	638
Kujawsko-Pomorskie, Poland	Bydgoszcz	45	266	646
Kaliningradskaya oblast', Russia	Kaliningrad	46	268	648
Śląskie, Poland	Katowice	47	269	649
Pskovskaya oblast', Russia	Pskov	48	271	651
Wielkopolskie, Poland	Poznan	49	299	683
Leningradskaya oblast', Russia	Gatchina	50	302	686
Lubelskie, Poland	Lublin	51	303	687
Podlaskie, Poland	Bialystok	52	313	700
Świętokrzyskie, Poland	Kielce	53	328	715
Warmińsko-Mazurskie, Poland	Olsztyn	54	334	721
Opolskie, Poland	Opole	55	335	722

Subclusters

ICT is a rather broad sector comprising many different types of activities, including manufacturing, design, software and a range of IT services. The rankings for the Top-10 subclusters are shown in Table 6.

Table 6. Top-10 ICT Subclusters in BSR

ICT Manufacturing Subcluster

Regional Cluster	Largest city in region	Number of employees	BSR CC Rank
Pohjois-Suomi, Finland	Oulu	5 014	1
Etelä-Suomi/Åland, Finland	Helsinki	14 904	2
Länsi-Suomi, Finland	Turku	4 443	3
Västsverige, Sweden	Göteborg	4 436	4
Östra Mellansverige, Sweden	Uppsala	3 162	5
Trøndelag, Norway	Trondheim	512	6
Sydsverige, Sweden	Malmö	2 012	7
Hamburg, Germany	Hamburg	3 840	8
Berlin, Germany	Berlin	5 165	9
Agder og Rogaland, Norway	Kristiansand	988	10

ICT Services Subcluster

Regional Cluster	Largest city in region	Number of employees	BSR CC Rank
Oslo og Akershus, Norway	Oslo	12 993	1
Stockholm, Sweden	Stockholm	21 796	2
Hovedstaden, Denmark	Copenhagen	15 721	3
Agder og Rogaland, Norway	Kristiansand	2 741	4
Västsverige, Sweden	Göteborg	8 006	5
Mellersta Norrland, Sweden	Sundsvall	1 416	6
Övre Norrland, Sweden	Umeå	1 509	7
Hamburg, Germany	Hamburg	11 652	8
Östra Mellansverige, Sweden	Uppsala	4 254	9
Trøndelag, Norway	Trondheim	954	10

ICT Software Subcluster

Regional Cluster	Largest city in region	Number of employees	BSR CC Rank
Stockholm, Sweden	Stockholm	24 136	1
Oslo og Akershus, Norway	Oslo	9 358	2
Hovedstaden, Denmark	Copenhagen	14 982	3
Etelä-Suomi/Åland, Finland	Helsinki	16 104	4
Trøndelag, Norway	Trondheim	1 534	5
Sydsverige, Sweden	Malmö	6 276	6
Länsi-Suomi, Finland	Turku	5 455	7
Västsverige, Sweden	Göteborg	7 496	8
Pohjois-Suomi, Finland	Oulu	1 965	9
Midtjylland, Denmark	Aarhus	3 862	10

Telecommunications Subcluster

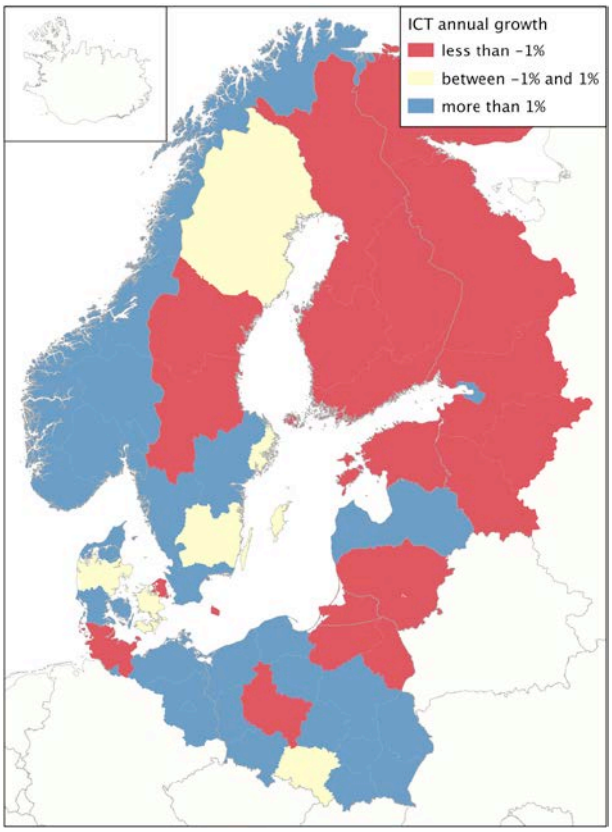
Regional Cluster	Largest city in region	Number of employees	BSR CC Rank
Oslo og Akershus, Norway	Oslo	7 286	1
Hovedstaden, Denmark	Copenhagen	15 266	2
Stockholm, Sweden	Stockholm	11 291	3
Mellersta Norrland, Sweden	Sundsvall	1 376	4
Hedmark og Oppland, Norway	Lillehammer	743	5
Övre Norrland, Sweden	Umeå	1 222	6
Etelä-Suomi/Åland, Finland	Helsinki	7 177	7
Mazowieckie, Poland	Warszawa	43 358	8
Nord-Norge, Norway	Tromsø	837	9
Trøndelag, Norway	Trondheim	792	10

The leading manufacturing industries are mostly concentrated to Finland, and to a lesser degree to Sweden. However, the three service-oriented subclusters display a very different pattern; they are by far most prevalent in dense urban regions, with Oslo, Stockholm and Copenhagen claiming the top three spots in each category.

Cluster Growth and Decline

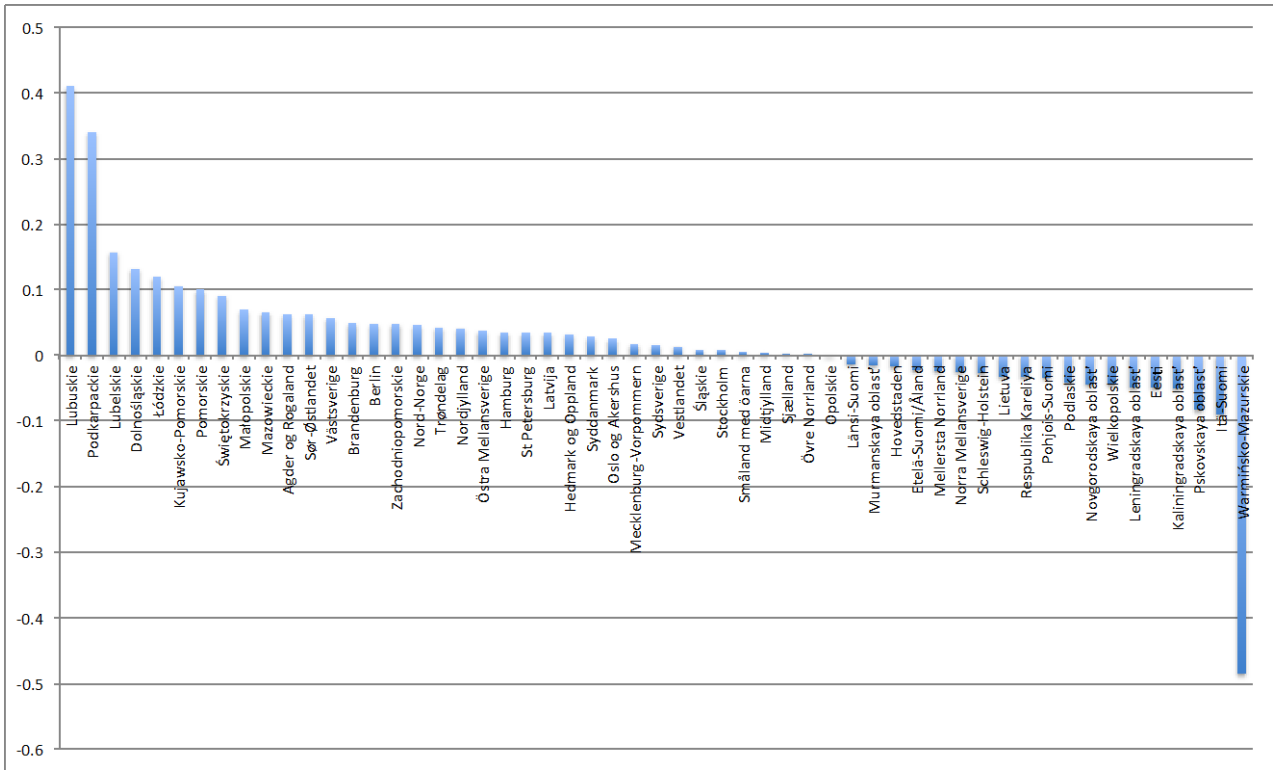
ICT clusters in BSR have grown at very different speeds. Judging from employment data (2005 – 2010) we can see how regional clusters in e.g. Russia, Finland, Estonia, and Lithuania have experienced decreasing ICT employment. In parts of Norway, Sweden, Denmark, Poland and Latvia, ICT employment has increased (Figure 9).

Figure 9. ICT Employment Growth (2005 - 2010)



In Figure 10 below we see the growing regional ICT clusters to the far left, and the declining ones to the far right. Many Polish ICT clusters have grown considerably in terms of employment, however, in many cases from very low levels.

Figure 10. Annual Growth Rates in ICT Employment (2005 – 2010)



Data for Germany: 2005-2011, Denmark and Russia: 2005-2009, Estonia and Poland: 2007-2010, rest of the countries: 2005-2010.

Cluster Organisations

There are a large number of organised ICT clusters around the Baltic Sea Region (Table 7). Some of these are involved the BSR Stardust project, coordinated under the Mobile Viking umbrella (Table 8). High density of organisations for collaboration, such as cluster organisations, is a sign of cluster dynamics.

Table 7. BSR Cluster Organisations in ICT

Name	***Website***	***Region***
Denmark		
IT Forum Trekantomradet	www.itft.dk	Syddanmark
Knowledge Lab	www.knowledgelab.dk	Syddanmark
Alexandra Instituttet	www.alexandra.dk	Midtjylland
IT City Katrinebjerg	www.katrinebjerg.net	Midtjylland
Brains Business	www.brainsbusiness.dk	Nordjylland
Det Digitale Nordjylland	www.detdigitalenordjylland.dk	Nordjylland
ICT Forum	www.iktforum.dk	Nordjylland
ICT North Denmark	www.brainsbusiness.dk	Nordjylland
Estonia		
Competence Centre of Electronics and ICT	www.eliko.ee	Eesti
Estonian HealthTech Cluster	www.htcluster.eu	Eesti
Estonian ICT Demo Center	www.demoestonia.eu	Eesti

Finland		
Embedded Systems	www.tekes.fi/ubicom	Etelä-Suomi
FENIX	www.tekes.fi/fenix	Etelä-Suomi
Forum Virium	www.forumvirium.fi	Etelä-Suomi
Helsinki Region Centre of Expertise	www.culminatum.fi	Etelä-Suomi
ICT Turku	www.turkusciencepark.com	Etelä-Suomi
MASI	www.tekes.fi/masi	Etelä-Suomi
Foodwest	www.foodwest.fi	Länsi-Suomi
Hermia	www.hermia.fi	Länsi-Suomi
Ubiquitous Computing Cluster Programme	www.ubi.fi	Länsi-Suomi
Micropolis	www.micropolis.fi	Pohjois-Suomi
Germany		
MOBKOM.NET	*www.mobkom.net*	*Berlin*
GEOkomm networks	www.geokomm.net	Brandenburg
SeSamBB	www.sesambb.de	Brandenburg
Hamburg@work	www.hamburg-media.net	Hamburg
Logistics Initiative Hamburg	www.hamburg-logistik.net	Hamburg
WT|SH	www.wtsh.de	Schleswig-Holstein
Lithuania		
Infobalt	www.infobalt.lt/english	Lietuva
Sunrise valley	www.sunrisevalley.lt	Lietuva
Visorial	www.vitp.lt	Lietuva
Window to the Future	www.langasiateiti.lt	Lietuva
Latvia		
Latvian IT Cluster	*www.itbaltic.com*	*Latvija*
Norway		
Trådløs Framtid	www.tradlosframtid.no	Oslo og Akershus
IKT Grenland	www.iktgrenland.no	Sør-Østlandet
Poland		
Alternatywny Klaster Informatyczny	www.klaster.info	Mazowieckie
EduKlaster - Nowe Media w Edukacji	eduklaster.pl	Mazowieckie
Mazowiecki Klaster ICT	www.klasterict.pl	Mazowieckie
Informatyka Podkarpacka	www.informatykapodkarpacka.pl	Podkarpackie
Wielkopolska ICT Cluster	www.wklaster.pl	Wielkopolskie
ICT Pomorze Zachodnie	ict-pomorzezachodnie.pl	Zachodniopomorskie
Sweden		
FaxenLaboratoriet	www2.mech.kth.se/faxenlab/	Stockholm
HomeCom	www.homecom.se	Östra Mellansverige
S-SENCE	www.ifm.liu.se/applphys/S-SENCE	Östra Mellansverige
CLUSTER 55°	cluster55.org	Sydsverige
Mobile Heights	www.mhbc.se	Sydsverige
Soft Center Network Ronneby	www.softcenter.net	Sydsverige
Center of Visualization Gotebrg	www.center-of-visualization.org	Västsverige
Microwave Road	www.microwaveroad.se	Västsverige
Compare IT	www.compare.se	Norra Mellansverige

Future Position X	*www.fpx.se*	*Norra Mellansverige*
ProcessIT Innovations	www.processitinnovations.se	Övre Norrland

Table 8. BSR Stardust Partners (Mobile Vikings)

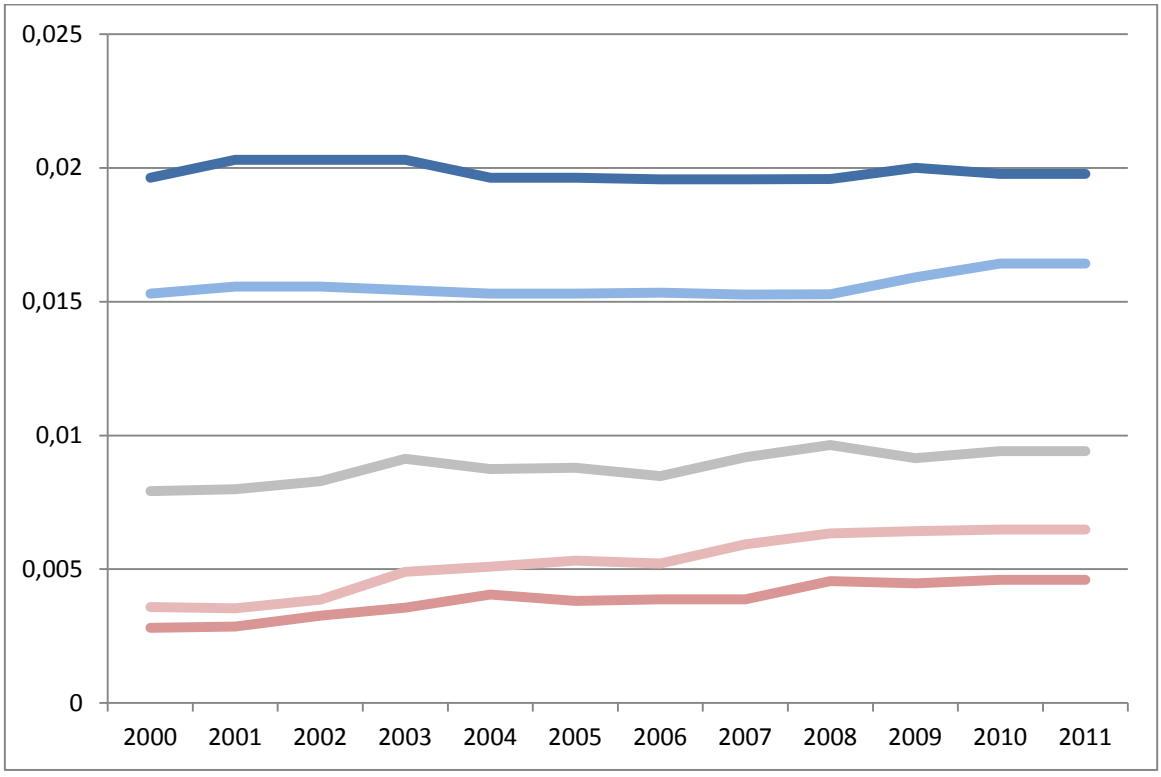
Name	***Website***	***Region***
Denmark		
Brains Business	*www.brainsbusiness.dk*	*Nordjylland*
Finland		
Forum Virium	*www.forumvirium.fi*	*Etelä-Suomi*
Hermia	*www.hermia.fi*	*Länsi-Suomi*
Germany		
MOBKOM.NET	*www.mobkom.net*	*Berlin*
Lithuania		
Visorial	*www.vitp.lt*	*Lietuva*
Latvia		
Latvian IT Cluster	*www.itbaltic.com*	*Latvija*
Norway		
Trådløs Framtid	*www.tradlosframtid.no*	*Oslo og Akershus*
IKT Grenland	*www.iktgrenland.no*	*Sør-Østlandet*
Poland		
Wielkopolska ICT Cluster	*www.wklaster.pl*	*Wielkopolskie*
ICT Pomorze Zachodnie	*ict-pomorzezachodnie.pl*	*Zachodniopomorskie*
Sweden		
CLUSTER 55°	*cluster55.org*	*Sydsverige*
Mobile Heights	*www.mhbc.se*	*Sydsverige*
Future Position X	*www.fpx.se*	*Norra Mellansverige*

Chapter 4 Cleantech Clusters in BSR

The Baltic Sea Region has a one of the global leaders in teh Cleantech sector. The total share of employment for clean technology clusters in the 56 regions is close to 1.1% compared to 0.78% in EU-27 and 0.92% in Europe as a whole, suggesting a very high level of Cleantech specialisation in the BSR. The difference in even clearer in the global context with Japan only having 0.7% of employment in clean tech and the United States at 0.35%, less than a third of the BSR shares.

If we take a closer look at the Cleantech sector in BSR we can see that there has been a convergence in specialisation between the transition regions and the innovative leader regions (Figure 11), where the Y-axis represents degree of regional specialisation in Cleantech. The bottom clusters have increased Cleantech specialisation, whereas the top clusters (dark blue line representing the top-10%) have been flat.

Figure 11. Convergence of Cleantech Cluster Specialisation in BSR (2000 – 2011)



The lines represent the values of 10th, 30th, 50th, 70th and 90th percentile of specialization in Cleantech

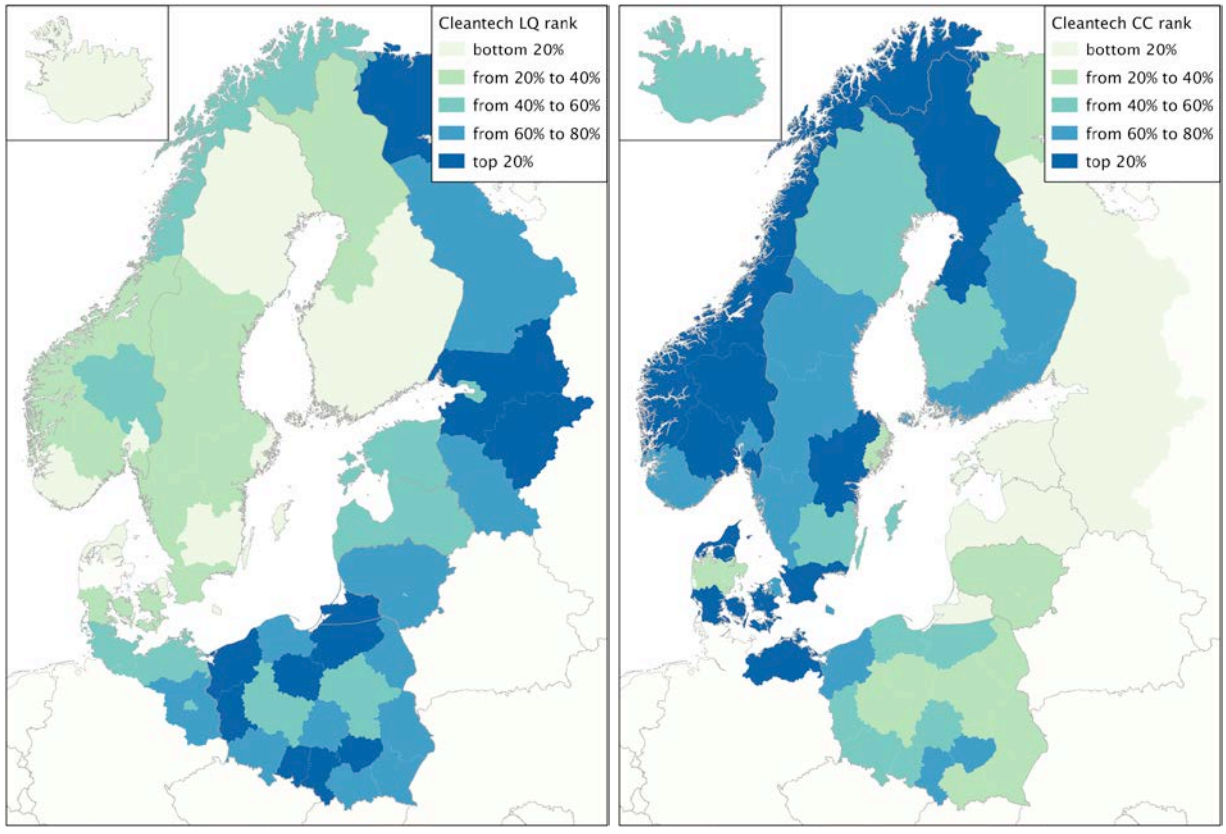
Regional Cluster Competitiveness

In order to rank clusters we use three measures: employment size, degree of specialisation (LQ) and degree of competitiveness (CC). The Top-10 Cleantech clusters in terms of employment we find in the eastern regions in Poland, Russia and Lithuania (Table 9).

Table 9. Top-10 Cleantech Clusters in BSR by Employment

Regional Cluster	Largest city in region	Number of employees	BSR CC Rank
Śląskie, Poland	Katowice	20 078	20
St Petersburg, Russia	St Petersburg	18 660	45
Mazowieckie, Poland	Warszawa	18 347	41
Lietuva, Lithuania	Vilnius	11 373	39
Dolnośląskie, Poland	Wroclaw	10 808	27
Wielkopolskie, Poland	Poznan	10 375	40
Małopolskie, Poland	Kraków	9 633	37
Leningradskaya oblast', Russia	Gatchina	8 784	44
Łódzkie, Poland	Lodz	7 849	31
Latvija, Latvia	Riga	7 438	48

Figure 12. Cluster Competitiveness in Cleantech



Left: location quotient, Right: wage-adjusted location quotient.

However, the cluster patterns in Cleantech depend drastically on whether or not wage information is included in the analysis. While the regions with the highest concentration of clean technology are in the east, particularly Poland and Russia, the differences in wages among the countries in the BSR are staggering (from 2 700 EUR per year in Pskovskaya Oblast in Russia to 55 000 EUR per year in Copenhagen). Taking wages (as a proxy for productivity) into account leads to a completely different pattern. The most competitive Cleantech clusters we find in Norway, Denmark, Sweden and Germany (see map in Figure 12).

Nord-Norge with Tromsø as the hub takes the lead in BSR, and has an impressive number 4 position in Europe (Table 10).

Table 10. Cleantech Cluster Competitiveness Ranking (CC)

Regional Cluster	Largest city in region	BSR CC Rank	Europe CC Rank	Transatl. CC Rank
Nord-Norge, Norway	Tromsø	1	4	9
Mecklenburg-Vorpommern, Germany	Rostock	2	7	14
Sør-Østlandet, Norway	Skien	3	14	22
Syddanmark, Denmark	Odense	4	17	26
Hedmark og Oppland, Norway	Lillehammer	5	19	30
Vestlandet, Norway	Bergen	6	22	33
Sjælland, Denmark	Roskilde	7	24	35
Trøndelag, Norway	Trondheim	8	27	40
Nordjylland, Denmark	Aalborg	9	43	64
Sydsverige, Sweden	Malmö	10	49	72
Östra Mellansverige, Sweden	Uppsala	11	51	74
Pohjois-Suomi, Finland	Oulu	12	53	76
Västsverige, Sweden	Göteborg	13	62	87
Agder og Rogaland, Norway	Kristiansand	14	69	100
Mellersta Norrland, Sweden	Sundsvall	15	73	106
Zachodniopomorskie, Poland	Szczecin	16	77	111
Świętokrzyskie, Poland	Kielce	17	81	117
Norra Mellansverige, Sweden	Gävle	18	82	118
Oslo og Akershus, Norway	Oslo	19	86	129
Śląskie, Poland	Katowice	20	87	130
Itä-Suomi, Finland	Kuopio	21	90	134
Etelä-Suomi/Åland, Finland	Helsinki	22	94	139
Hovedstaden, Denmark	Copenhagen	23	101	155
Lubuskie, Poland	Gorzów Wielkopolski	24	103	157
Opolskie, Poland	Opole	25	104	161
Warmińsko-Mazurskie, Poland	Olsztyn	26	105	162
Dolnośląskie, Poland	Wroclaw	27	110	172
Övre Norrland, Sweden	Umeå	28	117	190
Länsi-Suomi, Finland	Turku	29	118	191
Småland med öarna, Sweden	Jönköping	30	126	205
Łódzkie, Poland	Lodz	31	127	206
Pomorskie, Poland	Gdansk	32	135	218
Stockholm, Sweden	Stockholm	33	139	232
Kujawsko-Pomorskie, Poland	Bydgoszcz	34	140	233

Podkarpackie, Poland	Rzeszów	35	141	234
Lubelskie, Poland	Lublin	36	149	251
Małopolskie, Poland	Kraków	37	150	257
Podlaskie, Poland	Bialystok	38	154	267
Lietuva, Lithuania	Vilnius	39	167	317
Wielkopolskie, Poland	Poznan	40	169	319
Mazowieckie, Poland	Warszawa	41	178	363
Murmanskaya oblast', Russia	Murmansk	42	179	371
Midtjylland, Denmark	Aarhus	43	186	385
Leningradskaya oblast', Russia	Gatchina	44	196	408
St Petersburg, Russia	St Petersburg	45	222	487
Kaliningradskaya oblast', Russia	Kaliningrad	46	223	488
Novgorodskaya oblast', Russia	Novgorod	47	231	503
Latvija, Latvia	Riga	48	242	553
Eesti, Estonia	Tallinn	49	255	580
Respublika Kareliya, Russia	Petrozavodsk	50	258	584
Pskovskaya oblast', Russia	Pskov	51	282	632

Wage data, and hence competitiveness, for Cleantech in German regions Berlin, Brandenburg, Hamburg and Schleswig-Holstein is missing, so they were excluded from the analysis.

Subclusters

Cleantech is a broad sector comprising many different types of activities, including Sewerage, Water treatment and Waste management and remediation. In Table 11 we show the rankings for the Top-10 subclusters. Top BSR subclusters we find in the Nordjylland sewerage cluster in Denmark, the Swietokrzyskie water treatment cluster in Poland, and the Nordnorge waste management cluster in Norway around the city of Tromsø.

Table 11. Competitiveness of Cleantech Subclusters in BSR

Sewerage Subcluster

Regional Cluster	Largest city in region	Number of employees	BSR CC Rank
Nordjylland, Denmark	Aalborg	264	1
Lubelskie, Poland	Lublin	2 942	2
Podlaskie, Poland	Bialystok	1 156	3
Warmińsko-Mazurskie, Poland	Olsztyn	1 459	4
Pomorskie, Poland	Gdansk	2 355	5
Kujawsko-Pomorskie, Poland	Bydgoszcz	2 336	6
Sjælland, Denmark	Roskilde	173	7
Syddanmark, Denmark	Odense	392	8
Łódzkie, Poland	Lodz	2 704	9
Vestlandet, Norway	Bergen	205	10

Water Treatment Subcluster

Regional Cluster	Largest city in region	Number of employees	BSR CC Rank
Świętokrzyskie, Poland	Kielce	2 237	1
Mecklenburg-Vorpommern, Germany	Rostock	1 587	2
Zachodniopomorskie, Poland	Szczecin	2 647	3
Opolskie, Poland	Opole	1 855	4
Śląskie, Poland	Katowice	8 380	5
Lubuskie, Poland	Gorzów Wielkopolski	1 504	6
Łódzkie, Poland	Lodz	3 171	7
Pohjois-Suomi, Finland	Oulu	286	8
Dolnośląskie, Poland	Wroclaw	4 510	9
Małopolskie, Poland	Kraków	4 318	10

Waste Management and Remediation Subcluster

Regional Cluster	Largest city in region	Number of employees	BSR CC Rank
Nord-Norge, Norway	Tromsø	912	1
Sør-Østlandet, Norway	Skien	1 500	2
Hedmark og Oppland, Norway	Lillehammer	529	3
Syddanmark, Denmark	Odense	2 122	4
Trøndelag, Norway	Trondheim	597	5
Mecklenburg-Vorpommern, Germany	Rostock	4 092	6
Vestlandet, Norway	Bergen	1 252	7
Sjælland, Denmark	Roskilde	958	8
Östra Mellansverige, Sweden	Uppsala	1 920	9
Sydsverige, Sweden	Malmö	1 869	10

Cluster Growth and Decline

Cleantech clusters in BSR have grown at very different speeds. Judging from employment data (2005 – 2010) we can see how employment in clean technology increased in most Western Countries (except for Norway), while decreasing sharply in Russia and the Baltic states (Figure 13). One of the explanations for this decline in the Eastern countries is the relative inefficiency of work in this sectors, as evidenced from Figure 12, leading to contracting employment needs as the productivity of labor increases.

In Figure 14 below we see the growing regional Cleantech clusters to the far left, and the declining ones to the far right. While Nordjylland in Denmark has experienced the largest employment growth, we also find growing clusters in Finland and Sweden. The largest decline we find in a number of Eastern clusters and in Norway, thought the magnitude of the effects is much smaller than for ICT.

Figure 13. Cleantech Cluster Employment Growth (2005 – 2010)

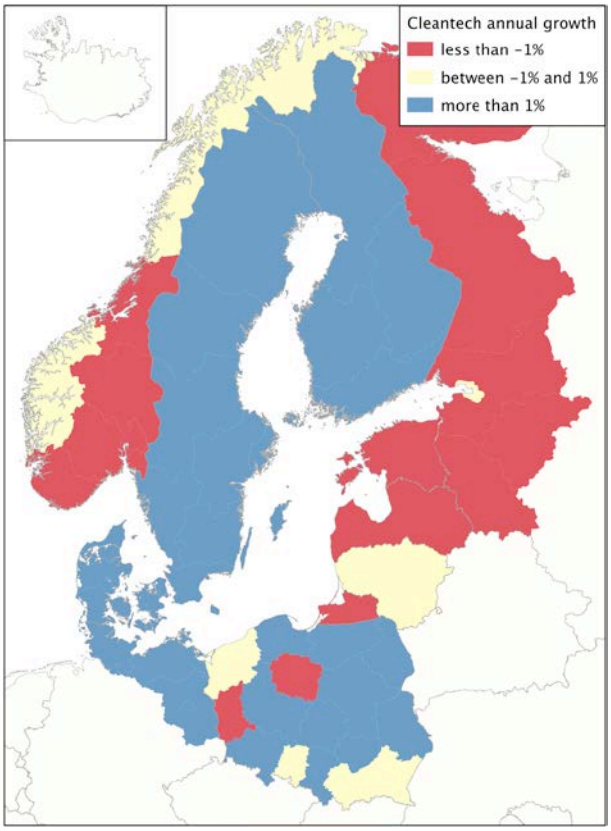
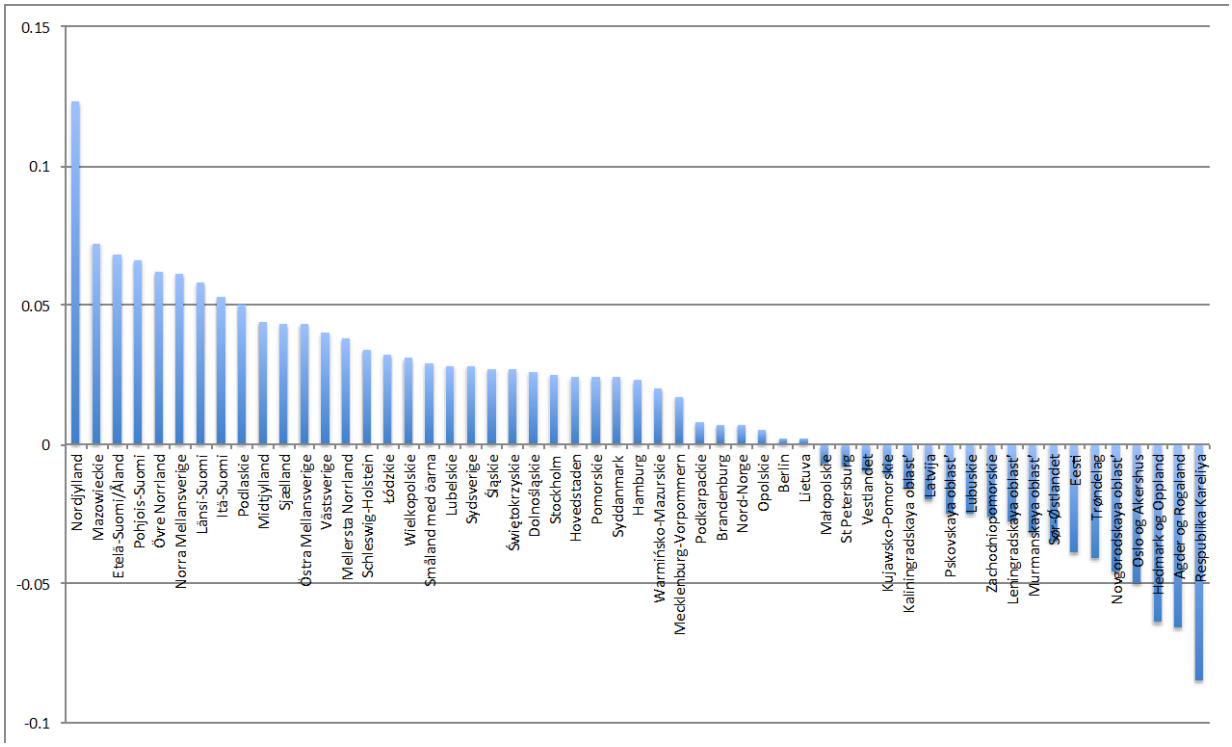


Figure 14. Annual Growth Rates in Cleantech Employment (2005 – 2010)



Data for Germany: 2005-2011, Denmark and Russia: 2005-2009, Estonia and Poland: 2007-2010, rest of the countries: 2005-2010.

Cluster Organisations

There are a large number of organised cleantech clusters around the Baltic Sea Region (Table 12). Some of these are involved the BSR Stardust project, coordinated under the Clean Water umbrella (Table 13). High density of organisations for collaboration, such as cluster organisations, is a sign of cluster dynamics.

Table 12. BSR Cluster Organisations in Cleantech

Name	*URL*	*Region*
Denmark		
Gate 21	www.gate21.dk	Hovedstaden
Green Centre	www.greencenter.dk	Sjælland
The industrial symbiosis of Kalundborg	www.symbiosis.dk	Sjælland
AluCluster	www.alucluster.com	Syddanmark
Environment Forum Funen	www.mf-fyn.dk	Syddanmark
Environment Network South	www.milra.dk	Syddanmark
Green Network	www.greennetwork.dk	Syddanmark
Green Network South Jutland	www.gns.dk	Syddanmark
Key2Green	www.key2green.dk	Syddanmark
Danish University Wind Energy Training	www.duwet.dk	Midtjylland
Hydrogen Innovation & Research Centre	www.hirc.dk	Midtjylland
Innovation Centre for Bioenergy and Environmental Technology	www.cbmi.dk	Midtjylland
Finland		
Cleantech Cluster	www.cleantechcluster.fi	Etelä-Suomi
Helsinki Region Centre of Expertise	www.culminatum.fi	Etelä-Suomi
Lahti Cleantech Cluster	www.ladec.fi	Etelä-Suomi
Oulu Innovation	www.ouluinnovation.com	Pohjois-Suomi
Germany		
BioHyTec Biohybrid Technologies – Potsdam	www.biohytec.de	Brandenburg
Lithuania		
Sunrise valley	www.sunrisevalley.lt	Lietuva
Norway		
OREEC	www.oreec.no	Oslo og Akershus
EYDE Nettverket	www.eyde-nettverket.no	Agder og Rogaland
Norwegian Centre of Expertise - Subsea	www.ncesubsea.no	Vestlandet
Poland		
Malopolsko-Podkarpacki Klaster Czystej Energii	www.klaster.agh.edu.pl	Małopolskie
Slaski klaster wodny	www.klasterwodny.pl	Śląskie
The Green Technologies Centre	www.zielonetechnologie.pl	Podlaskie
Dolnoslaski Klaster Energii Odnawialnej	www.dkeo.pl	Dolnośląskie

Klaster turystyczny Bory Tucholskie	www.klaster.tucholski.pl	Kujawsko-Pomorskie
Baltycki Klaster Ekoenergetyczny	www.bkee.pl	Pomorskie
Sweden		
Vingaker Energetic Science Park	www.vesp.se	Östra Mellansverige
Sustainable Sweden Southeast AB	www.sustainable-sweden.se	Småland med öarna
Cleantech	www.cinns.se	Sydsverige
CPM	www.cpm.chalmers.se	Västsverige
Samvate i Vast	www.etcab.se	Västsverige
Paper Province	www.paperprovince.eu	Norra Mellansverige
The Energy Square	www.energysquare.se	Norra Mellansverige
Processum	www.processum.se	Mellersta Norrland
BioFuel Region	www.biofuelregion.se	Övre Norrland

Table 13. BSR Stardust Partners (Clean Water)

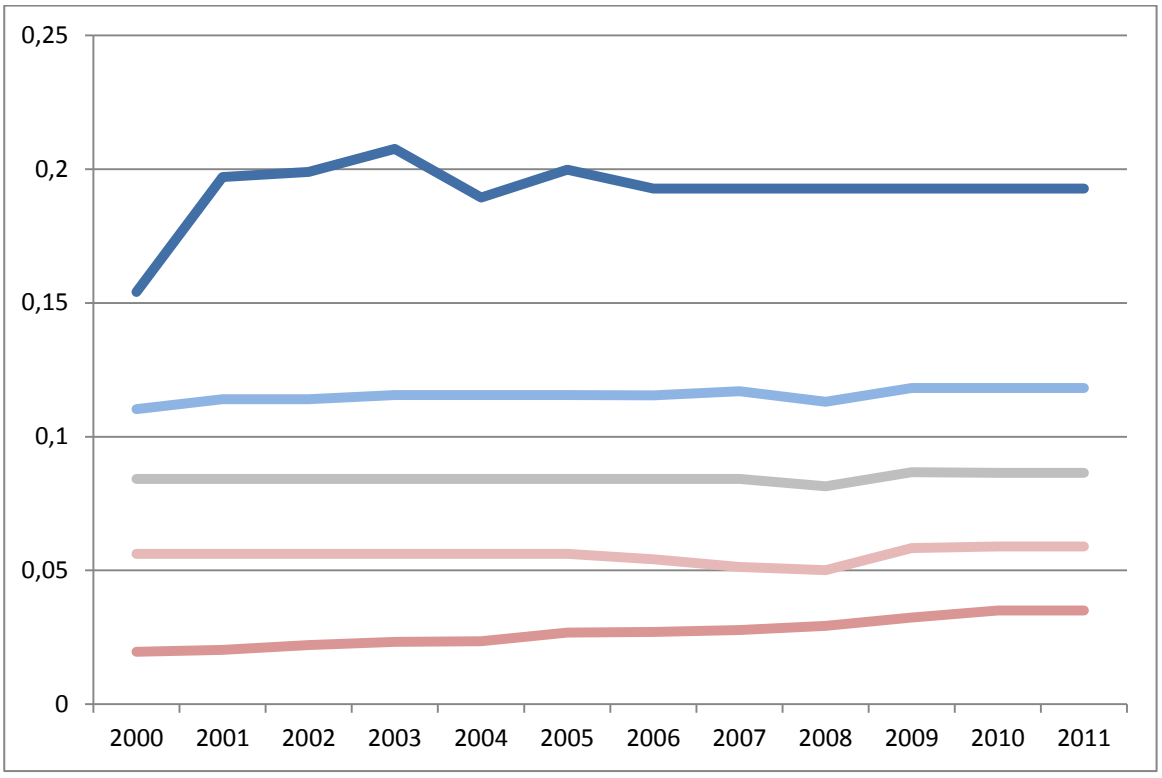
Name	***URL***	***Region***
Finland		
Lahti Cleantech Cluster	*www.ladec.fi*	*Etelä-Suomi*
Lithuania		
Kaunas University of Technology	*en.ktu.lt*	*Lietuva*
Poland		
Institute of Oceanology Polish Academy of Sciences	*www.iopan.gda.pl*	*Pomorskie*
Sweden		
Sustainable Sweden Southeast AB	*www.sustainable-sweden.se*	*Småland med öarna*

Chapter 5 Healthcare Clusters in BSR

Unlike the other three sectors described in this report, the Baltic Sea Region has relatively fewer people employed when compared to other macro-regions. At 7.5% it is has a rather smaller share than EU-27 and Europe as a whole, which have 9% and 8.7% respectively. Compared globally, the difference is even larger with Japan employing close to 9.7% in healthcare and the United States almost 16.2%, reflecting the different approaches to health systems in these countries.

If we take a closer look at the Healthcare sector in the macro region we can see that there has been some slight convergence among the clusters, though the numbers remain extremely stable (Figure 15). This could be due to the large involvement of the state in healthcare and the constant societal need for these services, leading to strong resilience to shocks.

Figure 15. Convergence of Healthcare Cluster Specialisation in BSR (2000 – 2011)



The lines represent the values of 10th, 30th, 50th, 70th and 90th percentile of specialization in Healthcare

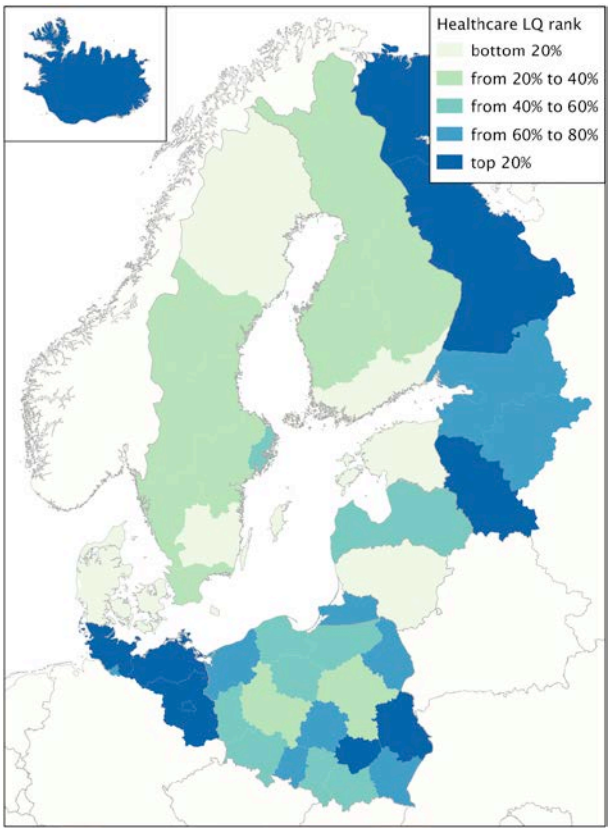
Regional Cluster Competitiveness

The largest Healthcare clusters we find in Germany and Russia (Table 14). The Berlin Healthcare cluster takes the top position in terms of size, and is also one of the most specialised ones.

Table 14. Top-10 Healthcare Clusters in BSR by Employment

Regional Cluster	Largest city in region	Number of employees	BSR LQ Rank
Berlin, Germany	Berlin	170087	3
St Petersburg, Russia	St Petersburg	154585	13
Schleswig-Holstein, Germany	Kiel	125674	1
Brandenburg, Germany	Potsdam	103458	5
Mazowieckie, Poland	Warszawa	94140	32
Hamburg, Germany	Hamburg	84536	15
Śląskie, Poland	Katowice	81032	26
Mecklenburg-Vorpommern, Germany	Rostock	77786	4
Stockholm, Sweden	Stockholm	57193	25
Dolnośląskie, Poland	Wroclaw	54971	22

Figure 16. Cluster Specialisation in Healthcare



With addition of the Icelandic healthcare cluster, the clusters with the highest degrees of specialisation we also find in the Baltic parts of Germany and Russia. The most specialised cluster we find around Kiel (Schleswig-Holstein), see Table 15. In general BSR regions rank low in Europe in terms of cluster specialisation.

It has to be noted that the data for the Healthcare cluster is different than other sectors in that there is very little data on wages for public sector employees, of which health care is a part. Thus, we must use employment-based statistics, and location quotients are not adjusted by wage, i.e. LQ rank is used instead of CC rank[12].

Table 15. Healthcare Cluster Specialisation

Regional Cluster	Largest city in region	BSR LQ Rank	Europe LQ Rank	Transatl. LQ Rank
Schleswig-Holstein, Germany	Kiel	1	33	189
Ísland, Iceland	Reykjavik	2	35	191
Berlin, Germany	Berlin	3	41	198
Mecklenburg-Vorpommern, Germany	Rostock	4	45	203
Brandenburg, Germany	Potsdam	5	73	254
Respublika Kareliya, Russia	Petrozavodsk	6	80	267
Murmanskaya oblast', Russia	Murmansk	7	121	326
Świętokrzyskie, Poland	Kielce	8	123	329
Lubelskie, Poland	Lublin	9	128	335
Pskovskaya oblast', Russia	Pskov	10	130	338
Kaliningradskaya oblast', Russia	Kaliningrad	11	146	362
Novgorodskaya oblast', Russia	Novgorod	12	155	375
St Petersburg, Russia	St Petersburg	13	164	386
Podlaskie, Poland	Bialystok	14	166	390
Hamburg, Germany	Hamburg	15	171	397
Podkarpackie, Poland	Rzeszów	16	174	403
Leningradskaya oblast', Russia	Gatchina	17	175	405
Łódzkie, Poland	Lodz	18	183	424
Opolskie, Poland	Opole	19	186	427
Zachodniopomorskie, Poland	Szczecin	20	193	435
Warmińsko-Mazurskie, Poland	Olsztyn	21	195	438
Dolnośląskie, Poland	Wroclaw	22	197	440
Kujawsko-Pomorskie, Poland	Bydgoszcz	23	199	442
Małopolskie, Poland	Kraków	24	200	445
Stockholm, Sweden	Stockholm	25	201	447
Śląskie, Poland	Katowice	26	203	450
Lubuskie, Poland	Gorzów Wielkopolski	27	204	451
Pomorskie, Poland	Gdansk	28	207	455
Latvija, Latvia	Riga	29	215	463
Östra Mellansverige, Sweden	Uppsala	30	230	479
Wielkopolskie, Poland	Poznan	31	238	487
Mazowieckie, Poland	Warszawa	32	257	507
Itä-Suomi, Finland	Kuopio	33	258	508
Sydsverige, Sweden	Malmö	34	263	513
Pohjois-Suomi, Finland	Oulu	35	269	519
Norra Mellansverige, Sweden	Gävle	36	271	521
Västsverige, Sweden	Göteborg	37	278	528

[12] Data for Norway is missing in this section.

Mellersta Norrland, Sweden	Sundsvall	38	279	529
Länsi-Suomi, Finland	Turku	39	283	533
Sjælland, Denmark	Roskilde	40	284	534
Övre Norrland, Sweden	Umeå	41	288	538
Etelä-Suomi/Åland, Finland	Helsinki	42	290	540
Hovedstaden, Denmark	Copenhagen	43	292	542
Småland med öarna, Sweden	Jönköping	44	295	545
Nordjylland, Denmark	Aalborg	45	299	549
Syddanmark, Denmark	Odense	46	301	551
Midtjylland, Denmark	Aarhus	47	303	553
Eesti, Estonia	Tallinn	48	305	555
Lietuva, Lithuania	Vilnius	49	313	563

Subclusters

Polish and German clusters take the top positions in the Human health subcluster (Table 16). The most specialised subclusters in residential care are located in Russia and Iceland, and social work in Iceland and Germany.

Table 16. Specialisation of Healthcare Subclusters in BSR

Human Health Subcluster

Regional Cluster	Largest city in region	Number of employees	BSR LQ Rank
Lubelskie, Poland	Lublin	29 091	1
Świętokrzyskie, Poland	Kielce	17 291	2
Mecklenburg-Vorpommern, Germany	Rostock	44 027	3
Podlaskie, Poland	Bialystok	14 250	4
Schleswig-Holstein, Germany	Kiel	65 958	5
Berlin, Germany	Berlin	89 107	6
Podkarpackie, Poland	Rzeszów	27 635	7
Brandenburg, Germany	Potsdam	55 356	8
Łódzkie, Poland	Lodz	33 093	9
Dolnośląskie, Poland	Wroclaw	43 031	10

Residential Care Subcluster

Regional Cluster	Largest city in region	Number of employees	BSR LQ Rank
Respublika Kareliya, Russia	Petrozavodsk	11 765	1
Ísland, Iceland	Reykjavik	9 302	2
Kaliningradskaya oblast', Russia	Kaliningrad	12 328	3
Pskovskaya oblast', Russia	Pskov	9 798	4
Novgorodskaya oblast', Russia	Novgorod	10 231	5
Leningradskaya oblast', Russia	Gatchina	19 550	6
Murmanskaya oblast', Russia	Murmansk	13 987	7
Schleswig-Holstein, Germany	Kiel	39 248	8
St Petersburg, Russia	St Petersburg	51 691	9
Brandenburg, Germany	Potsdam	21 829	10

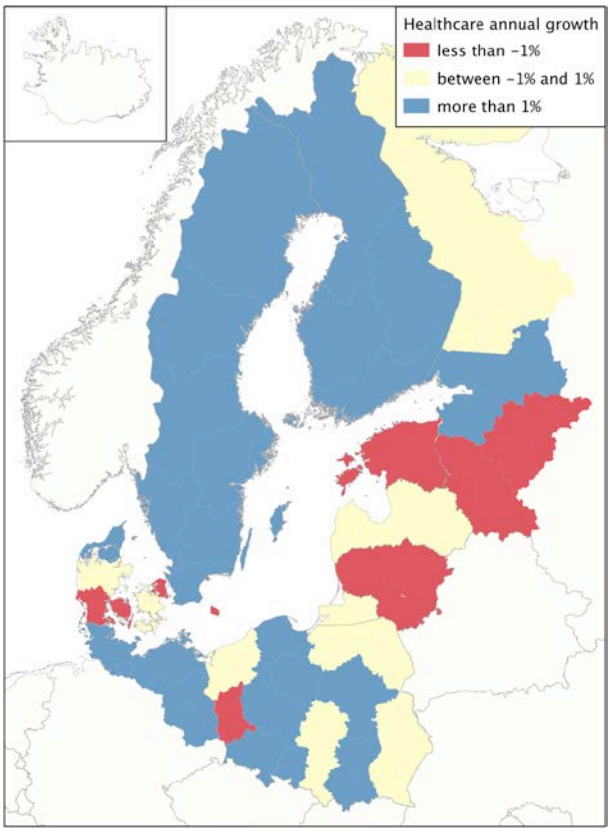
Social Work Subcluster

Regional Cluster	Largest city in region	Number of employees	BSR LQ Rank
Ísland, Iceland	Reykjavik	7 720	1
Berlin, Germany	Berlin	51 139	2
Mecklenburg-Vorpommern, Germany	Rostock	19 108	3
Brandenburg, Germany	Potsdam	26 273	4
Östra Mellansverige, Sweden	Uppsala	9 401	5
Schleswig-Holstein, Germany	Kiel	20 468	6
Stockholm, Sweden	Stockholm	14 577	7
Mellersta Norrland, Sweden	Sundsvall	1 684	8
Hamburg, Germany	Hamburg	15 257	9
Hovedstaden, Denmark	Copenhagen	16 138	10

Growth and decline

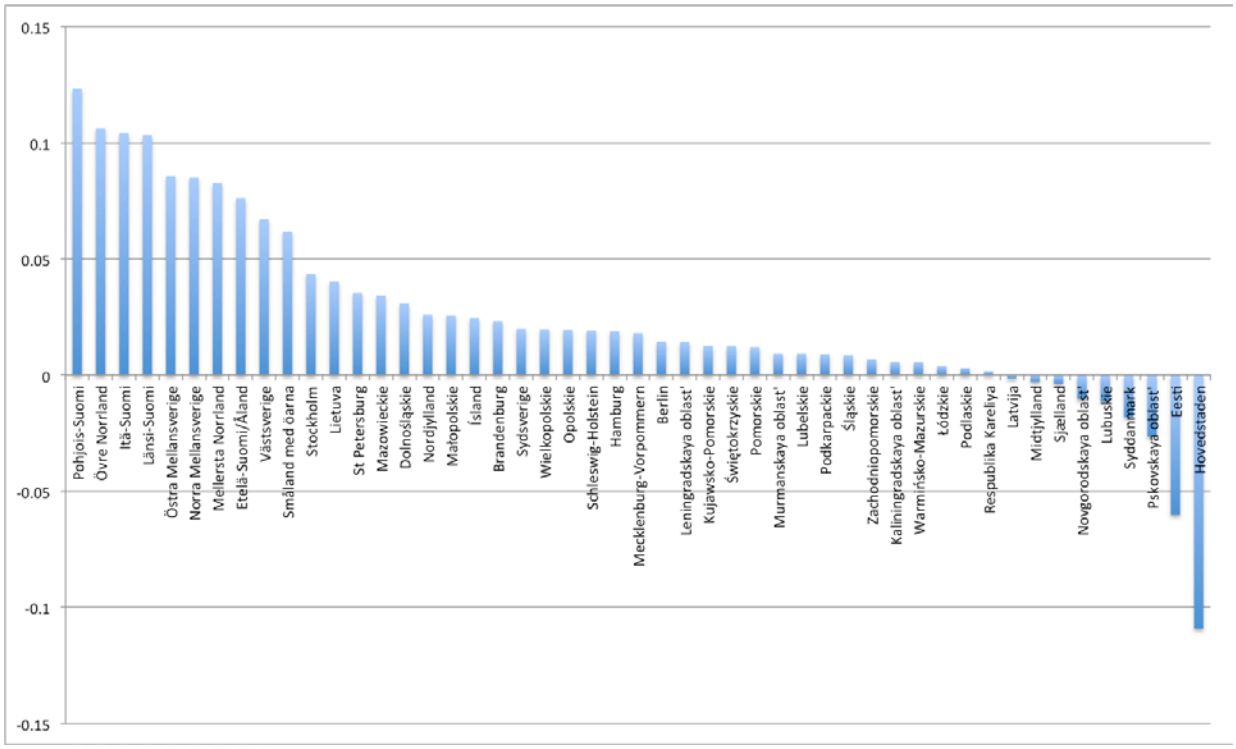
The healthcare cluster experienced rather strong growth in most of the BSR region, in particular in Sweden and Finland (Figure 17). On the other hand, the Baltic states and some regions in Russia and Denmark had their healthcare employment decline slightly, though nowhere was this effect strong with the exception of Copenhagen.

Figure 17. Healthcare Cluster Employment Growth



Growth rates vary across clusters. The fastest growing clusters, in excess of 10%, we find in parts of Finland and Sweden. Declining clusters are in parts of Denmark and in some of the Eastern regions including the Baltic countries.

Figure 18. Annual Growth Rates in Healthcare



Data for Germany: 2005-2011, Denmark and Russia: 2005-2009, Estonia and Poland: 2007-2010, rest of the countries: 2005-2010. Norway is missing.

Cluster Organisations

There are a large number of organised healthcare clusters around the Baltic Sea Region (Table 17). Some of these are involved the BSR Stardust project, coordinated under the Comfort in Living and Active for Life umbrellas (Table 18). High density of organisations for collaboration, such as cluster organisations, is a sign of cluster dynamics. Evidence suggests that there are more organized clusters around Biotech, Pharmaceuticals and Medical equipment (not reported here), than around the larger service sector of Healthcare.

Table 17. BSR Cluster Organisations in Healthcare

Name	*Website*	*Region*
Denmark		
Green Network	www.greennetwork.dk	Syddanmark
Germany		
Competence Network for Congenital Heart Defects	www.kompetenznetz-ahf.de	Berlin
DiagnostikNet-BB	www.diagnostiknet-bb.de	Berlin
MedRegio	www.medregio.de	Schleswig-Holstein
BioCon Valley	www.bcv.org	Mecklenburg-Vorpommern
Estonia		
Estonian HealthTech Cluster	www.htcluster.eu	Eesti
Finland		
HealthBIO	www.healthbio.fi	Etelä-Suomi
Culminatum Innovation	www.culminatum.fi	Etelä-Suomi
Finn-Medi Research	www.finnmediresearch.com	Länsi-Suomi
Sweden		
Halsoteknikalliansen	www.halsoteknik.com	Västsverige
New Tools for Health	www.newtoolsforhealth.com	Östra Mellansverige

Table 18. BSR Stardust Partners (Comfort In Living and Active for Life)

Name	*Website*	*Region*
Denmark		
Aalborg University	*www.en.aau.dk*	*Nordjylland*
Development Centre UMT		*Midtjylland*
Germany		
BioCon Valley	*www.bcv.org*	*Mecklenburg-*

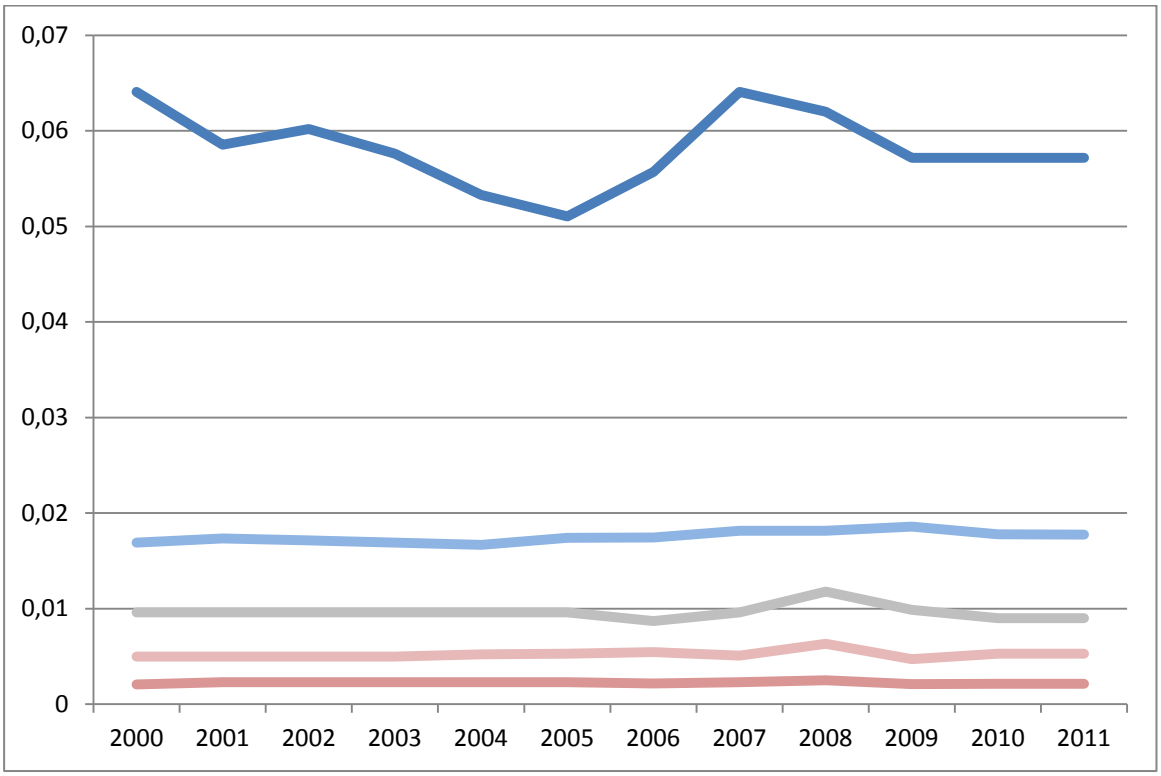
		Vorpommern
Estonia		
Estonian Academy of Fine Arts	*www.artun.ee*	*Eesti*
Finland		
Culminatum Innovation	*www.culminatum.fi*	*Etelä-Suomi*
Latvia		
Art Academy of Latvia	*www.lma.lv*	*Latvija*
Lithuania		
Community Relationship Consultants		*Lietuva*
Business Cooperation Center of Southern Lithuania		*Lietuva*
Poland		
Poznań University of Life Sciences	*en.puls.edu.pl*	*Wielkopolskie*
Sweden		
New Tools for Health	*www.newtoolsforhealth.com*	*Östra Mellansverige*
IDC West Sweden	*www.idcab.se*	*Västsverige*

Chapter 6 Maritime Clusters in BSR

The Baltic Sea Region has a very long history linked to the Maritime sector, including a wide range of maritime logistics, shipbuilding and fisheries industries. This is evidenced by a world-leading employment share of 1.4%, largely due to the presence of extremely maritime-specialised regions in Norway and Iceland, as well as the fact that the vast majority of the BSR is on the seashore by definition. However, the strength of the BSR region remains even when comparing to Japan, which has 0.76% of people employed in maritime. The difference with EU-27, Europe and US is even larger as these regions score 0.56%, 0.63% and 0.3% respectively, in large part due to having a large share of inland territories.

If we take a closer look at Maritime in the macro region we can see that there has neither been a convergence or divergence across clusters in terms of specialisation (Figure 19). In the first half of the 2000s there was a certain degree of convergence (top regions decreased their level of specialisation), but this levelled off after 2005.

Figure 19. Convergence of Maritime Cluster Specialisation in BSR (2000 – 2011)



The lines represent the values of 10th, 30th, 50th, 70th and 90th percentile of specialization in Maritime

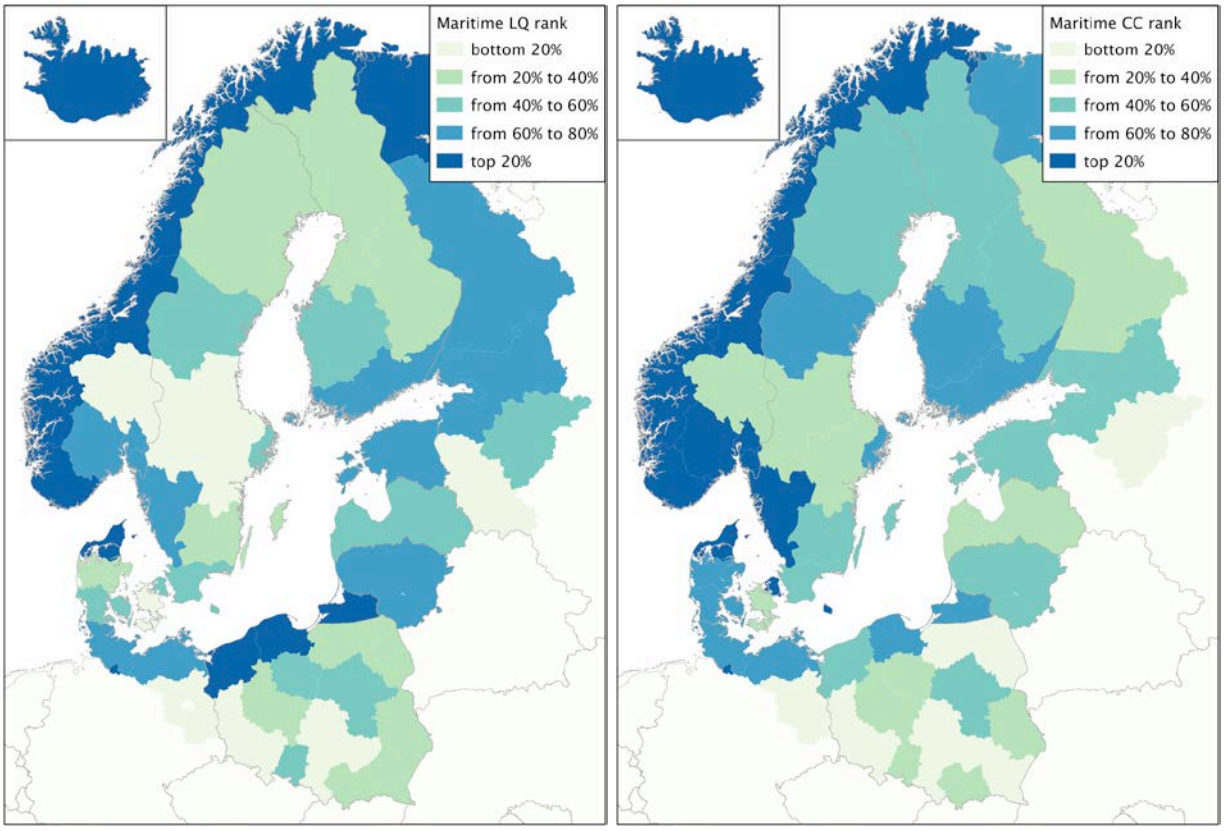
Regional cluster competitiveness

Vestlandet in Norway exhibits the largest maritime cluster in overall employment (Table 19). Other large clusters we find in Russia and Poland, but when controlling for wage differences they are far down the BSR list in terms of competitiveness (CC rank).

Table 19. Top-10 Maritime Clusters in BSR by Employment and CC Rank

Regional Cluster	Largest city in region	Number of employees	BSR CC Rank
Vestlandet, Norway	Bergen	26158	1
St Petersburg, Russia	St Petersburg	26056	30
Murmanskaya oblast', Russia	Murmansk	19405	13
Pomorskie, Poland	Gdansk	18520	16
Hamburg, Germany	Hamburg	16914	7
Mazowieckie, Poland	Warszawa	15001	32
Agder og Rogaland, Norway	Kristiansand	14153	3
Hovedstaden, Denmark	Copenhagen	12787	8
Etelä-Suomi/Åland, Finland	Helsinki	12692	12
Kaliningradskaya oblast', Russia	Kaliningrad	12509	21

Figure 20. Cluster Competitiveness in Maritime



Left: location quotient, Right: wage-adjusted location quotient.

Five Norwegian maritime clusters plus the Icelandic one hold the top BSR spots in the cluster competitiveness ranking, and interestingly enough the maritime clusters in Vestlandet (Bergen), Nord-Norge (Tromsø) and Agder og Rogaland (Kristiansand) also take the top European and Transatlantic spots (Table 20).

Table 20. Maritime Cluster Competitiveness Ranking (CC)

Cluster	Largest city in region	BSR CC Rank	Europe CC Rank	Transatl. CC Rank
Vestlandet, Norway	Bergen	1	1	1
Nord-Norge, Norway	Tromsø	2	2	2
Agder og Rogaland, Norway	Kristiansand	3	3	3
Ísland, Iceland	Reykjavik	4	4	5
Trøndelag, Norway	Trondheim	5	6	8
Sør-Østlandet, Norway	Skien	6	9	12
Hamburg, Germany	Hamburg	7	11	14
Hovedstaden, Denmark	Copenhagen	8	12	15
Nordjylland, Denmark	Aalborg	9	13	16
Västsverige, Sweden	Göteborg	10	15	21
Oslo og Akershus, Norway	Oslo	11	16	24
Etelä-Suomi/Åland, Finland	Helsinki	12	20	30
Murmanskaya oblast', Russia	Murmansk	13	24	35
Schleswig-Holstein, Germany	Kiel	14	29	40
Syddanmark, Denmark	Odense	15	30	41
Pomorskie, Poland	Gdansk	16	33	45
Länsi-Suomi, Finland	Turku	17	40	54
Mecklenburg-Vorpommern, Germany	Rostock	18	45	62
Stockholm, Sweden	Stockholm	19	46	63
Mellersta Norrland, Sweden	Sundsvall	20	48	65
Kaliningradskaya oblast', Russia	Kaliningrad	21	50	67
Midtjylland, Denmark	Aarhus	22	55	72
Sydsverige, Sweden	Malmö	23	56	74
Zachodniopomorskie, Poland	Szczecin	24	57	79
Lietuva, Lithuania	Vilnius	25	84	122
Itä-Suomi, Finland	Kuopio	26	85	124
Övre Norrland, Sweden	Umeå	27	88	129
Småland med öarna, Sweden	Jönköping	28	89	130
Eesti, Estonia	Tallinn	29	100	152
St Petersburg, Russia	St Petersburg	30	104	156
Pohjois-Suomi, Finland	Oulu	31	105	157
Mazowieckie, Poland	Warszawa	32	107	161
Leningradskaya oblast', Russia	Gatchina	33	109	165
Respublika Kareliya, Russia	Petrozavodsk	34	116	180
Latvija, Latvia	Riga	35	126	202
Hedmark og Oppland, Norway	Lillehammer	36	133	211
Sjælland, Denmark	Roskilde	37	140	230
Norra Mellansverige, Sweden	Gävle	38	141	231
Kujawsko-Pomorskie, Poland	Bydgoszcz	39	142	233
Opolskie, Poland	Opole	40	145	238
Östra Mellansverige, Sweden	Uppsala	41	154	258
Lubelskie, Poland	Lublin	42	170	281
Wielkopolskie, Poland	Poznan	43	177	301
Małopolskie, Poland	Kraków	44	178	304

Podlaskie, Poland	Bialystok	45	191	332
Podkarpackie, Poland	Rzeszów	46	195	341
Warmińsko-Mazurskie, Poland	Olsztyn	47	196	343
Śląskie, Poland	Katowice	48	219	380
Novgorodskaya oblast', Russia	Novgorod	49	220	381
Dolnośląskie, Poland	Wroclaw	50	227	390
Brandenburg, Germany	Potsdam	51	229	394
Świętokrzyskie, Poland	Kielce	52	248	423
Berlin, Germany	Berlin	53	252	428
Łódzkie, Poland	Lodz	54	264	451
Lubuskie, Poland	Gorzów Wielkopolski	55	269	457
Pskovskaya oblast', Russia	Pskov	56	282	475

Subclusters

Maritime is a broad sector comprised of many different types of activities, including Fisheries, Shipbuilding and Water transportation and logistics. In Table 21 we show the ranking for the Top-10 subclusters. Norwegian clusters, in addition to Iceland, hold the top spots for all subclusters.

Table 21. Competitiveness of Maritime Subclusters in BSR

Fishing Subcluster

Regional Cluster	Largest city in region	Number of employees	BSR CC Rank
Nord-Norge, Norway	Tromsø	3 721	1
Ísland, Iceland	Reykjavik	10 400	2
Vestlandet, Norway	Bergen	3 898	3
Trøndelag, Norway	Trondheim	1 243	4
Nordjylland, Denmark	Aalborg	2 187	5
Agder og Rogaland, Norway	Kristiansand	701	6
Syddanmark, Denmark	Odense	1 404	7
Västsverige, Sweden	Göteborg	2 020	8
Zachodniopomorskie, Poland	Szczecin	5 263	9
Murmanskaya oblast', Russia	Murmansk	4 065	10

Shipbuilding Subcluster

Regional Cluster	Largest city in region	Number of employees	BSR CC Rank
Vestlandet, Norway	Bergen	10 681	1
Agder og Rogaland, Norway	Kristiansand	7 212	2
Sør-Østlandet, Norway	Skien	3 048	3
Trøndelag, Norway	Trondheim	1 408	4
Nord-Norge, Norway	Tromsø	958	5
Länsi-Suomi, Finland	Turku	3 134	6
Pomorskie, Poland	Gdansk	11 119	7
Mellersta Norrland, Sweden	Sundsvall	497	8
Schleswig-Holstein, Germany	Kiel	5 753	9
Oslo og Akershus, Norway	Oslo	1 814	10

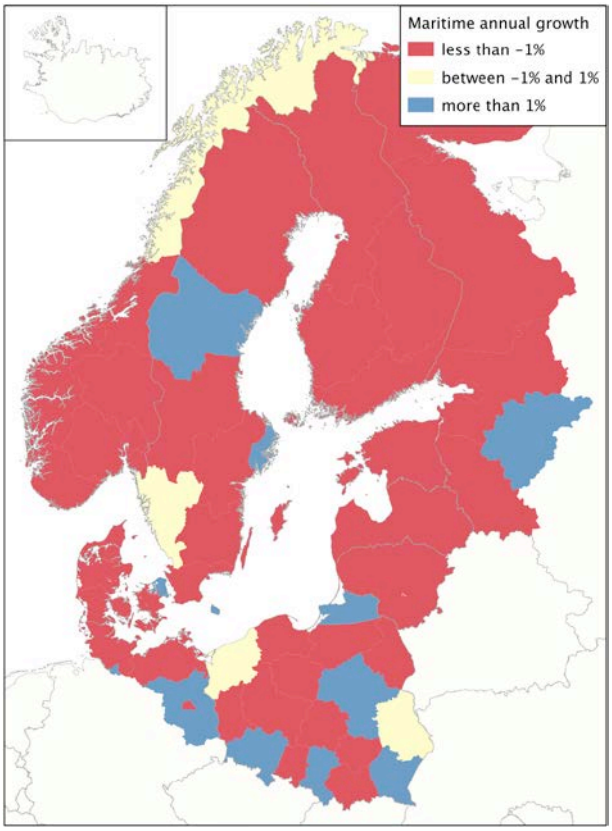
Water Transportation Subcluster

Regional Cluster	Largest city in region	Number of employees	BSR CC Rank
Vestlandet, Norway	Bergen	11 579	1
Nord-Norge, Norway	Tromsø	3 643	2
Agder og Rogaland, Norway	Kristiansand	6 240	3
Hovedstaden, Denmark	Copenhagen	12 229	4
Hamburg, Germany	Hamburg	12 845	5
Västsverige, Sweden	Göteborg	6 238	6
Oslo og Akershus, Norway	Oslo	4 851	7
Etelä-Suomi/Åland, Finland	Helsinki	7 900	8
Trøndelag, Norway	Trondheim	960	9
Ísland, Iceland	Reykjavik	1 495	10

Growth and decline

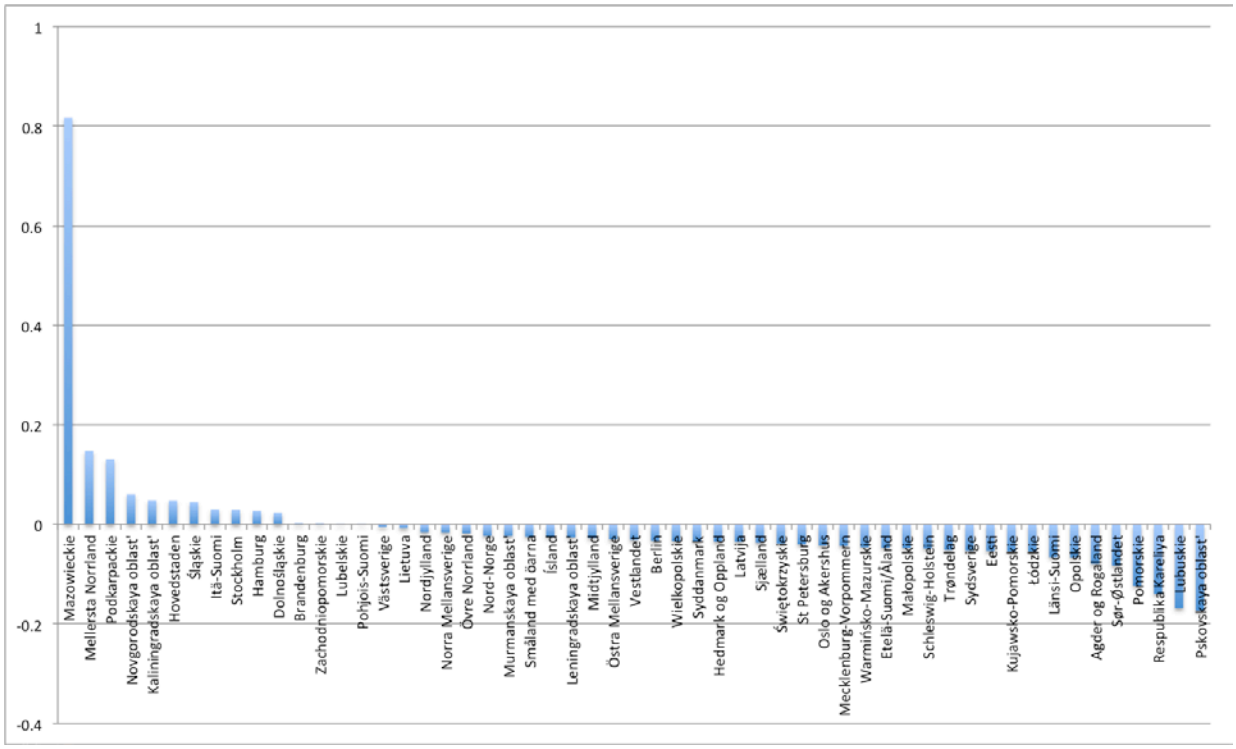
The maritime sector suffered from rather step decline in employment almost everywhere apart from some inland regions where the original figures where quite low (Figure 21). The only regions with significant maritime employment and strong growth are Kaliningrad, Hamburg and Stockholm, while the number of employees in Warszawa increased the fastest: from 2 500 in 2007 to 10 000 in 2010, mostly due to water transportation subcluster.

Figure 21. Maritime Cluster Employment Growth



Growth rates vary a lot within Maritime. We find a case of very high growth (80%) in Mazowieckie in Poland. Mellersta Norrland in Sweden and Podkarpackie in Poland exhibit cluster growth in excess of 10%. The clusters in Lubuskie (Poland) and Pskovskaya oblast (Russia) have almost declined by 20% during the last decade (Figure 22).

Figure 22. Annual Growth Rates in Maritime



Data for Germany: 2005-2011, Denmark and Russia: 2005-2009, Estonia and Poland: 2007-2010, rest of the countries: 2005-2010.

Cluster Organisations

There are a large number of organised maritime clusters around the Baltic Sea Region (Table 22). Some of these are involved the BSR Stardust project, coordinated under the MarChain umbrella (Table 23). High density of organisations for collaboration, such as cluster organisations, is a sign of cluster dynamics.

Table 22. BSR Cluster Organisations in Maritime

Name	*Website*	*Region*
Denmark		
Danish Maritime Authority	www.dma.dk	Hovedstaden
Maritime Development Center of Europe	www.maritimecenter.dk	Hovedstaden

The Transport Innovation Network	www.tinv.dk	Midtjylland
The Maritime Growth Centre	www.fiskeviden.dk	Nordjylland
Estonia		
Marine Systems Institute	www.msi.ttu.ee	Eesti
Germany		
Center of Maritime Technologies	www.cmt-net.org	Hamburg
Maritime Allianz Ostseeregion	www.mao-ev.de	Mecklenburg-Vorpommern
Maritime Cluster in Schleswig-Holstein	www.maritimes-cluster.de	Schleswig-Holstein
schiff-gmbh	www.schiff-gmbh.de	Schleswig-Holstein
WTSH	www.wtsh.de	Schleswig-Holstein
Finland		
Association of Finnish Maritime Industries	www.meriliitto.fi	Etelä-Suomi
Maritime cluster Programme	www.oske.net	Länsi -Suomi
Turku University	www.utu.fi	Länsi -Suomi
Latvia		
Latvia Logistic Association	www.lla.lv	Latvija
Lithuania		
Klaipeda Science and Technology Park	www.kmtp.lt	Lietuva
Norway		
Maritimt Forum	www.maritimt-forum.no	Oslo og Akershus
Oslo Maritime Network	www.oslo.teknopol.no	Oslo og Akershus
Maritimt Forum Haugalandet	www.maritimt-forum.no	Agder og Rogaland
Maritimt Forum South East Norway	www.maritimt-forum.no	Agder og Rogaland
Maritimt Forum Bergen	www.maritimebergen.no	Vestlandet
Norwegian Centre of Expertise - Maritime	www.ncemaritime.no	Vestlandet
Arena Fritidsbat	www.arenafritidsbaat.no	Trøndelag
Nordland Research Institute	nordlandsforskning.no	Nord-Norge
Vestfjords Regional development Agency		Nord-Norge
Poland		
Maritime Academy of Gdynia	www.am.gdynia.pl	Pomorskie
Pomeranian Sea and Vistula Cathment Basin Cluster Association		Pomorskie
Westpomeranian Maritime Cluster Association		Zachodniopomorskie
Sweden		
SP Technical Research Institute of Sweden	www.sp.se	Västsverige

Table 23. BSR Stardust Partners (MarChain)

Name	***Website***	***Region***
Denmark		
Maritime Development Center of Europe	*www.maritimecenter.dk*	*Hovedstaden*
Estonia		
Marine Systems Institute	www.msi.ttu.ee	Eesti
Germany		
WTSH	www.wtsh.de	Schleswig-Holstein

Finland		
Maritime cluster Programme	www.oske.net	Länsi -Suomi
Turku University	www.utu.fi	Länsi -Suomi
Latvia		
Latvia Logistic Association	www.lla.lv	*Latvija*
Lithuania		
Klaipeda Science and Technology Park	www.kmtp.lt	Lietuva
Norway		
Nordland Research Institute	nordlandsforskning.no	Nord-Norge
Vestfjords Regional development Agency		Nord-Norge
Poland		
Maritime Academy of Gdynia	www.am.gdynia.pl	Pomorskie
Pomeranian Sea and Vistula Cathment Basin Cluster Association		Pomorskie
Westpomeranian Maritime Cluster Association		Zachodniopomorskie
Sweden		
SP Technical Research Institute of Sweden	www.sp.se	Västsverige

About the Authors

Professor Örjan Sölvell has been an active researcher and teacher at the Stockholm School of Economics for more than three decades. Since 2001 he is also a Senior Associate at the Institute for Strategy and Competitiveness, ISC, at Harvard Business School, led by Professor Michael E Porter. In 2005, Professor Sölvell set up a new research institute at SSE, the Center for Strategy and Competitiveness, CSC. He is the Director for the Cluster Observatory, and Chairman of Ivory Tower, a consulting practice based in Stockholm.

Dr Sergiy Protsiv is a researcher at the Center for Strategy and Competitiveness, CSC. He joined the team in 2006 and participated in the Cluster Observatory project from its inception, being responsible for data collection and analysis. In 2012 he defended his PhD at SSE, and is currently the Manager for the Cluster Observatory.

BSR Stars links universities, clusters and innovative companies in the Baltic Sea region through projects and new opportunities for financing transnational cooperation. BSR Stars speeds up innovation using transnational cooperation to create strengthened competitiveness and sustainable growth.

StarDust consists of five sub-projects supported by new tools and methods on open and user-driven innovation. StarDust combines strengths and core competencies in nine countries in Northern Europe and brings business, academic and public worlds together.

During 2012 and 2013 StarDust has strengthened its partnership by attracting new partners and financiers: the partners received more than 8 MEUR as add-on investment, 15 research institutions and six new cluster and business development organisations joined as associated partners. The five sub-projects are continuing their work by preparing strategic action plans focusing on long term strategy.

Contact: Karin Nygård Skalman, project leader of StarDust,
karin.nygardskalman@vinnova.se, Phone: +46 8 473 30 68

www.bsrstars.se/stardust

The StarDust project started in 2011 and is finalized in 2013.
It is co-financed by the European Union's Baltic Sea Region Programme 2007-2013.

Baltic Sea Region Programme 2007–2013

StarDust

EUSBSR EU STRATEGY FOR THE BALTIC SEA REGION

CLUSTER OBSERVATORY

Part-financed by the European Union (European Regional Development Fund and European Neighbourhood and Partnership Instrument)