Länsstyrelsen
Stockholm

Mapping of areas of strenght in the Stockholm region

Länsstyrelsen
Stockholm

Mapping of areas of strenght in the Stockholm region

Foreward

The question of innovation has received an increased interest in the EU over the last years. As part of the EU strategy *Europe 2020 for smart, sustainable and inclusive growth*, the Commission has launched the concept "Smart specialization" to secure an efficient use of investments in research and innovation. This has contributed in the demand for so called Research and Innovation Strategies for Smart Specialization (RIS3) as ex-ante conditionality for funding from the Structural Funds Programs 2014-2020.

In 2012, Stockholm presented the regional innovation strategy *Stockholm 2025: The World´s most Innovation-Driven Economy*. The strategy identified five prioritized policy areas; the need for more efficient use of research and innovation infrastructure, increased focus on cross-sector (inter-disciplinary) collaboration, supply of capital, innovative procurement and global attracttion for students, researchers and experts. The regional innovation strategy is of a general character and does not focus on specific sectors or competence areas. The European Regional Development Funds Program of Stockholm, however, has an overall focus on Sustainable Urban Development. There is also an ambition of the regional partnership to take increased responsibility in identifying strategic challenges to be addressed in the program, called the Stockholm Model.

During 2015 a process to revise the regional innovation strategy started. As a background material, this mapping of regional strengths of research, business and public sector in Stockholm was produced. The report was an initiative of the regional platform *Innovation Stockholm* and co-funded by the Swedish Agency for Economic and Regional Growth (Tillväxtverket). The purpose of the mapping is to inspire further discussions on a revised regional innovation strategy, in line with the ambitions of smart specialization.

The mapping was made by the consultancy company DAMVAD Sverige AB during the fall 2014. It was based on a combination of document studies, bibliometric and statistical analysis, and interviews with key actors in the region. The consultants are responsible for the content and recommendations in the report. Project manager at the County Administrative Board of Stockholm was Maria Lindqvist, Growth Department.

Innehåll

Summary

DAMVAD has conducted a study on behalf of Stockholm County Administrative Board, with the purpose of analysing regional areas of strength. Specifically, the following questions have been examined:

- Within which research areas do Stockholm's university and university colleges hold a strong position in Sweden and internationally?

- Which disciplines/research groups are prioritised in national research funding and within which fields has the region participated in international research programmes?

- Within which niche areas does Stockholm's business community hold a strong national and/or international position?

- Within which niche areas does Stockholm's public sector hold a strong position? How can these niche areas be specified/defined?

The analysis has been carried out based on a combination of document studies, extracts from existing databases, bibliometric analysis, analysis of research funding, interviews, surveys and a workshop with a selection of key individuals within academia, business and the public sector.

With regard to research, the results indicate that Stockholm has a total of 97 areas of strength within 334 different research areas. We use two different variables to measure the strength of each research area: the impact within each discipline measured by level of citations, and the degree of speciali- sation. Both parameters are compared with a Nordic average. Of the 97 strengths, 77 are within health sciences and natural sciences. Of the areas that have not been defined as strengths, 108 have the potential to be a research strength in the future. These 108 exceed the Nordic average for one of the two parameters that define a strength. The focus of any intention to advance a position of strength should therefore be on the second parameter. It is important to emphasise here that the Nordic average is relatively high in international comparisons.

The status of research-related positions of strength is backed up by data on research funding. If we look at national research funding, the Swedish Research Council (Vetenskapsrådet, VR) distributed just over SEK 5.6 billion in the Stockholm region between the years 2010 and 2014. The Swedish Research Council has granted funding to organisations in the Stockholm region primarily within the fields of Medicine and Health (43%), and Natural Sciences and Technology (34%). During the period 2004–2014, VINNOVA has distributed SEK 6.5 billion to projects with participants in the Stockholm region. Of the funding granted that is not directed at general

areas, just over 60% of VINNOVA's funding has been allocated within programmes that come under the field of Technology. When it comes to international funding from the Seventh Framework Programme for development within research and technology (FP7), organisations from Stockholm account for 40% of the budget granted for Swedish participation. The main participants from the County of Stockholm are Karolinska Institutet, KTH Royal Institute of Technology and Stockholm University.

We also see that strengths within research are reflected in the strengths that have been identified within the Stockholm region's business community and skills. There is a clear link between ICT and Technology, where both research and industry hold positions of strength.

We have compiled areas of strength in business and skills at both a general and a more detailed level. At a general level we have found 11 areas where the Stockholm region demonstrates strength – Knowledge Intensive Business Services (KIBS), Finance, Information and Communication Technology (ICT), Creative and Cultural Businesses (CCB), CleanTech, Life Science, Professional Services and Research Expertise, Trade, Transport, Manufacturing and Education.

At a more detailed level we have taken it a step further and identified niche areas within the general areas. These niche areas can be found mainly within relatively high-tech sectors such as ICT, KIBS, CleanTech and Professional Services and Research Expertise. Several prominent niche areas have also emerged within Manufacturing.

To summarise, the results indicate that the Stockholm region mainly has positions of strength within niche areas of business and expertise in fields that are relatively knowledge-intensive. This creates a firm basis for the Stockholm region to specialise within areas where future challenges can be taken on with high levels of knowledge and skill.

We have also identified strengths among public sector institutions in the County of Stockholm. In interviews, surveys and document studies, the following areas are mentioned: *Development of healthcare choice, Access to unique biobank and patient register, Health systems of the future, Open data and extensive IT services, IT and sustainable urban development, Sustainable buildings, IT to reduce climate and energy impact, new business models and creative businesses.*

In conclusion, based on sustainable urban development, which is the overriding objective of the regional Structural Fund Programme in Stockholm (2014–2020), we have worked on mapping the Stockholm region's areas of strength as a background of a strategy for smart specialisation. As an initial basis for discussion, we have identified five overall themes where the empirical evidence is consistent with the Stockholm region's strengths. These five themes are: "Healthy City", "Green City", "Smart City", "Inclusive City" and "Attractive City". These are areas in which we can see that business, research and the public sector display strengths. In the next

stage, the analysis of these areas needs to be more in-depth and rooted in a regional mobilisation process.

Torben Bundgaard Vad at DAMVAD was the project manager for this assignment. The majority of the text was written by Frida Karlsson, Jonas Öhlin and Alberte Nielsen at DAMVAD and Christina Johannesson at Cajalma.

Introduction

Why areas of strength?

Over the past few years, the issue of innovation has increasingly moved further up the agenda at a European, national and regional level. Discussions are conducted at various levels about how to support innovative strength in the European regions. As part of the Europe 2020 strategy for smart, sustainable and inclusive growth, the concept "Smart" has been introduced within the EU. One of the aims of this strategy is to establish specific regional areas of strength that can take advantage of investments in research and innovation in a more effective way.

As a condition for funding within the Structural Fund Programmes 2014–2020, regions must have a Research and Innovation Strategy for Smart Specialisation (RIS3), which aims to specify the areas of strength of European regions. The purpose of this study is to identify existing areas of strength within the Stockholm region that can contribute towards tackling prioritised challenges. The report examines which organisations in the Stockholm region within niche areas have the prerequisites for developing international competitiveness through collaboration.

The basic information that this mapping aims to produce can also be used to identify areas where the region lacks competitive conditions, and where challenges should instead be managed via increased collaboration with other regions, both nationally and internationally. More specifically, the report examines the following questions:

- Within which research areas do Stockholm's university and university colleges hold a strong position in Sweden and internationally?

- Which disciplines/research groups are prioritised in national research funding and within which fields has the region participated in international research programmes?

- Within which niche areas does Stockholm's business community hold a strong national and/or international position?

- Within which niche areas does Stockholm's public sector hold a strong position and how can these areas be more clearly defined?

Regional areas of strength

There have been several studies into regional areas of strength, clusters and niche areas within research and business in Sweden, for the Stockholm region and internationally. However, in our experience these analyses often use one-dimensional, methodical approaches with a focus on, for example, business, research *or* skills sourcing, which can be difficult to connect. The analyses are often one-dimensional and fail to take a comprehensive approach to a region's areas of strength. In light of this it can be hard to establish a general picture of how a region can specialise in comparison with other regions.

There are also quite considerable variations between definitions of a regional position of strength, a cluster or a research-related strength. In addition, the analyses often have different geographical boundaries, in which the Stockholm region is rarely a focal point.

The result is a relatively fragmented and/or fairly general picture of positions of strength that goes no deeper than identifying areas of strength such as Life Science, ICT, Creative and Cultural Businesses and CleanTech, which are also highlighted as regional areas of strength in Stockholm.

In our knowledge-intensive economy, growth in metropolitan areas and large cities is largely fuelled by human capital and innovative strength. To be innovative, and thereby competitive, companies must cooperate with research institutions and have access to a well-qualified workforce. These people tend to gravitate towards the big cities, owing to career opportunities. Urbanisation around metropolitan areas has therefore contributed to major differences between the Stockholm region and other regions, which has also impacted the way we identify and work with areas of strength. Figure 1 below demonstrates the connection between business, research and education and skills sourcing.

As a starting point for this mapping study, we treat the County of Stockholm as a metropolitan region and will analyse it as such.

Figure 1 – Three areas that define regional positions of strength
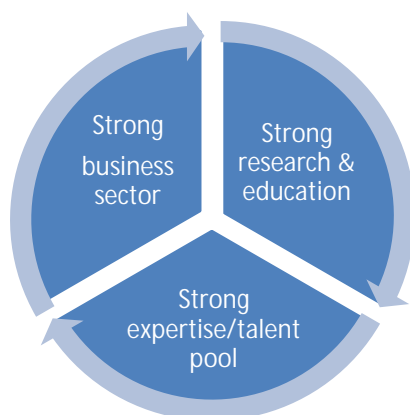
Source: DAMVAD 2014

Analysis model

Our approach in this mapping involves getting down to a more detailed level than traditional industries, which is realistic given the large and varied business community in the Stockholm region. We also aim to produce a multidimensional analysis, in which we identify strong areas of research and business niches that are interacting with each other, and strengths on the skills side with a focus on education and the labour market. Finally, we wish to document areas of strength in the Stockholm region based on a perception of it as a metropolitan region that owing to its size, varied business community, differing population composition and varied range of research and education, is unlike other regions in Sweden. Figure 2 summarises the analysis and method model we use in this report.

In this analysis we study regional areas of strength where it is possible to establish synergies and interaction between regional business niches, strong regional fields of research and education and strong talent pools.

In the study we rely on document studies, existing statistical databases, bibliometrics and individual, in-depth interviews combined with a mini survey with organisations involved in research policy, to identify the combined and detailed areas of strength for the County of Stockholm. During the project we have also held meetings and a final workshop to further test and variegate the results. The process of analysing and identifying regional areas of strength in detail requires a model with building blocks, where the analysis of interaction and synergies between them gives added value that goes beyond the traditional one-dimensional focus often applied when regional areas of strength are analysed.

Figure 2 – Analysis model to identify regional areas of strength
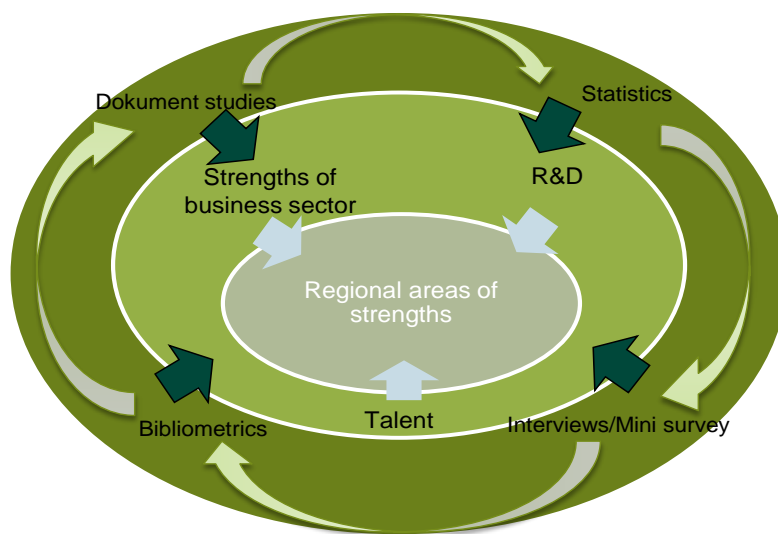
Source: DAMVAD 2014

Overview

The first chapter will analyse and detail the areas of research in which the Stockholm region's university and university colleges hold a strong position in Sweden and internationally. We also look more closely at which disciplines/research groups are prioritised in national research funding and the fields in which we have participated in international research programmes.

Chapter two is about business and expertise in the Stockholm region. We use statistics to ascertain the niche areas within which the Stockholm region's business community holds strong positions.

Chapter three examines strengths within the public sector and a selection of the areas where respondents feel public sector organisations have a significant role in supporting business and research, as well as promoting innovation.

In the final chapter we link positions of strength from research, business and the public sector together. This section aims to provide a collective insight into the Stockholm region's current and future areas of strength.

Research-related positions of strength

In order to establish the region's strengths it is not sufficient to focus exclusively on business performance – we need to include future potential, which is where research plays a critical role. This chapter uses bibliometric analyses to consider the specialisation (quantity) and impact of the research that is produced in the Stockholm region. In this chapter we also provide details of which research disciplines/research groups are prioritised in national funding, along with details of the organisations that have participated in international research programmes. The results reveal that:

- Stockholm has a position of strength in 97 areas of research of a possible 334. These have a major impact in their respective disciplines and a high degree of specialisation in relation to the Nordic region as a whole.

- Of the 97 strengths, 77 are within health sciences and natural sciences.

- Of the areas that have not been defined as strengths, 108 have the potential to be strong in the future. These 108 exceed the Nordic average for one of the two parameters (specialisation and impact) that define a strength[1]. The focus of any intended development efforts should therefore be on the second parameter.

- With regard to national research funding, the Swedish Research Council (Vetenskapsrådet,VR) distributed just over SEK 5.6 billion in the Stockholm region between the years 2010 and 2014. The Swedish Research Council has granted funding to organisations in the Stockholm region primarily within the fields of Medicine and Health (43%), and Natural Sciences and Technology (34%). During the period 2004–2014, VINNOVA has distributed SEK 6.5 billion to projects with participants in the Stockholm region. Of the funding granted that is not directed at general areas, just over 60% of VINNOVA's funding has been allocated within programmes that come under the field of Technology. As regards international funding, we see that organisations from the County of Stockholm make up 40% of the budget granted for Swedish participation in the Seventh Framework Programme for development within research and technology (FP7). The main participants from the County of Stockholm are Karolinska Institutet, KTH Royal Institute of Technology and Stockholm University.

---

[1] The parameters impact and specialisation are defined later on in this chapter.

The analysis focuses on the level of impact of research in the Stockholm region in relation to general Nordic research. This is achieved by looking at the number of academic publications published by institutions in the region, along with the number of times these publications have been cited. Both these pieces of information are well-defined in the databases that make up our data sources. This gives us a picture of the Stockholm region's strengths and where there is development potential. This analysis defines a strength as a research area in which Stockholm has a major impact and a particular specialisation. This is discussed further in the following section.

Method

This analysis uses the international bibliometric database Scopus, which is one of two leading databases within this area. Scopus contains 50 million publications, 629,803 of which have a Swedish author (October 2014). The database has a particular focus on international publications, as well as publications of the type "articles" and "conference papers", which means that publications in local languages and publications in monographs and anthologies are covered to a lesser extent by the database. We have also carried out interviews with organisations and institutions in the Stockholm region as part of the study, to test and variegate the bibliometric results. These responses are constantly referred to in the results section.

Scope

The focus of this analysis is on the educational establishments in the Stockholm region that have the most extensive research volumes. This covers the following five educational establishments:

- Stockholm School of Economics
- Karolinska Institutet (incl. the university hospital)
- KTH Royal Institute of Technology
- Stockholm University
- Södertörn University

The analysis is limited to the most recent five-year period, i.e. publications published during the years 2009 to 2013. The study is also limited to the following types of publication: "articles", "reviews" and "conference papers". We have done this in order to restrict any interference from publication types, such as notes and editorials that do not have a significant academic content.

In order to be able to compare Stockholm with a benchmark, we have identified similar information about publications from all the Nordic countries: Sweden, Norway, Denmark, Finland and Iceland. The Nordic countries are regarded as being the most relevant for comparisons as the analysis aims to find regional positions of strength. A distinctive feature of

all the Nordic countries is that they are strong in terms of research (NordForsk 2014). Relatively speaking this makes it harder to achieve a position of strength than if we made comparisons with the rest of the world, where countries such as China would have brought down the average.

Finally, it should be noted that the analysis is limited to the academic disciplines in which Stockholm has more than 50 publications in a five-year period. There are two reasons for this: one is that the analysis of research areas will not be sufficiently stable if it is based on a very low number of publications. The second reason is that there are no grounds for calling something a strength if the research area fails to achieve a certain volume of results.

Identification of strengths

Scopus assigns one or more research areas to each journal in its database, which thematically cover the content of the journal's publications. Such research areas may for example be "Animal Science and Zoology", "Language and Linguistics" and so on. The academic publications are divided into a total of 334 different research areas. To identify specific strengths, Stockholm's (the chosen educational establishments) academic publications were divided up according to these research areas and analysed. This method allows us to establish which research areas perform best, instead of taking Stockholm's research in its entirety.

The 334 research areas are further divided into 36 principal disciplines that bring together related research areas, such as "Biochemistry" or "Biophysics", both of which come under the discipline "Biochemistry, Genetics and Molecular Biology". These main categories have been created by Scopus.

In this analysis, these principal categories have then been further broken down into five main areas: humanities, technology, natural sciences, social sciences and health sciences. This primary division has been done based on the 334 research areas in order to be able to illustrate where the strengths are at an aggregate level.

For each research area, the number of citations is divided by the number of publications. This is done for both Stockholm and the Nordics, and then the figures are compared with each other. If Stockholm is higher than the Nordic region, it means their publications on average have a higher *impact* than the Nordics (>1). Conversely, if the figure falls short of the Nordic average, Stockholm has a lower *impact,* and this method will not indicate any particular strength in Stockholm.

The analysis of *impact* is supplemented by an analysis of whether Stockholm has *specialised* in this area, i.e. whether Stockholm's activity in the discipline/main area exceeds the average level of activity. This is achieved by observing how large a proportion of Stockholm's combined number of publications is within a particular discipline, which is then compared with

the Nordic countries' combined proportion. As with impact, a higher figure (values >1) means that there is a specialisation.

Together these two measures give a strong indication of Stockholm's research-related strengths. To find the best strengths represented within all five main academic areas, we examined the five research areas from each main area that have above-average specialisation and that also have the highest impact. This gave 38 disciplines, with humanities having just five areas that satisfied the requirements and social sciences having just three.

It is worth noting that the research area "Archaeology" appears twice in the Scopus database, under the discipline "Arts and Humanities" as well as within the discipline "Social Sciences". In our analysis, these two disciplines are merged into one research area called "Arts and Humanities". Based on our aims, the two research areas are not sufficiently different in their content to justify them losing strength and position by being treated separately in our analysis.

Development of strengths

In the analysis, the identification of current research-related strengths is supplemented by examining *the development* of these research areas up to the present. This is done by looking at how current strengths have performed historically by comparing the period 2004–2008 with 2009–2013. As the analysis will elucidate, some strengths have become more specialised and had a greater impact, while other research areas were more prominent strengths during the period 2004–2008 and performed less well in 2009–2013.

Identification of potential strengths

If a research area has a low level of specialisation but a high impact, it may mean that the area has the potential to develop into one of the Stockholm region's strengths, but has yet to achieve sufficient research volumes to be one of the main contenders.

On the other hand, if a research area has a high level of specialisation but low impact then the area does not have the same research-related quality as the rest of the Nordic region. However, the volume of publications is significant, which can mean that the research area is a particular priority in the Stockholm region but that several of the publications do not have sufficient citations, bringing the average down. The analysis can therefore be used to identify areas where a greater focus on upgrading skills and the number of citations could be a priority for achieving the status of a strength.

Results

97 of the 334 research areas are classed as areas of strength. These strengths have a major impact in their respective disciplines and a high degree of specialisation in relation to the Nordic region as a whole. Of the 97 strengths, 77 are within health sciences and natural sciences.

Of the areas that have not been defined as strengths, 108 have the potential to become one in the future. These 108 exceed the Nordic average for one of the two parameters that define a strength. The focus of any intention to develop should therefore be on the second parameter. The ten strongest potential research areas are: *Science Plant, Neuroscience (miscellaneous), Insect Science, Control and Optimisation, Computational Mathematics, Ecology, Evolution, Behaviour and Systematics, Endocrine and Autonomic System, Oncology (nursing), History and Philosophy of Science, Linguistics and Language*

The Stockholm region's 38 areas of strength are shown in the figure below:

Figure 3 – Overview of the Stockholm region's 38 areas of strength compared with the Nordic average
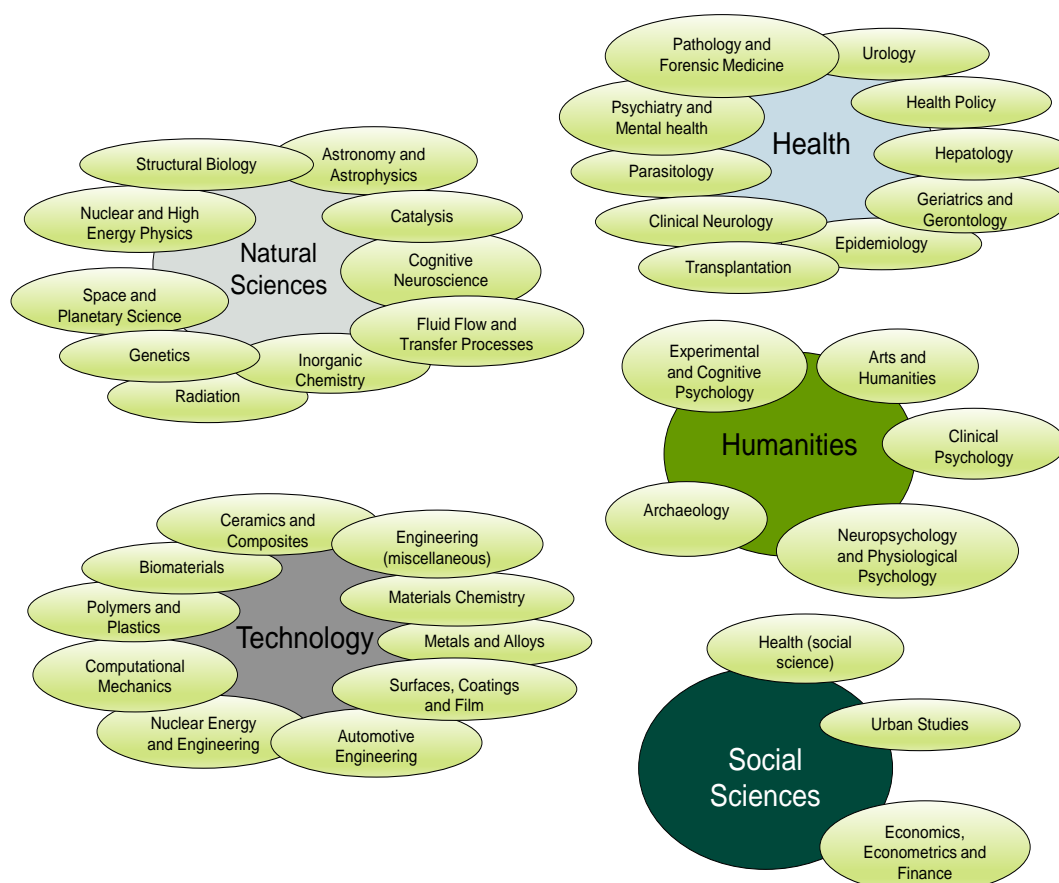
Source: DAMVAD (2014)

Analysis

By examining the distribution of the disciplines we can see how the areas are positioned in relation to the Nordic average.

Figure 4 below shows the impact and degree of specialisation on the X and Y axes, and we gain a picture of how the research areas relate to the Nordic average. The research areas that are positioned in the upper left quadrant have a high degree of specialisation but low impact. In the upper right quadrant, the research areas have both a high degree of specialisation and high impact. In the lower left quadrant the research areas have a low degree of specialisation and low impact. In the lower right quadrant the research areas have a low degree of specialisation, but high impact. *The research areas that are positioned in the upper right quadrant are the areas that we define as strengths, since they exceed the average with regard to both parameters.*

Figure 4 – The Stockholm region's research areas compared with the Nordic average
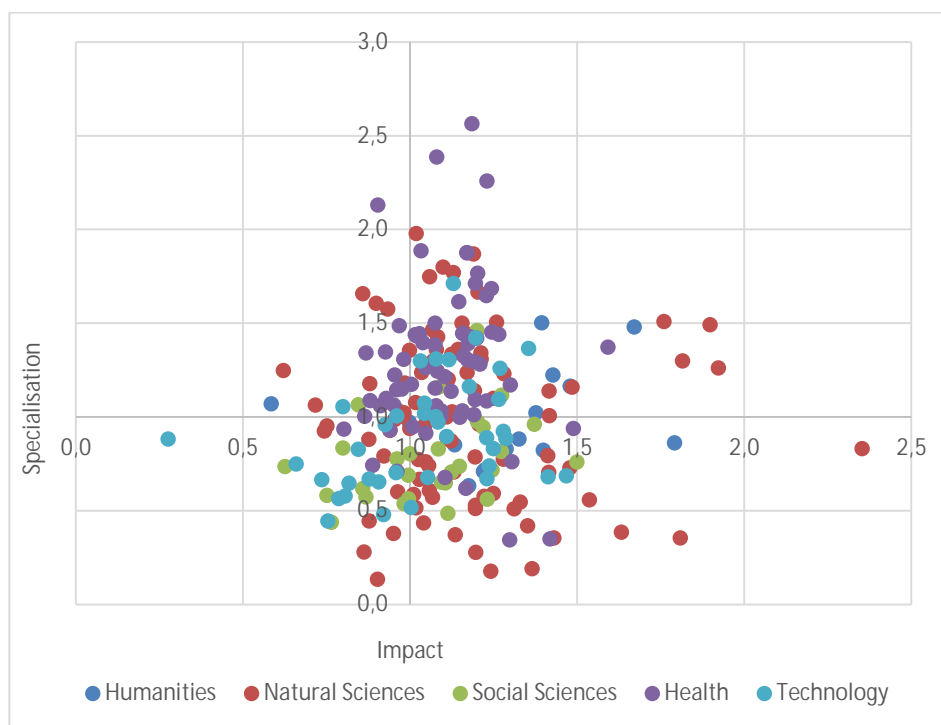
Source: DAMVAD 2014 Note: Detailed values for all research areas are given in the Appendix

Figure 4 above shows that the majority of the research areas in Stockholm are positioned in the quadrant that has both high impact and a high degree of specialisation, while the lower right quadrant has the second highest number of research areas (high impact but low specialisation). Most research areas are centred around the axes' intersection (1 = average) and are therefore not significantly better or worse with regard to specialisation and/or impact. However, there are individual areas that are located at the outer edges of the

diagram, which are therefore disciplines that are significantly better based on one or two of the chosen parameters. A detailed table with values for each area can be found in the Appendix. Figure 5 gives a more precise indication of the number of research areas located in each quadrant.

Figure 5 – Number of research areas per quadrant
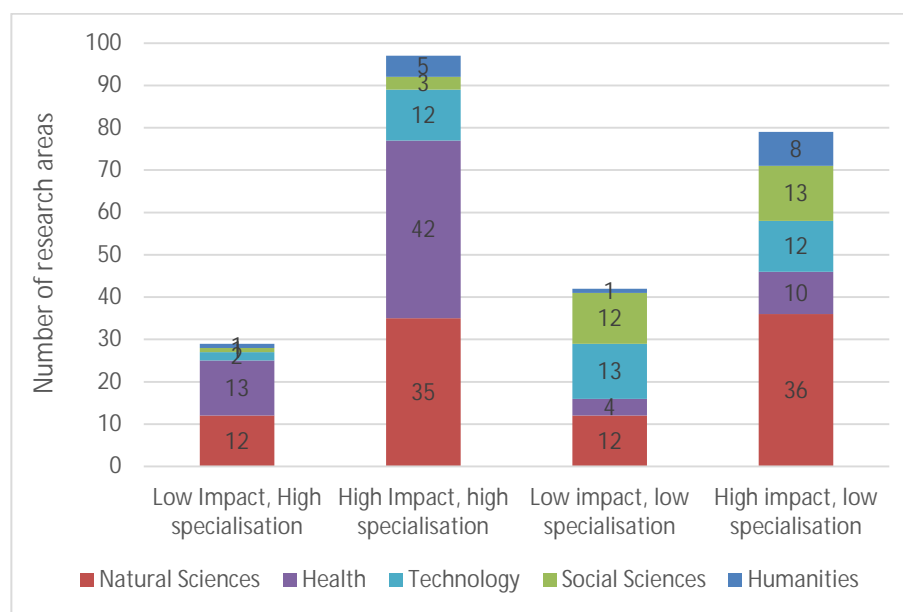
Source: DAMVAD 2014

As Figure 5 shows, the majority of the areas are located in the upper and lower right quadrants, both of which have high impact. The lowest number of areas is found in the quadrant where the research areas have low impact, but a high degree of specialisation. This means that there are few research areas in Stockholm that produce a great deal, but where quality fails to live up to the Nordic standard. There are 42 research areas in the lower left quadrant, which has both low impact and low specialisation. This is significantly fewer than in the upper right quadrant. This means that overall, Stockholm already has many strengths but also that a number of research areas that have either high impact or high specialisation have the potential to develop into such strengths.

Health sciences and natural sciences are the two disciplines that dominate in the quadrant with high impact and high degree of specialisation. Natural sciences also encompass the largest portion of the disciplines in the quadrant with high impact and low specialisation. Consequently, Stockholm has a substantial number of research areas that can be classified as strengths in the Nordic region.

Figure 6 below illustrates the 38 top strengths found in the upper right quadrant. The Appendix gives details of all the values for each research area.

To find the top positions of strength within all five disciplines, we have taken 10 research areas within each main area that is above the Nordic average in terms of specialisation and impact. This produced a total of 38 subject areas, including just five research areas within humanities and just three research areas within social sciences that satisfied these requirements (specialisation and impact above 1.0)

Figure 6 – The Stockholm region's top 38 positions of strength compared with the Nordic average

Legend:
- Arts and Humanities (miscellaneous)
- Clinical Psychology
- Neuropsychology and Physiological Psychology
- Experimental and Cognitive Psychology
- Archaeology
- Radiation
- Cognitive Neuroscience
- Catalysis
- Inorganic Chemistry
- Chemistry (general)
- Genetics
- Astronomy and Astrophysics
- Space and Planetary Science
- Nuclear and High Energy Physics
- Structural Biology
- Health(social science)
- Urban Studies
- Economics, Econometrics and Finance (general)
- Parasitology
- Clinical Neurology
- Psychiatry and Mental health
- Pathology and Forensic Medicine
- Transplantation
- Geriatrics and Gerontology
- Hepatology
- Health Policy
- Pharmacology, Toxicology and Pharmaceutics (general)
- Urology
- Surfaces, Coatings and Films
- Materials Science (general)
- Metals and Alloys
- Materials Chemistry
- Nuclear Energy and Engineering
- Computational Mechanics
- Polymers and Plastics
- Biomaterials
- Ceramics and Composites
- Engineering (miscellaneous)

Source: DAMVAD 2014
Note: Detailed values for all research areas are given in the Appendix

The Stockholm region's strengths in relation to the fields of health science, natural science and technology are confirmed via interviews and the survey that we sent to organisations involved in research policy.

One of the strongest research areas mentioned in interviews with organisations from the Stockholm region is the region's research within Health/Life Science, specifically cancer, protein, genetics, diabetes, epidemiology, basic research, chronic diseases, e-health, neuroscience, biomedicine and sensors. Cancer research is highlighted as a particular strength in several interviews. If we examine the bibliometric analysis, we see that this is one of the Stockholm region's 98 areas of strength, with an impact of 1.02 and specialisation of 1.98. However, cancer research is not among the 38 strongest research areas shown in Figure 6 above.

In interviews and surveys, fields within technology and natural sciences also stand out as strong research areas. In particular: robotics, wood technology research, surface chemistry and research into traffic solutions, electric power, production engineering, nanotechnology, photonics, biotechnology, industrial production, metrology and sensors, environmental and climate research. Research linked to ICT is also deemed to be an area of strength, along with the significance of technology with regard to social development.

Research areas with positive development tendencies

In this context areas of research can advance from year to year. To illustrate the direction in which there is a tendency for them to shift, Figure 6 highlights the direction in which the research area has moved from one period to the next, based on the previous five-year period.

As indicated in Figure 6 above, most of the strengths are assembled around 1.1 to 1.5 in impact, while there are few that have a relatively high impact or specialisation. The latter are particularly strong areas of research. The six strongest are:

- Structural Biology

- Nuclear and High Energy Physics

- Space and Planetary Science

- Astronomy and Astrophysics

- Archaeology

- Urology

Four of these areas come under natural sciences, but we also find humanities and health sciences among the top six. All of them have a positive growth trend (direction of the arrow in Figure 6 for both parameters, with the exception of Structural Biology, which is however showing an increase in impact. All these areas thus have the opportunity to develop in a positive

direction over the next five years if the level is maintained or improved in relation to the current level.

Potential areas of strength

Of the 108 potential areas of strength that either have an impact or specialisation of more than 1.0, we have chosen to identify the research areas that have relatively good potential to be an area of strength. Figure 7 shows the research areas that have an impact or specialisation of more than 1.5, while the other parameter is below 1.

Figure 7 – Potential areas of strength for the Stockholm region compared with the Nordic average
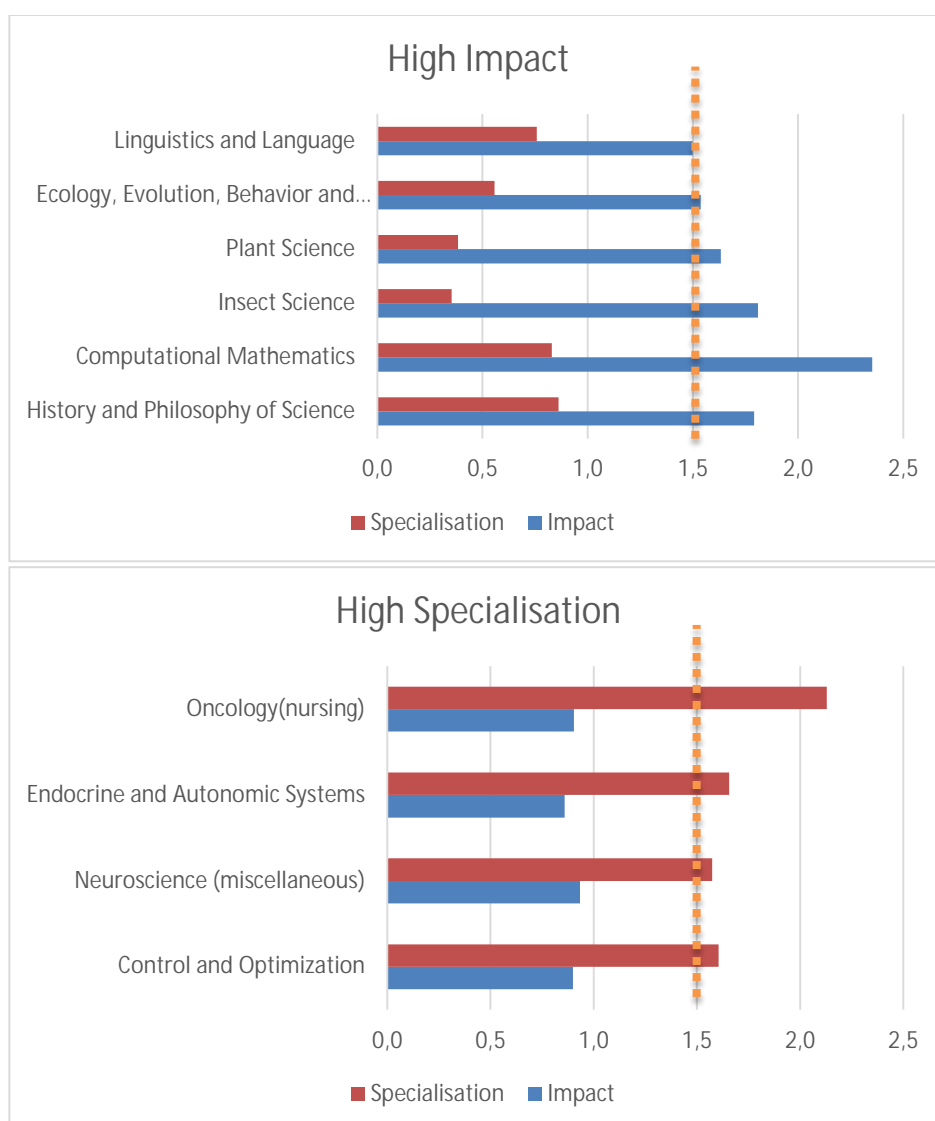
Source: DAMVAD 2014

With regard to potential research areas where there is the possibility of the Stockholm region gaining a prominent position, the respondents in the interviews highlight research into Big Data and E-science. Service research is mentioned as an area where Stockholm should have good prerequisites for being at the forefront, and where there is unutilised potential. Interdisciplinary research is also mentioned as an area of untapped potential. On this subject, one respondent comments that we should be working between disciplines – that organisations should be working together to develop new areas of research. However, one condition for this is the availability of project funding for interdisciplinary research.

In interviews it has also emerged that instead of identifying research areas, we should see strengths in the form of the close integration between research and healthcare, with its scope for clinical trials, which speeds up opportunities to translate research into social benefit. In this context it is the approach that is the strength, rather than the area itself.

Impact of institutions

It is also interesting to study the distribution of impact among the 38 research areas for the chosen institutions. The reason is that this will enable us to view the strengths *between* the institutions, to see which of them contribute towards raising the research to a high level in a Nordic perspective. If an institution has a fairly strong position in relation to the others it may be because it produces the best research in the field, relative to other institutions in Stockholm. The distribution between the institutions can be seen in Figure 8.

Figure 8 – The impact of the institutions within the 38 strongest research areas compared with the Nordic average
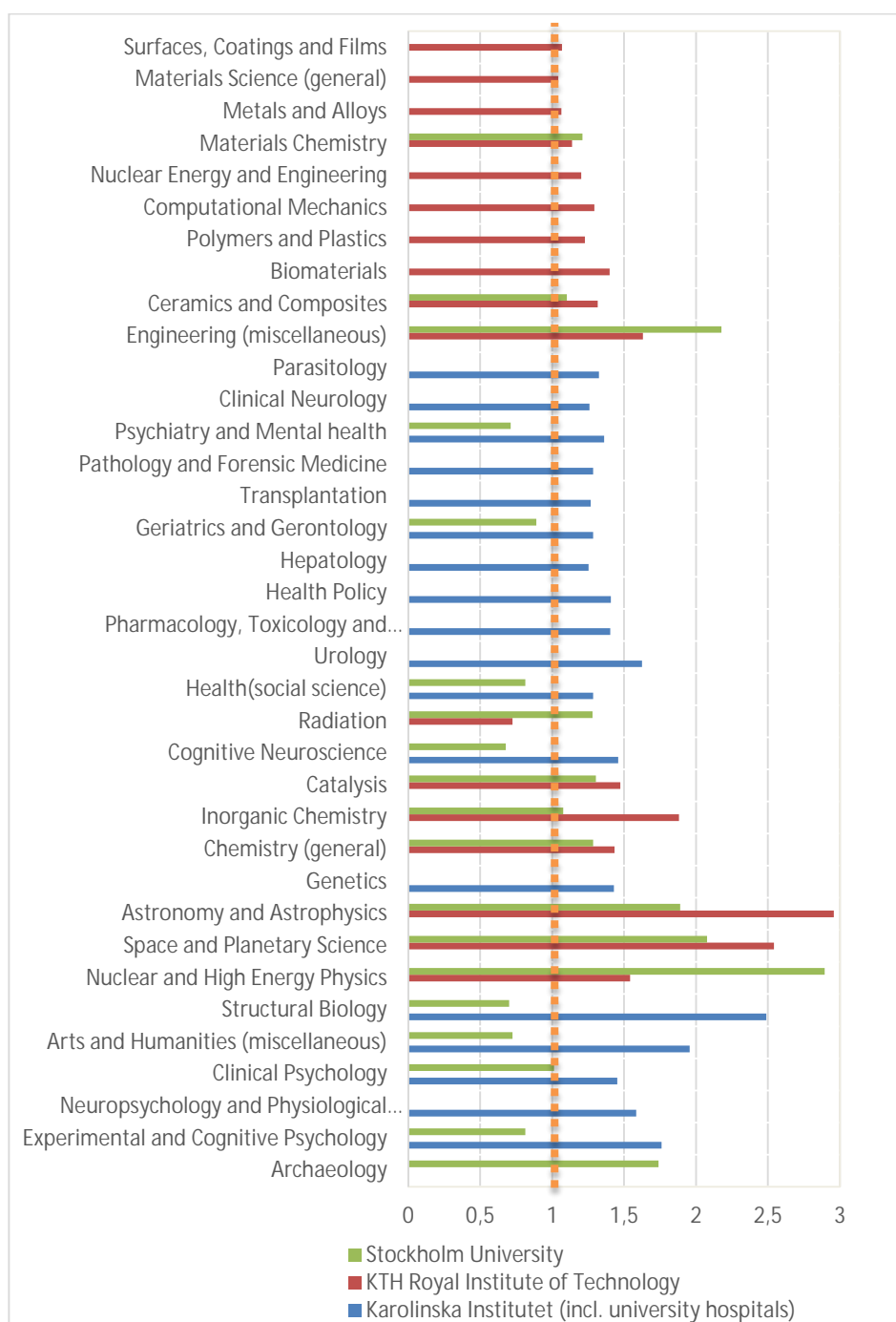
Source: DAMVAD 2014

The biggest areas are primarily found among the natural sciences, where impact is high for several of the universities. Astronomy and nuclear physics have a particularly high figure for Stockholm University and KTH Royal Institute of Technology. In addition, Karolinska Institutet also has an impact that is above the average in all research areas in which they have specialised. These are primarily psychology and medical areas, but they have a strength in Structural Biology as well, which is also their largest.

The Stockholm School of Economics and Södertörn University are not represented in any of the research areas, which is due to the fact that they do not have over 50 publications in any of the 38 selected strengths. This is why they are not included in the figure (compare method section). It is important to point out that this does not mean their research does not live up to the Nordic standard, but rather that their specialities are not among the 38 research areas. For example, the Stockholm School of Economics is represented in the quadrant with high impact and low specialisation within the research area "Economics and Econometrics". Like Karolinska Institutet, the Stockholm School of Economics has a narrower research focus and is therefore not included in the research areas that cover several different main areas. The research at the Stockholm School of Economics is also centred around economics and law, which has a greater national focus compared to other research areas. This means that the Stockholm School of Economics' publications may be underrepresented in the Scopus database, as mentioned in the method section.

The areas Economics, Econometrics and Finance (general) and Urban Studies are not included in Figure 8. This is because each individual institution does not have 50 or more publications within these disciplines and therefore fails to meet the minimum requirement. This means therefore that an individual institution does not manage to raise the area to a high level in a Nordic perspective, but that all the institutions combined manage to achieve a strength.

Figure 9 – Stockholm University's impact within the 38 strongest research areas compared with the Nordic average
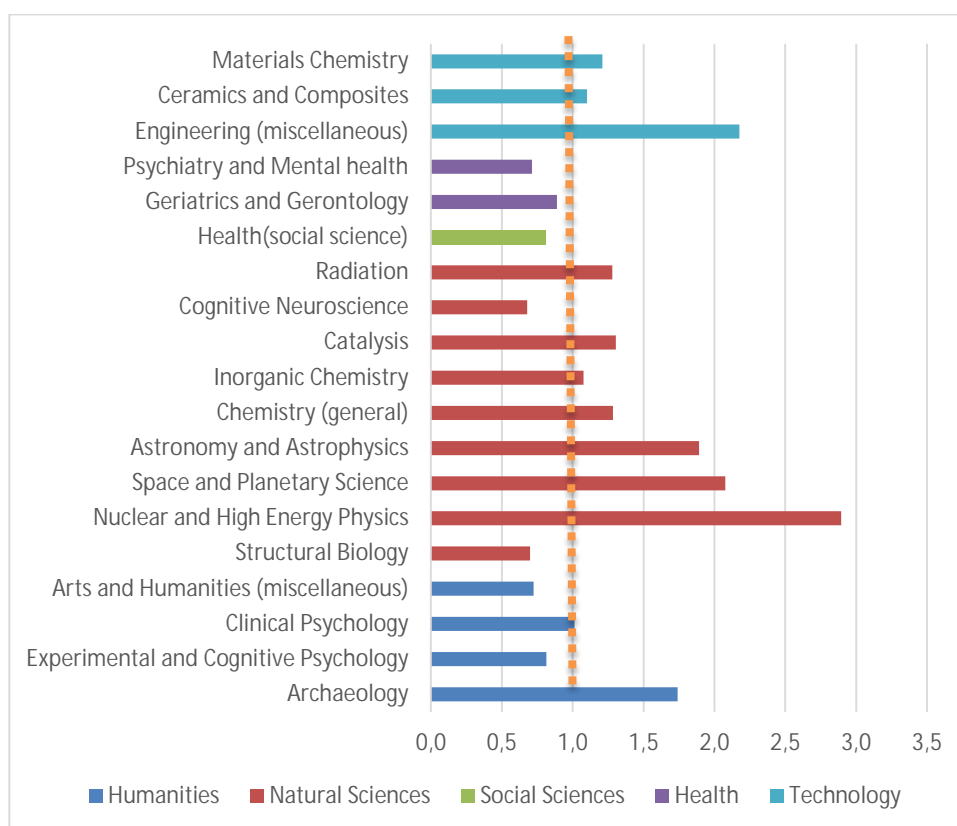
Source: DAMVAD 2014

Stockholm University's impact within the 38 strongest research areas is shown in Figure 9. Stockholm University has more than 50 publications for 19 of the 38 research areas. However, 12 of these 19 are actually strengths, i.e. they have a higher impact than the average. Stockholm University's research is effectively reaching a wider audience. This may be because the university has a broader profile in relation to Karolinska Institutet, which has a narrower research focus. Stockholm University also has several research areas per discipline, with the exception of social sciences, where the only research area is not a strength (green bars). However, there is clearly a major strength among the natural sciences, where only "Structural Biology" is lower than the average, while the rest are significantly higher (red bars).

Figure 10 – KTH Royal Institute of Technology's impact within the 38 strongest research areas compared with the Nordic average
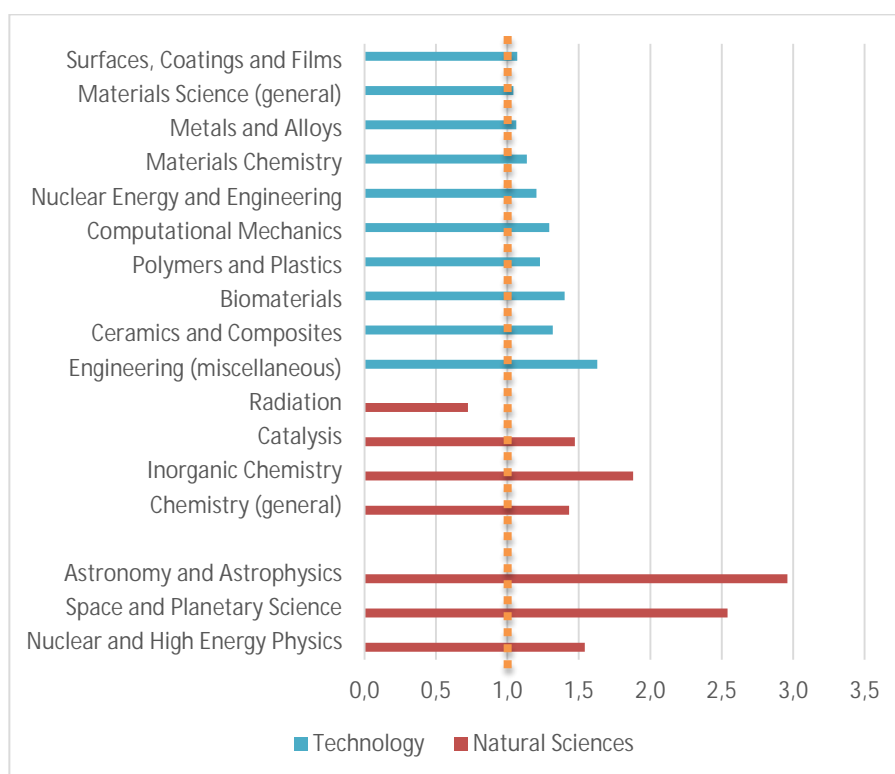
Source: DAMVAD 2014

KTH Royal Institute of Technology has strengths within both natural sciences and technology, see Figure 10.. Of these, astronomy and nuclear physics-based research areas are the strongest and most likely originate from KTH's Department of Physics, where research into these areas is conducted[2]. Their astronomy-based research is of particularly high quality and has an impact of between 2.5 and 3, which is remarkably high. This means that their research within this field is without a doubt among the best in the Nordic region. The only area where KTH does not exceed the Nordic average is Radiation, which is dominated by Stockholm University and Karolinska Institutet.

___

[2]KTH Royal Institute of Technology's Department of Physics and their research groups:
http://www.physics.kth.se/se/omoss/forskargrupper-1.385707

Figure 11 ─ Karolinska Institutet's impact within the 38 strongest research areas compared with the Nordic average
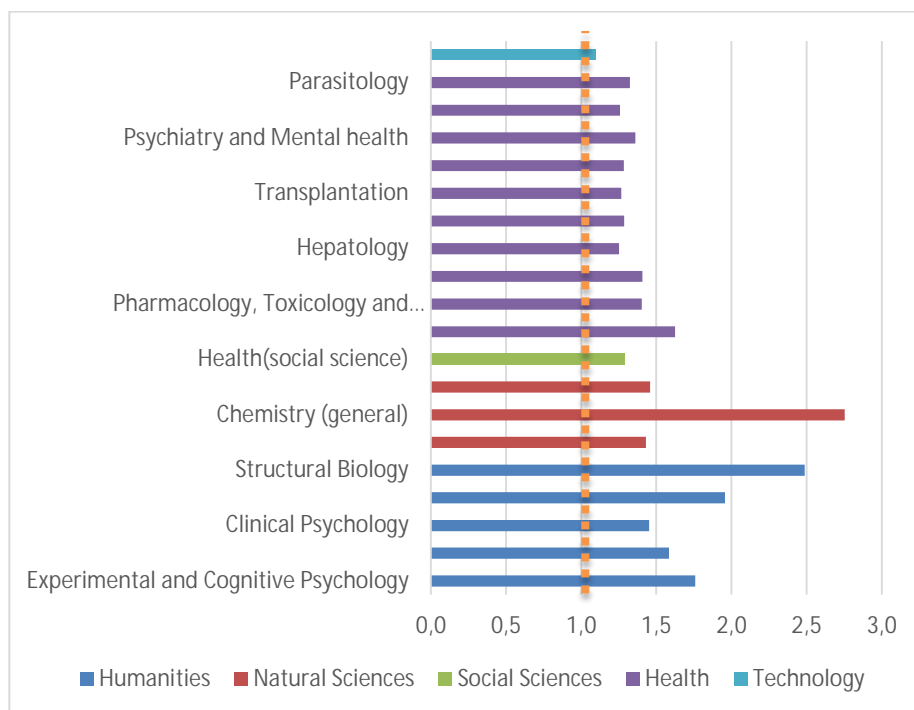
Source: DAMVAD 2014

Karolinska Institutet's strengths are mainly found within medicine, psychology and biology, see Figure 11. It is worth noting that the discipline "Arts and Humanities (miscellaneous)" appears for Karolinska Institutet because publications have occurred in journals that cover this discipline, but also other disciplines from the medical and psychological main areas. These articles are therefore on the borderline between medicine and humanities.

Karolinska Institutet is the primary engine for research in the areas of health sciences and psychology (placed under humanities), which are among the 38 top strengths. Karolinska Institutet is consistently above the Nordic average here for impact, while Stockholm University, for example, is below the average. Karolinska Institutet has such a significant strength that it compensates for the fact that Stockholm University fails to meet the Nordic standard, since the research area is a strength for Stockholm as a whole.

It is worth noting that half of the areas have a value of between 1 and 1.5, and are thus not significantly higher than the average. However, one interpretation is that the area is generally very high and that Karolinska Institutet is nevertheless better.

National and international research funding

To get an indication of which disciplines/research groups are prioritised in national research funding, we have chosen to look more closely at the national funding that has been allocated to institutions and organisations in the Stockholm region over the past five years by VINNOVA and the Swedish Research Council. The data on funding granted to projects from each funder and an analysis of annual reports has enabled us to establish which subject areas have been prioritised in national funding.[3]

The Swedish Research Council (Vetenskapsrådet,VR) distributed just over SEK 5.6 billion in the Stockholm region between the years 2010 and 2014. The Swedish Research Council has granted funding to organisations in the Stockholm region primarily within the fields of Medicine and Health (43%), and Natural Sciences and Technology (34%). During the period 2004–2014, VINNOVA has distributed SEK 6.5 billion to projects with participants in the Stockholm region. Of the funding granted that is not directed at general areas, just over 60% of VINNOVA's funding has been allocated within programmes that come under the field of Technology. This is followed by programmes within Natural Sciences, Health and Social Science subject areas.

Due to limited data as regards international funding, we can only give details of which organisations that are legally registered in the County of Stockholm have been allocated money from the EU under the Seventh Framework Programme. Recipients from Stockholm account for 40% of the total granted budget for Swedish participation, of which the main participants from the County of Stockholm are Karolinska Institutet, KTH Royal Institute of Technology and Stockholm University.

Due to the limited scope of the assignment, it has not been possible to include national funding from foundations and funds or other private institutions. This means that the results only show a portion of the national funding.

Funding from the Swedish Research Council

The Swedish Research Council (VR) is a state authority that comes under the Ministry of Education. VR's main task is to allocate funding for research. In addition, VR identifies research funding areas for strategic initiatives, conducts analyses, evaluations concerning research funding in a national and international perspective, promotes multi- and interdisciplinary research and advises the government on research policy matters, etc. VR has several forms of grants that come under the following subject areas:

- · Humanities and social sciences
- · Clinical treatment research

---

[3] DAMVAD has been given access to data on funded projects from VINNOVA and the Swedish Research Council.

- Artistic research
- Medicine and health
- Natural sciences and technology
- Educational science
- Development research

Funding from the Swedish Research Council to organisations in the County of Stockholm is shown in Figure 12 below. A total of 32 different organisations in the County of Stockholm have been given grants by VR over the past five years (the figures are based on historical data; some organisations have changed name/merged with others). We have included most types of "individual support", i.e. not for infrastructure, conferences or similar.

Figure 12 – Funding to organisations in the County of Stockholm 2010–2014 (October)
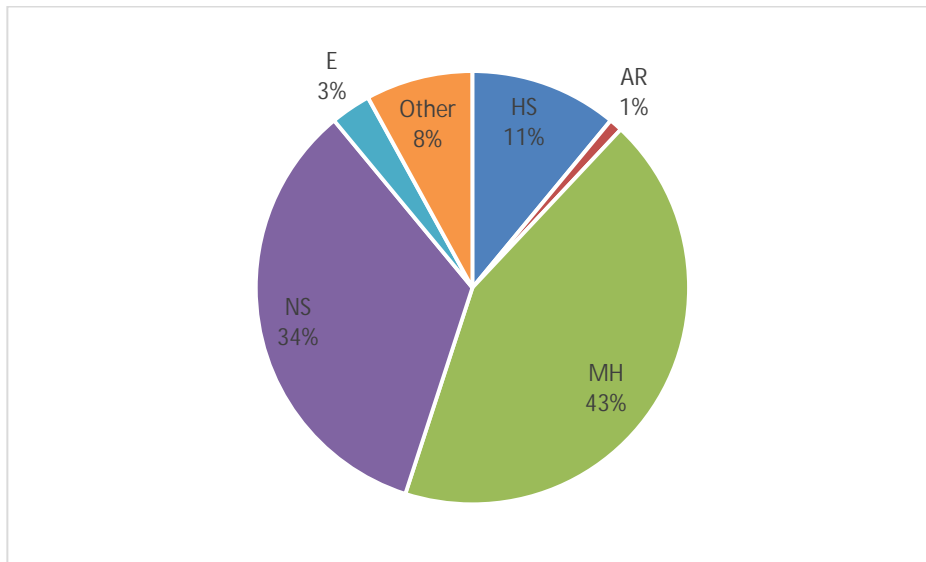
Source: Data from the Swedish Research Council 2014, processed by DAMVAD
Note: HS = Humanities and Social Sciences, AR = Artistic research, MH= Medicine and Health, NS = Natural Sciences and Technology, E= Educational science

As shown in Figure 12 above, most of the funding has been allocated to projects within Medicine and Health (43%) and Natural Sciences and Technology (34%), followed by Humanities and Social Sciences (11%), Education (3%) and Artistic research (1%). The largest percentage of funding from VR has been allocated to subject areas where the Stockholm region has positions of strength within research (see Figure 4) i.e. health sciences and natural sciences. All organisations that have received funding in the County of Stockholm over the past five years are shown in Table 1.

Table 1 – Organisations from the County of Stockholm that have received funding from VR

Organisations in the County of Stockholm	Project total
Karolinska Institutet	2,768,121,171
Stockholm University	1,370,080,801
KTH Royal Institute of Technology	1,103,091,990
Museum of Natural History	76,772,264
Södertörn University	59,565,000
Stockholm School of Economics	51,596,000
Institute for Future Studies	48,823,000
Research Institute of Industrial Economics	24,494,000
Stockholm International Peace Research Institute	22,480,000
Public Health Agency of Sweden	19,502,000
Swedish Institute of International Affairs	15,142,000
University College of Arts, Crafts and Design	8,200,000
School of Dance and Circus	8,081,000
National Historical Museums	7,964,000
Royal Institute of Art	7,600,000
Swedish Institute for Infectious Disease Control	6,242,409
Ersta Sköndal University College	6,132,000
Swedish School of Sport and Health Sciences	6,020,000
Centre for Architecture and Design	5,650,000
Swedish National Heritage Board	5,370,000
Stockholm Academy of Dramatic Arts	4,650,000
Nobel Museum	4,500,000
Swedish Defence University	4,206,000
Stockholm County Council	3,900,000
Labour Movement Archives and Library	3,852,000
Ludwig Institute in Stockholm	2,916,000
ACREO AB	2,460,000
Royal College of Music	2,300,000
Swedish Performing Arts Agency	1,782,000
Moderna Museet	1,700,000
Royal Swedish Academy of Sciences	1,680,000
Royal Swedish Academy of Arts	900,000
TOTAL	5,655,773,635

Source: Data from the Swedish Research Council 2014, processed by DAMVAD

As indicated in Table 1, the biggest recipients overall are Karolinska
Institutet, Stockholm University and KTH Royal Institute of Technology.
These organisations have received a total of just over SEK 5.2 billion in
granted funding from VR over the past five years, which corresponds to 92%
of the total funding.

Funding from VINNOVA

VINNOVA is a government innovation agency that comes under the Ministry of Enterprise, Energy and Communications, and a national contact authority for the EU's Framework Programme for research and development. VINNOVA was established in 2009 and distributes around SEK 2.7 billion a year for various innovation promotion initiatives.

In this section we can see the breakdown of all projects that have received funding since 2004. We also take a more in-depth look at the programmes and agendas that have received funding within the Strategic Innovation Areas (SIA).

Between the years 2004–2014 (October), VINNOVA granted a total of SEK 6.5 billion to programmes with participants (both coordinators and participants) in the Stockholm region. Much of this funding has been allocated to general innovation work, for example the various VINN programmes. However, it has been possible to categorise roughly SEK 2.9 billion, or around 45% of all funding, into various sectors. Figure 13 below shows that around half of funding has gone to projects associated with the transport industry (SEK 1,289 million). However, a single programme – Strategic motor vehicle research and innovation – pushes the average up. Over SEK 1 billion has been paid out within this programme alone. Otherwise, relatively large sums have been paid out within the areas of ICT, Manufacturing, Environment/CleanTech and Life Science.

Figure 13 – Funding from VINNOVA to organisations in the Stockholm region – amounts granted per sector.
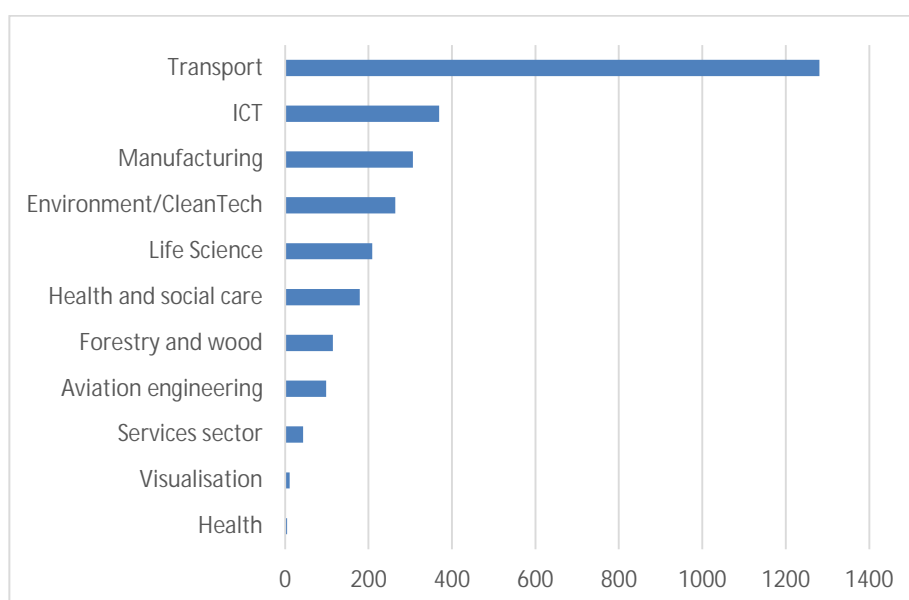
Source: VINNOVA, processed by DAMVAD 2014. SEK millions.

To give an indication of the size of the programmes in each sector, the average amount paid out within each programme and sector is given in Figure 14 below. We can see that the largest average programme size has been in the transport sector, which again is due to the programme "Strategic motor vehicle research and innovation", which pushes up the mean value. A total of 10 programmes are linked to the transport sector. The manufacturing industry has the highest number of programmes (18), which means a programme size of approx. SEK 17 million.

Figure 14– Funding from VINNOVA to organisations in the Stockholm region – amounts granted per programme within each sector.
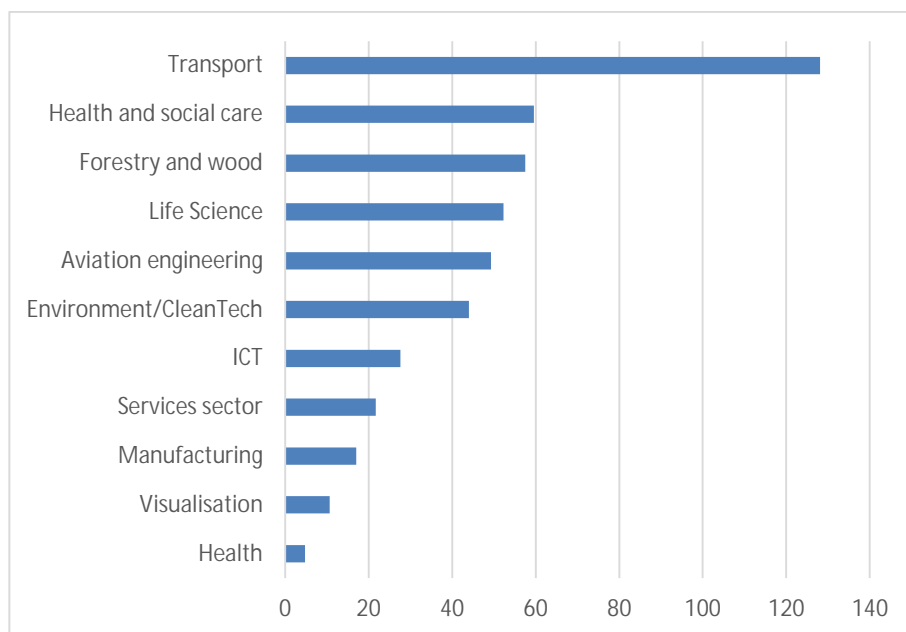
Source: VINNOVA, processed by DAMVAD 2014. SEK millions.

It has been possible to sort SEK 2.6 billion (40%) of the total funds into subject areas. A summary of this breakdown is given in Figure 15 below. Just over 60% of this funding has been distributed among programmes connected to technology (SEK 1,584 million). This is followed by natural sciences (SEK 499 million), health (SEK 336 million) and social science (SEK 151 million) subject areas. No project has been categorised as coming under humanities.

Figure 15 – Funding from VINNOVA – amounts granted per subject area.
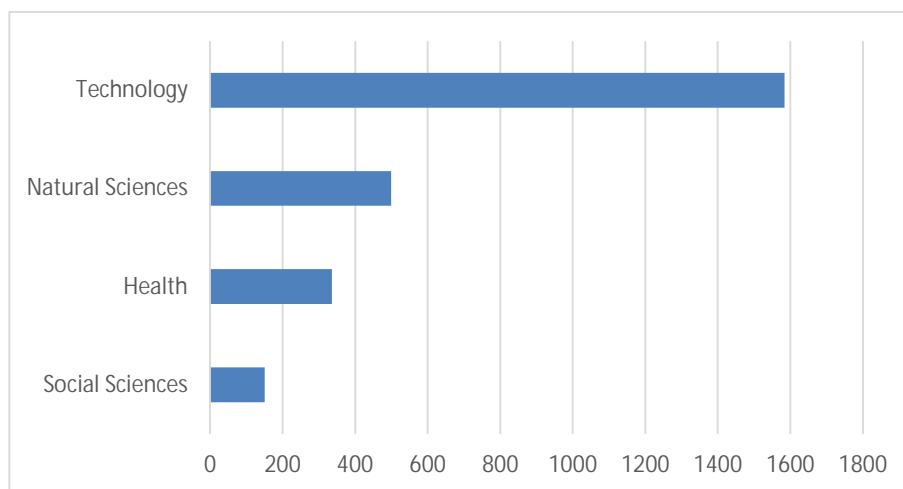
Source: VINNOVA, processed by DAMVAD 2014. SEK millions.

On the other hand if we look at amounts granted per programme within each subject area, it appears that the largest programme is in the social science subject area. However, only one project has taken place within this area, "Programme for financial market research". Four programmes have been sorted under the subject area of health, while technology and natural sciences have 25 and 15 programmes respectively.

Figure 16 – Funding from VINNOVA, amounts granted per programme within each subject area
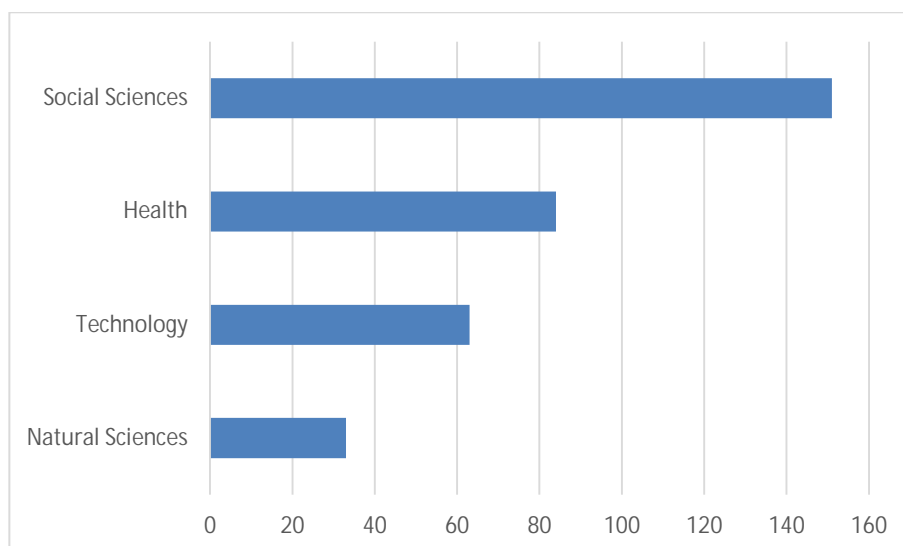
Source: VINNOVA, processed by DAMVAD 2014. SEK millions.

Funds granted for SIO programmes and agendas

The Strategic Innovation Areas (SIAs) are part of the government's research and innovation policy. The initiative aims to mobilise business, academic research and the public sector to come together to strengthen Sweden's competitiveness and create the conditions for sustainable solutions to global social challenges. VINNOVA is one of the three agencies[4] responsible for granting funding within the framework of the strategic research areas. VINNOVA has opted to adopt a bottom-up approach to the initiative, which involves the organisations and institutions themselves defining the areas around which to mobilise support. Just over 60% of the projects that are coordinated by organisations from the County of Stockholm are in the SIA programme for metallic materials. Figure 17 gives details of the projects that have received the largest share of funding. In addition to these, SIA Chronic Diseases should have a particular mention, as Stockholm has a prominent role in the coordination and development work.

Figure 17 – Funding from VINNOVA to organisations in the Stockholm region by project – the top 18 projects
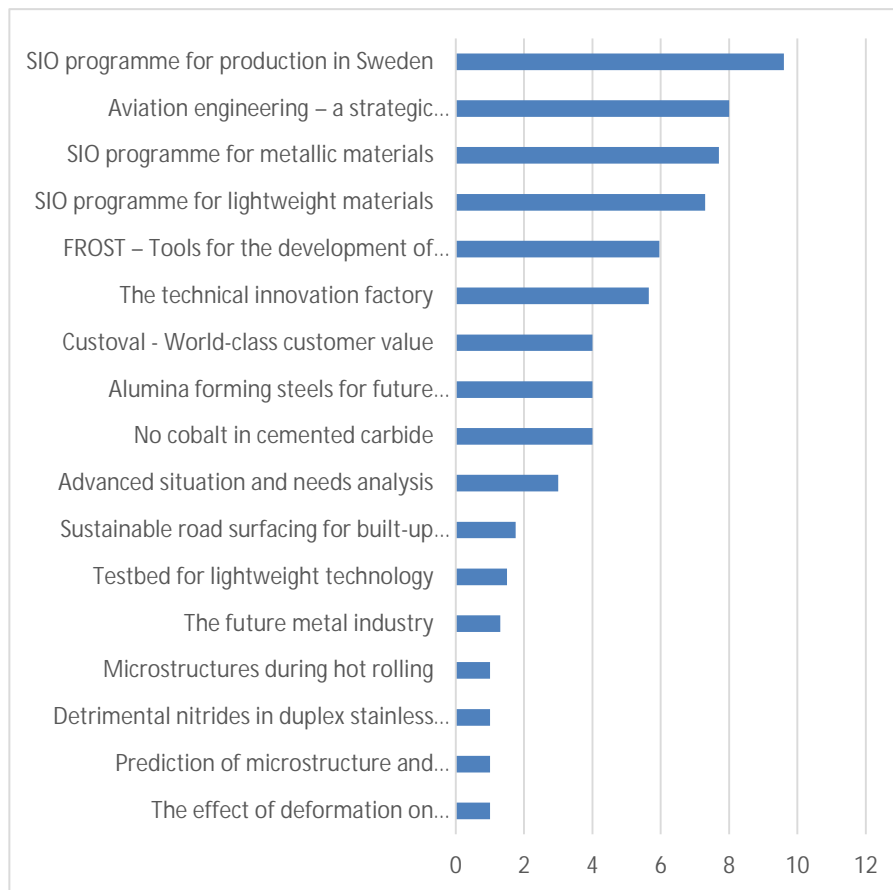
Source: Data from VINNOVA 2014, processed by DAMVAD. SEK millions.

---

[4] The other two are the Swedish Energy Agency and FORMAS.

Figure 17 reveals that the SIA programme for production is the project that received the largest portion of funding, at SEK 9.6 million. This is followed by Aviation Engineering (SEK 8 million) and the SIA programme for metallic materials (SEK 7.7 million).

Figure 18 shows the coordinators from the County of Stockholm that have been allocated the largest portion of funding from VINNOVA within SIA programmes and agendas between the years 2012 and 2014.

Figure 18 – Funding from VINNOVA to organisations in the Stockholm region by organisation
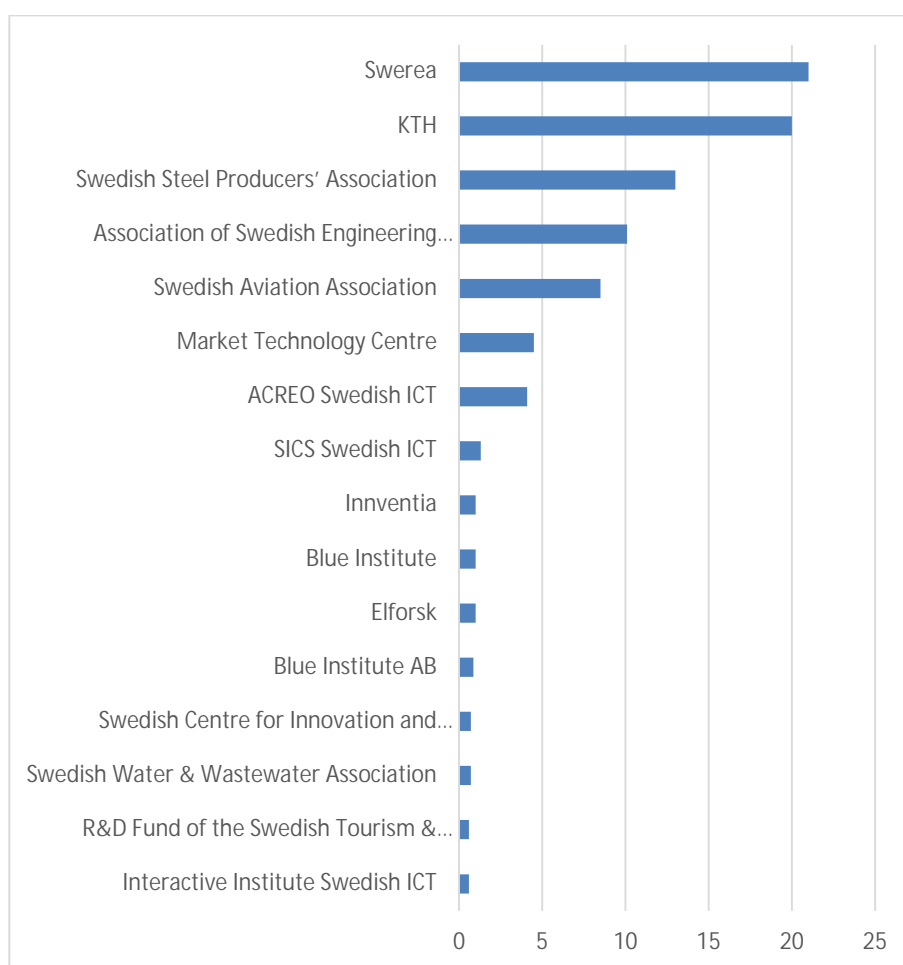
Source: Data from VINNOVA 2014, processed by DAMVAD. SEK millions.

As is evident from Figure 18, the recipients of the most funding in the County of Stockholm are Swerea (SEK 20.4 million), KTH (SEK 19.5 million) and the Swedish Steel Producers' Association, Jernkontoret (SEK 12.7 million).

International funding

In order to analyse international funding in the Stockholm region's research environments we have chosen in this study to focus solely on participation in the EU's Seventh Framework Programme. The Seventh Framework Programme for development within research and technology (FP7) constitutes the EU's most important tool for funding research in Europe. The programme operated from 2007–2013 and is the result of several years' consultation between academia, the research community, the decision-making institutions and other stakeholders.

The funding that is included from FP7 is a subset of existing international funding in the county. The EU is one of the largest sources of international funding, but there are also other sources.

Due to limited data we can only give details of which organisations that are legally registered in the County of Stockholm have been allocated money from FP7. The EU Commission's website has a database of all current and completed projects[5]. Determining which disciplines have received funding requires an analysis of all the projects to match them to their respective discipline. This is not possible within the scope of this assignment. Statistics are also based on where an organisation is legally registered, which means that large organisations can channel funding to divisions in other parts of the country. For example, Ericsson's head offices are in Kista and so statistically the money can be said to be going to Kista, but Ericsson may decide to base the actual work at another division in Sweden, which is not necessarily evident from the statistics.

Swedish organisations have been granted a total of €1,466 million from the Seventh Framework Programme (the figures cover the period 2007 to October 2013), which corresponds to 3.8% of the total budget granted.[6] This places Sweden in an impressive ninth position in comparison with other countries.[7] Stockholm, Västra Götaland and Skåne are the counties where most organisations' registered offices are based. Participants from these three counties receive 74% of all funding granted to Swedish organisations, of which organisations based in Stockholm account for 40%. Despite the figures being based on organisations' registered offices rather than place of work, VINNOVA (2013) does not believe that this changes the outcome or the relative positioning between counties in any significant way.

As is evident in Table 2 below, the main participants (that have been granted funding) from the County of Stockholm are Karolinska Institutet, KTH Royal Institute of Technology and Stockholm University. Recipients from Stockholm account for 40% of the total granted budget for Swedish participation. Just over half of the funding granted to the Stockholm region

[5] http://cordis.europa.eu/projects/home_en.html
[6] Olivera.S, and Wefer. J., (2013), Year-book 2013 – Swedish participation in European programmes for research & innovation, VINNOVA, the EU coordination function (Swedish Energy Agency, Formas, Forte, Swedish National Space Board, Swedish Research Council & VINNOVA).
[7] ibid

has been allocated to university colleges and universities. SMEs and business account for roughly 20% and public administration for around 10%. The RISE Institute and other institutions account for just over 10% and the remaining portion goes to university hospitals, government enterprises and UH-owned holding companies.

Table 2 – Main participants in FP7 from Stockholm (sorted by funding granted)

Participant	Participants	Coordinators	Funding granted (EUR)
County of Stockholm, total	1456	252	593,466,605
Karolinska Institutet	295	101	170,319,922
KTH Royal Institute of Technology	275	55	123,476,305
Stockholm University	124	31	46,599,253
Swedish Defence Research Agency	74	13	35,190,536
VINNOVA	42	5	19,447,352
Ericsson	37	4	15,365,411
Swedish Research Council	30	3	15,167,406
Acera	33	1	11,842,497
IVL Swedish Environmental Research Institute	33		9,112,797
SICS, Swedish Institute of Computer Science AB	16	1	7,516,028
STFI-PACKFORSK	12	2	6,868,756
Swedish Research Council for Health, Working Life and Welfare	6	2	5,964,260
CNET	8		5,527,835
Swedish Institute for Infectious Disease Control	12	1	4,056,135
Chemrec	1		confidential
Astra Zeneca	17		3,393,930
Stockholm County Council	14		3,359,180
Athera Biotechnologies	1		confidential
Affibody	1		confidential
Neuronova	3	1	3,104,616
SKB, Swedish Nuclear Fuel and Waste Management Company	5		3,092,570
Museum of Natural History	10	3	3,008,695
The interactive institute 11	5		2,907,635
The Royal Swedish Academy of Sciences	6	1	2,290,821
Swedish Cement and Concrete Research Institute	3	2	2,049,459

Source: Olivera. Sandra & Wefer. Judit (2013), Year-book 2013 – Swedish participation in European programmes for research & innovation

Business niches and expertise

This section focuses on strengths within business and the areas of expertise found in the Stockholm region. The analysis mainly comprises statistical indicators, but is supplemented by interviews and document studies. In order to ascertain which areas within business can be defined as positions of strength, we have compared Stockholm with various comparison regions. We have mainly compared the Stockholm region with the rest of Sweden, with a focus on Västra Götaland and Skåne, but we have also brought in international perspectives.

We have compiled areas of strength at both a general and a more detailed level. At a general level we have found 11 areas where the Stockholm region demonstrates strength – Knowledge Intensive Business Services (KIBS), Finance, ICT, Creative and Cultural Businesses, CleanTech, Life Science, Professional Services and Research Expertise, Trade, Transport, Manufacturing and Education.

At a more detailed level we have gone one stage further and identified niches within the overall areas. These niche areas can be found mainly within relatively high-tech sectors such as ICT, KIBS, CleanTech and Professional Services and Research Expertise. Several prominent niche areas have also emerged within Manufacturing.

To summarise, the results indicate that the Stockholm region mainly has positions of strength within niche areas of business and expertise in fields that are relatively knowledge-intensive. This creates a firm basis for the Stockholm region to specialise within areas where future challenges can be taken on with high levels of knowledge and skill.

Method and data

The purpose of this chapter is to identify general areas of business and expertise that stand out in the Stockholm region, and to home in on niches within these overall business sectors at a more detailed level. The analysis of overall areas of business and expertise aims to identify general tendencies and patterns in the Stockholm region's business and expertise areas. Subsequently, the aim is to establish niches within the general areas of business and expertise at a detailed level.

The analysis is chiefly based on quantitative indicators. The indicators we use at a general level are described in more detail in Table 3 below. We describe sales levels, export levels, hours worked, venture capital investments, labour immigration and productivity. These indicators are primarily described based on Swedish Standard Industrial Classifications (SNI) aggregated based on various levels. However, the exception is venture

capital investments, which are based on another form of industry classification. The indicators that describe the Stockholm region's areas of strength have been combined under county level, which means that in this section, "Stockholm", "Stockholm region" and "County of Stockholm" are used synonymously.

Table 3 – General business indicators

Variable	Source	Level
Sales	rAps	15 business sectors
Hours worked	Eurostat	10 business sectors
Productivity	Eurostat	10 business sectors
Export	Statistics Sweden	19 business sectors
Venture capital investments	Swedish Private Equity & Venture Capital Association	14 business sectors

Table 4 below describes the business indicators used at a more detailed level. At this stage we use number of employees, number of workplaces, level of education, labour immigration and patent registrations. The former three indicators are divided up based on SNI categories. Labour immigration is divided into Swedish Standard Classification of Occupations codes (SSYK) and patent registrations are divided into 35 different technology areas.

Table 4 – Detailed business indicators

Variable	Source	Level
Number of employees	rAps	2-digit SNI2007, 89 business sectors
Number of workplaces	rAps	2-digit SNI2007, 89 business sectors
Level of education	rAps	SNI2007, 51 business sectors
Labour immigration	Swedish Migration Board	3-digit SSYK, 175 groups
Patent registrations	Swedish Patent and Registration Office	35 technology areas

In addition to indicators that relate directly to business, we have also analysed indicators that describe activities at lecturer and postgraduate student level at universities and university colleges. These indicators are detailed in Table 5 below. We describe active postgraduate students per subject area, and visiting lecturers and first-time postgraduate students per subject group. The indicators aim to give a picture of the region's practical skills within various academic disciplines.

Table 5 – Postgraduate students and lecturers at educational establishments

Variable	Source	Level
Active postgraduate students per subject area	Swedish Higher Education Authority	35 subject areas
Visiting lecturers per subject group	Swedish Higher Education Authority	5 subject groups
First-time postgraduate students per subject group	Swedish Higher Education Authority	5 subject groups

The absolute values for each variable in the Stockholm region are given in the Appendix.

Definition of specialisation

For the purposes of this study, specialisation is defined as the relative proportion that businesses or niches have in the Stockholm region, compared with a comparison region. Various comparison regions have been selected, depending on variables and access to data. The level of specialisation is based on a Balassa-Hoover index, which describes the relative degree of specialisation compared with other regions. This index is defined as:

$$BH_i = \frac{Y_{ij}/Y_j}{Y_i/Y}$$

If, for example, we want to calculate specialisation on the labour market (defined as number of employees per business niche) at a regional level compared with a national level, the variables are defined as follows: Y_{ij} describes the number of employees within niche i in region j, Y_j is the total number of employees in i region j. Y_i corresponds to the total number of employees within niche i, and Y is the total number of employees at a national level. The interpretation of the specialisation index values is described in Table 6 below.

Table 6 – Interpretation of index values

Index value	Interpretation
>1	The Stockholm region demonstrates a specialisation compared with the comparison region.
1	The Stockholm region demonstrates neither a specialisation nor a non-specialisation compared with the comparison region.
<1	The Stockholm region does not demonstrate a specialisation compared with the comparison region.

We have adopted a methodical approach to compiling the Stockholm region's areas of strength within business and expertise. The indicators have been examined together to determine which areas occur frequently within the various indicators.

We have initially compiled the 10 strongest areas per indicator. If the Stockholm region has fewer than 10 areas of strength within an indicator, i.e. indicators where fewer than 10 areas have a value of more than 1, only those areas with values of more than 1 have been selected.

The compilation has thereafter been carried out using a combination of a top-down and a bottom-up approach. First we analysed the general variables to establish overall categories. The general areas that recur at least three

times have been selected. Then we analysed the more detailed variables to identify additional patterns.

Following that we have incorporated the detailed areas into each general area of strength. At this stage we also chose to incorporate the results from the literature studies and interviews. The purpose is to highlight areas that may be hard to identify in quantitative terms. For example, some niche areas of business do not fit into the SNI categories but are instead based on skills within a number of classic business categories.

Results

Initially the business indicators that are described are the ones used in the analysis. Firstly the overall business indicators are reported, and subsequently the indicators are reported at a more detailed level. Finally indicators are reported that describe lecturers and postgraduate students at universities and educational establishments.

Overall business indicators

This section looks at the overall business indicators. The index values describe the relative degree of specialisation – *a value of more than 1 means that the Stockholm region is relatively specialised* within the respective business sector compared with the comparison region.

Sales

Initially sales levels are divided up according to 15 different SNI categories. Figure 19 below compares sales levels within each sector with Skåne County, Västra Götaland County, Sweden incl. Stockholm and Sweden excl. Stockholm. We can see that Stockholm displays a clear specialisation in relation to service companies, with Information and Communication, and Financial and Insurance Activities showing a consistently clear specialisation. The category Financial and Insurance Activities has a share of sales in the Stockholm region that is five times that of the rest of Sweden. Information and Communication in the Stockholm region has a sales level that, relatively speaking, is three times that of the rest of Sweden. We can also see that the category Agriculture, Forestry and Fishing has a relatively small share of sales in the Stockholm region.

Figure 19 – Specialisation within sales – Stockholm compared with four regions

Comparison regions:
- Sweden excl. Stockholm
- Sweden incl. Stockholm
- County of Västra Götaland
- County of Skåne
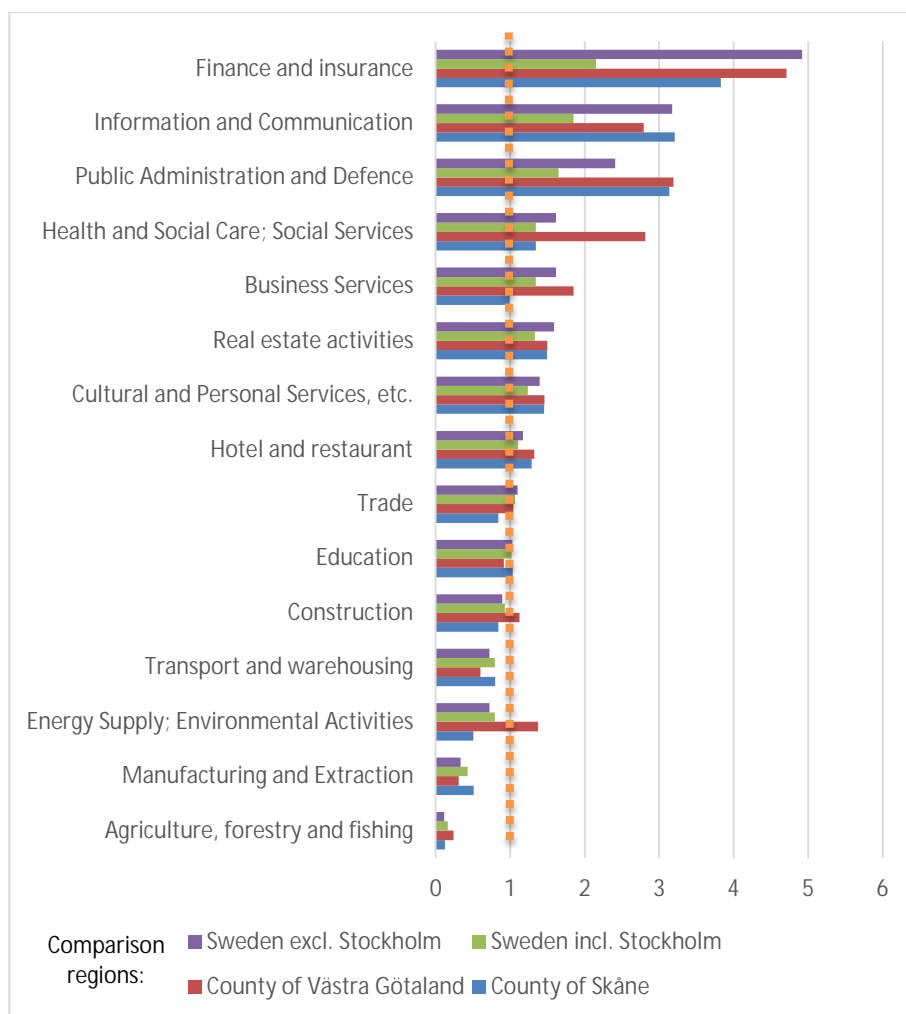
Source: rAps. Processed by DAMVAD. Data from 2012.
Note: The diagram is sorted by the comparison region "Sweden excl. Stockholm". Since sales are not given at a regional level in year-end data, if a company operates in more than one region, Statistics Sweden allocates sales by workplace based on specific keys.

Hours worked
Figure 20 below provides an overview in Europe, where hours worked within 10 different sectors are compared with three different regions: Hovedstaden (Copenhagen), Noord-Holland (Amsterdam) and Nylands Förbund (Helsinki-Uusimaa Regional Council). Once again the index shows the strength of Stockholm's specialisation within each sector compared with the respective region. A value of more than 1 means that the Stockholm region is relatively specialised within the respective area.

The diagram is sorted based on average degree of specialisation per comparison region. Based on this method, *Real Estate Activities* ends up in the top position of strength. However, we can also see that ICT is the only

area where the Stockholm region is relatively specialised compared with all regions. The agricultural sectors are ranked lowest within this category.

Figure 20 – Specialisation within hours worked – Stockholm compared with three international regions
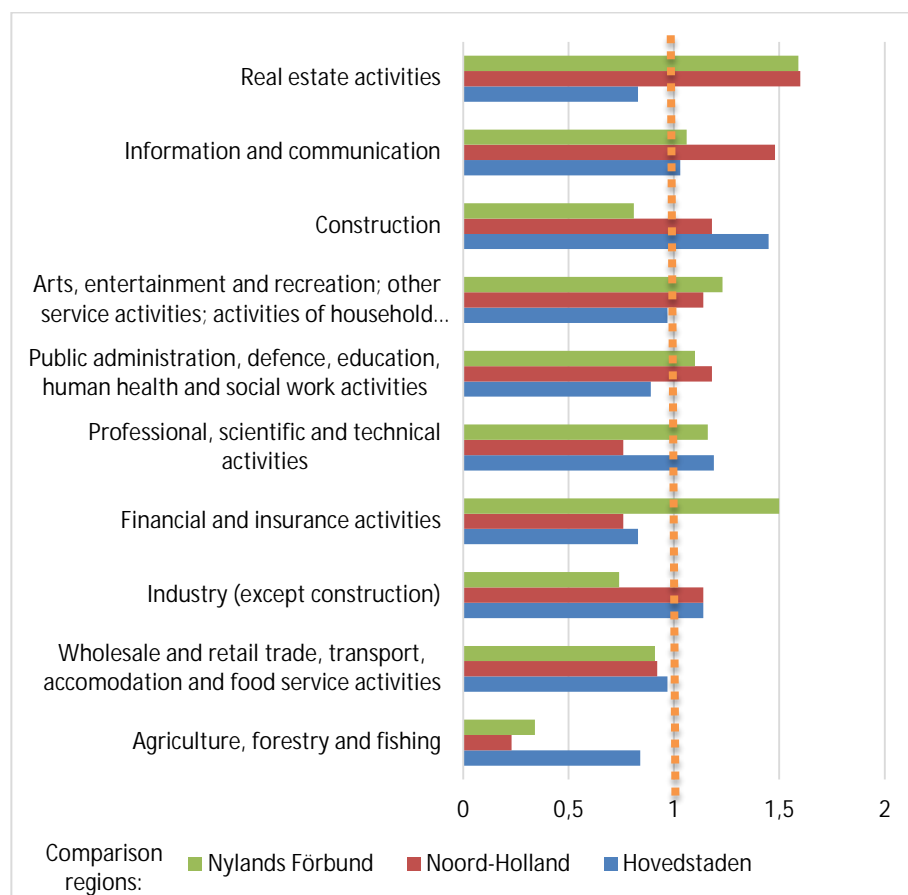
Source: Eurostat. Processed by DAMVAD. Average 2007–2010.
Note: The diagram is sorted by average degree of specialisation.

Productivity

We can also look at productivity, here defined as production per hour worked. Figure 21 compared with the same comparison regions as above. However, no specialisation index has been calculated in this diagram – a value of more than 1 here means that the Stockholm region has higher productivity within the respective sector, while a value of less than 1 means lower productivity. For example, a value of 2 means that the Stockholm region is twice as productive within the sector compared with the respective region.

We can see that the Stockholm region displays a high level of productivity within the agricultural sectors, ICT and Professional, Scientific and Technical Activities.

Figure 21 – Specialisation within productivity – Stockholm compared with three international regions
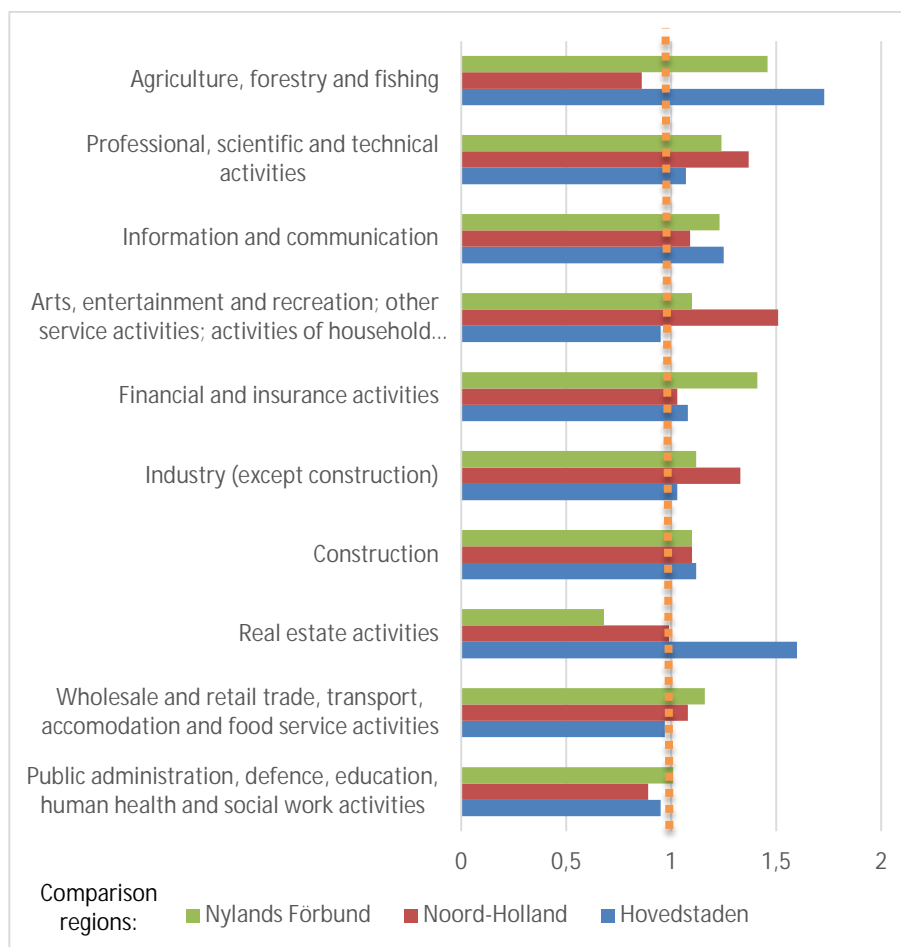
Source: Eurostat. Processed by DAMVAD. Average 2007–2010.
Note: Productivity defined as value added per hour worked. The diagram is sorted by average comparison value.

Export

Figure 22 below shows export levels by various regional groupings. However, it should be mentioned that export values are problematic to report at regional level for a number of reasons. Firstly, only export of goods is included in the reported statistics, which means that the service side of the economy is completely excluded. Furthermore, exports are attached to the county in which the company's head offices are based, which means that manufacturing and exports can in practice occur from a location other than the registered one. An additional problem is that companies with exports that are below SEK 4.5 million are not included in the statistics, thus the actual figures are undervalued. Despite this relatively inadequate data set we can still draw tentative conclusions from the results. Once again, Information and Communication stands out as an area of strength, as does Financial and Insurance Activities.

Figure 22 – Specialisation within exports – Stockholm compared with four regions
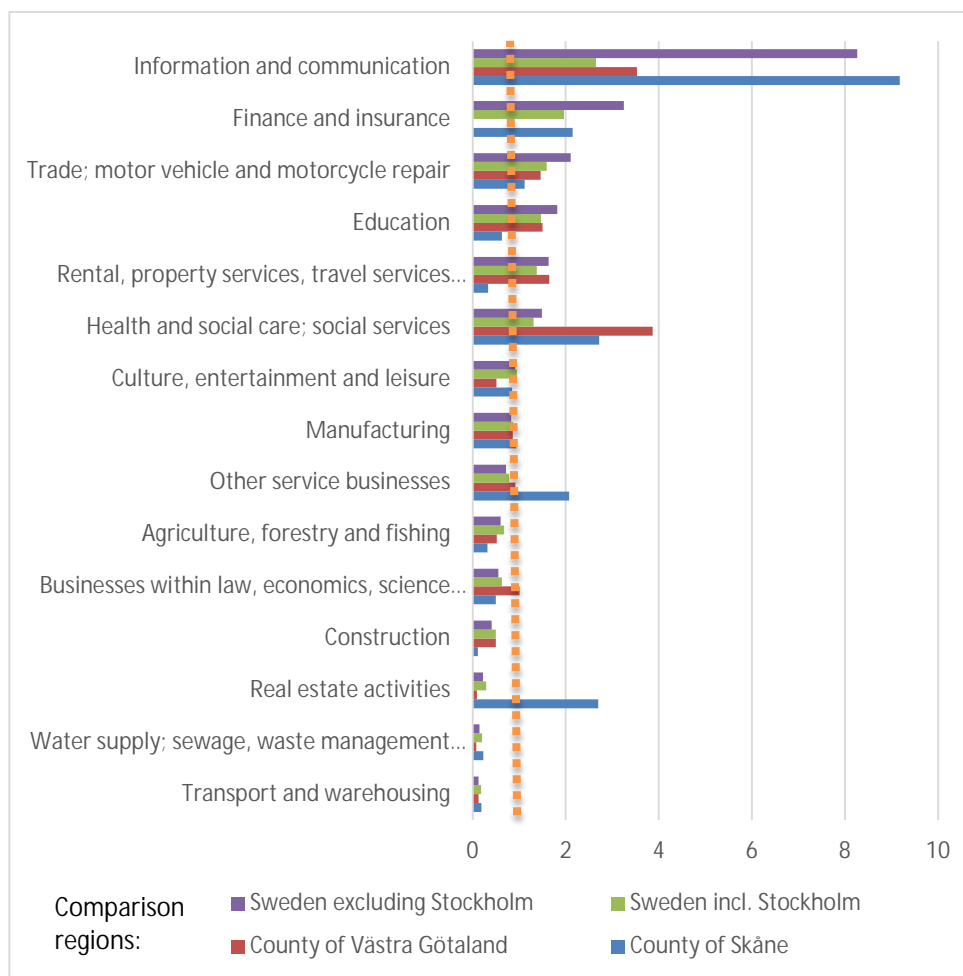
Source: Statistics Sweden. Processed by DAMVAD. Data from 2013. Since export data shows considerable variation within certain regions and sectors, the index values may in some cases reach extreme values. Index values of more than 10 have therefore been excluded from the diagram above. See Appendix for a complete set of data in table format.
Comparison region: Rest of Sweden.

Venture capital investments

Figure 23 below shows venture capital investments carried out in different Swedish regions. The data includes domestic and foreign venture capital; however, buy-out capital is not included in the statistics. The data is based on total venture capital between the years 2009 and 2013.

Compared with the rest of Sweden, we can see that the Stockholm region displays relative specialisations within Communications, Computer and Consumer Electronics, and Business and Industrial Products. We can also see comparisons with Skåne and Västra Götaland; however, these regions display relatively large variations within the various areas.

Figure 23 – Specialisation within venture capital investments – Stockholm compared with four regions
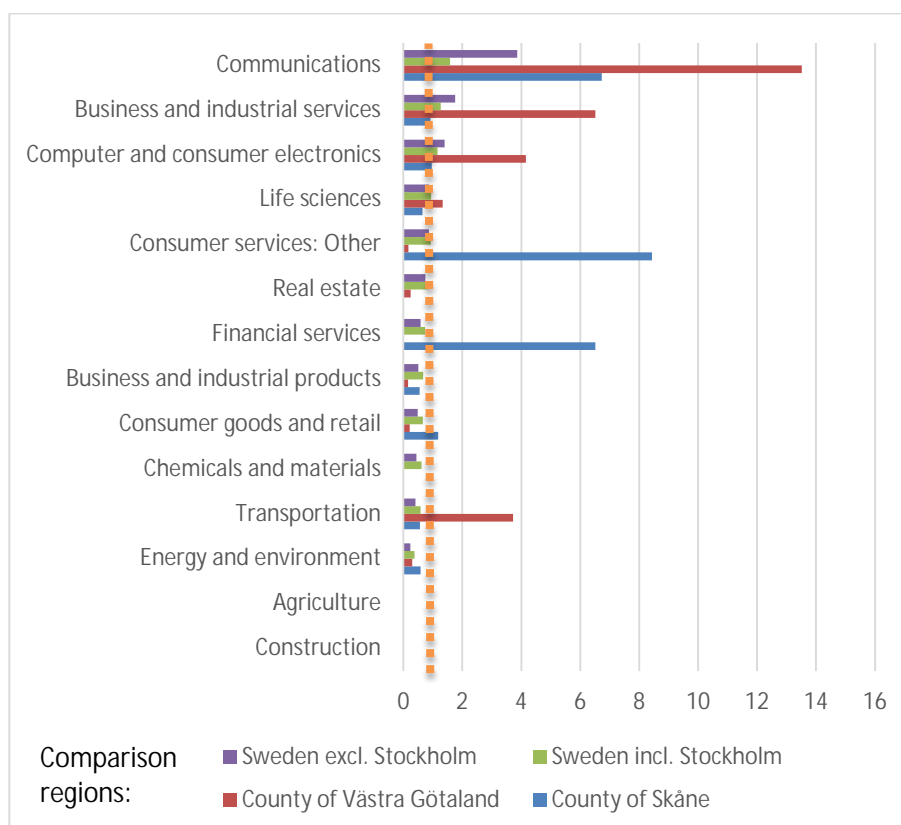
Source: Swedish Private Equity & Venture Capital Association. Processed by DAMVAD. Data from 2009–2013.
Comparison region: The diagram is sorted based on the benchmark for Sweden excluding Stockholm.

Detailed business indicators

This section deals with business indicators at a more detailed level than the section above. We describe number of employees and number of workplaces within various niche areas of business. We also analyse the relative level of education within different niches and the level of labour immigration for various professions. Finally we look at patent data by technical area. For reasons of space, in this section we only report comparisons between the Stockholm region and the rest of Sweden, excluding County of Stockholm.

Number of employees

The first indicator, which is shown in Figure 24 below, describes the relative specialisation in Stockholm based on number of employees within various sector groups, defined based on 2-digit SNI2007 level. There are 89 different sector groups at this level.

Four different niche areas stand out, with a specialisation index of over 6. This means that in relative terms, more than six times the number of people work within these sectors compared with the rest of Sweden. Film, television and television programme activities display the highest degree of specialisation, closely followed by Air transport, which is due to the fact that the County of Stockholm is home to both Arlanda and Bromma airports. The other two niche areas with a specialisation index exceeding 6 are Information services and Support services for financial services and insurance.

Financial services are generally strong in the Stockholm region. The fifth most specialised niche area is Financial services excluding insurance and pension funds. The area Insurance, reinsurance and pension fund activities excluding compulsory social insurance is also within the top ten on the list.

ICT niche areas also emerge as relatively specialised in the Stockholm region. As mentioned, Information services are high up on the list, but Telecommunications, Computer programming and IT consultancy etc., and Manufacture of computers, electronic products and such like are also fairly high up.

We also see that niche areas within cultural and creative businesses, CCB, are strong, primarily with Film, video and television programme activities, which is the strongest specialised sector in the region.

The Appendix provides statistics in table format, where all niche areas of business with a specialisation index that exceeds 1 are detailed. Furthermore, the gender distribution for each niche within the County of Stockholm is shown.

Figure 24 – Specialisation in number of employees – Stockholm compared with Sweden excl. Stockholm

Source: Statistics Sweden. Processed by DAMVAD. Data from 2012. For reasons of space, niche areas with a specialisation index that exceeds 2 are displayed. See Appendix for table with details of all niche areas with a specialisation index that exceeds 1, and proportion of women within each business sector.
Comparison region: Sweden excl. Stockholm

Gender distribution on labour market

One interesting observation is that the degree of specialisation defined as number of employees is closely linked to how equal the gender distribution is within the respective niche area Figure 25 shows the connection between these variables. The horizontal axis shows the degree of specialisation and the vertical axis shows how equal the gender distribution is for each niche, where 1 means completely equal and 0 that the niche only comprises one gender. We can see that the less equal the gender distribution in each niche area, the lower the degree of specialisation.

Although we are unable to identify a causal link within the scope of this assignment, we can still see that equality within each niche is strongly associated with the degree of specialisation.

Figure 25 – Link between gender equality on the labour market and specialisation
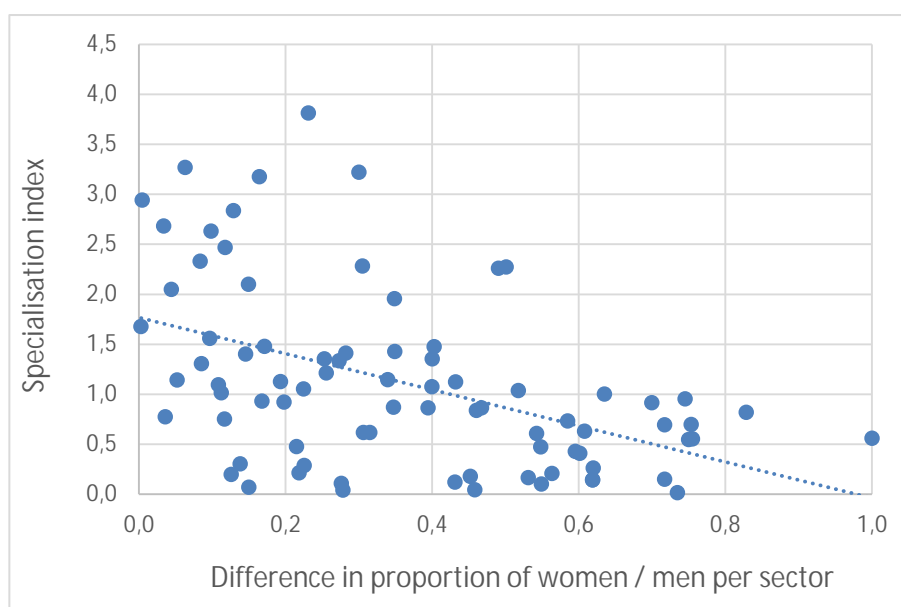
Source: Statistics Sweden. Processed by DAMVAD. Data from 2012.
Note: The difference in proportion women/men is defined as: 0=even distribution, 1=only men or women in the specified sector. Four extreme values have been excluded from the diagram for visual reasons; however, these observations do not affect the conclusions. Comparison region: Rest of Sweden

Table 7 is based on the same data reported in Figure 24. The table shows the 25 niche areas with the most even gender distribution. The Appendix provides data for all business sectors, along with the values on which Figure 24 is based.

The business sectors Other activities within law, economics, science and technology, and Financial services excluding insurance and pension funds stand out as areas with the most equal gender distribution.

It is worth noting that just two of the 15 business sectors with the most equal gender distribution have a specialisation index with values of less than 1: Office services and other business services, and Sports, leisure and entertainment.

Table 7 – Which niche areas have the most equal gender distribution?

Ranking	Business sector	Specialisation index
1	Other activities within law, economics, science and technology	2.3
2	Financial services excluding insurance and pension funds	3.8
3	Programme planning and broadcasting	3.2
4	Office services and other business services	0.9
5	Artistic and cultural activities and entertainment	2.3
6	Employment services, recruitment and other staffing-related services	1.3
7	Air transport	6.4
8	Advertising and market research	2.8
9	Property services and management and maintenance of green spaces	1.4
10	Gaming and betting businesses	2.1
11	Manufacture of basic pharmaceutical products and drugs	3.2
12	Public administration and defence; compulsory social insurance	1.1
13	Scientific research and development	1.1
14	Sports, leisure and entertainment	0.9
15	Insurance, reinsurance and pension fund activities excluding compulsory social insurance	2.9
16	Textile manufacturing	0.3
17	Activities performed by head offices; management consultancy	3.3
18	Other	0.5
19	Restaurant, catering and bar businesses	1.5
20	Publishing	2.3
21	Production of leather and leather goods, etc.	0.1
22	Extraction of metal ores	0.0
23	Support services for financial services and insurance	6.0
24	Real estate activities	1.0
25	Law and financial consultancy	2.0

Note: The Appendix gives details of all niche areas of business. Data from 2012.

Table 8 displays the proportion of women within five different business sectors – R&D, ICT, Life Science, CCB and KIBS. In Life Science and CCB, the gender distribution is in principle equal in the Stockholm region. The ICT sector differs in that only about one quarter of employees are women. This pattern is repeated in all comparison regions.

Table 8 – Percentage of women within five different business sectors

Region	Stockholm	Västra Götaland	Skåne	Sweden
R&D	44%	42%	35%	41%
ICT	27%	24%	24%	26%
Life Science	49%	52%	39%	45%
CCB	49%	49%	50%	50%
KIBS	38%	33%	35%	35%

Number of workplaces

We have also calculated the degree of specialisation within various niche areas based on number of workplaces. Figure 26 compares Stockholm with the rest of Sweden. The pattern that emerges in the figure (and the table in the Appendix) is largely reminiscent of the pattern found in the table above, which examines specialisation based on number of employees.

Figure 26 – Specialisation in number of workplaces – Stockholm compared with Sweden excl. Stockholm
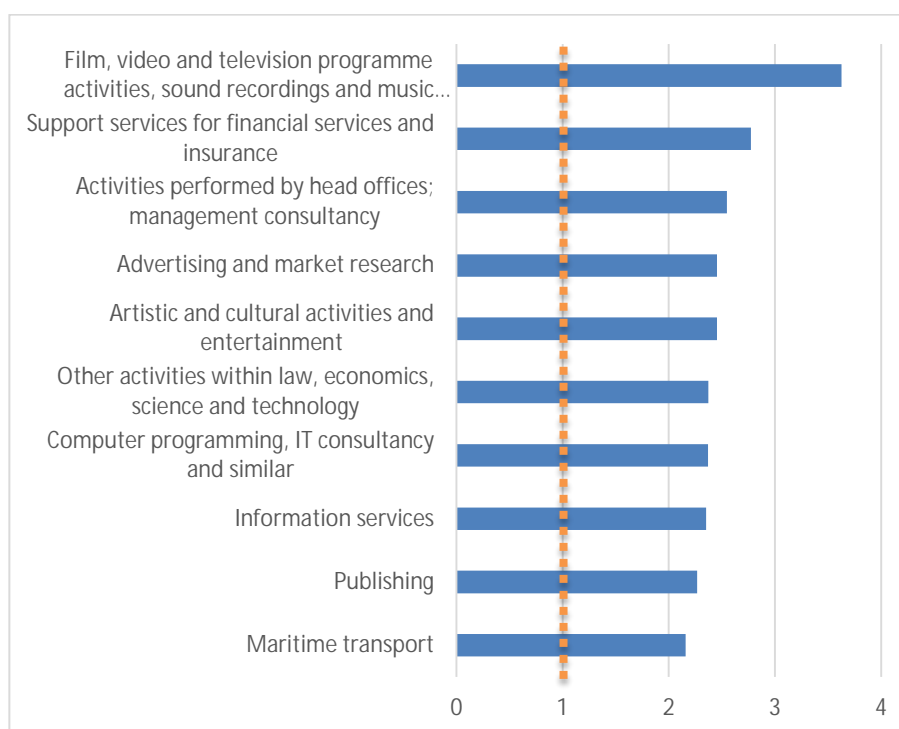
Source: Statistics Sweden. Processed by DAMVAD. For reasons of space, niche areas with a specialisation index that exceeds 2 are displayed. See Appendix for table with details of all niche areas with a specialisation index that exceeds 1. Data from 2012.
Comparison region: Rest of Sweden

Level of education

Figure 27 below looks at relative levels of education within various sectors. The calculations are based on the proportion of people with a minimum of three years' post-upper secondary education within each sector, where the index value describes the relative difference in education levels between the Stockholm region and the comparison region. If, for example, the index value amounts to 2, the proportion with a minimum of three years' post-upper secondary education is twice as high in the County of Stockholm compared to the comparison region.

However, this data should be interpreted with caution as the calculations do not take account of an individual's type of profession. For example, some sectors may achieve high values due to the fact that head offices are often located in Stockholm.

Figure 27 – Specialisation in level of education – Stockholm compared with Sweden excl. Stockholm

Labour immigration

Figure 28 below shows labour immigration according to 3-digit SSYK level.
We see that IT architects, system developers and test managers and others,
along with computer specialists are in the top position as regards
specialisation. This indicates that labour immigration within ICT is
extremely important for the Stockholm region.

Figure 28 – Specialisation in labour immigration (3-digit SSYK) – Stockholm compared with Sweden excl. Stockholm
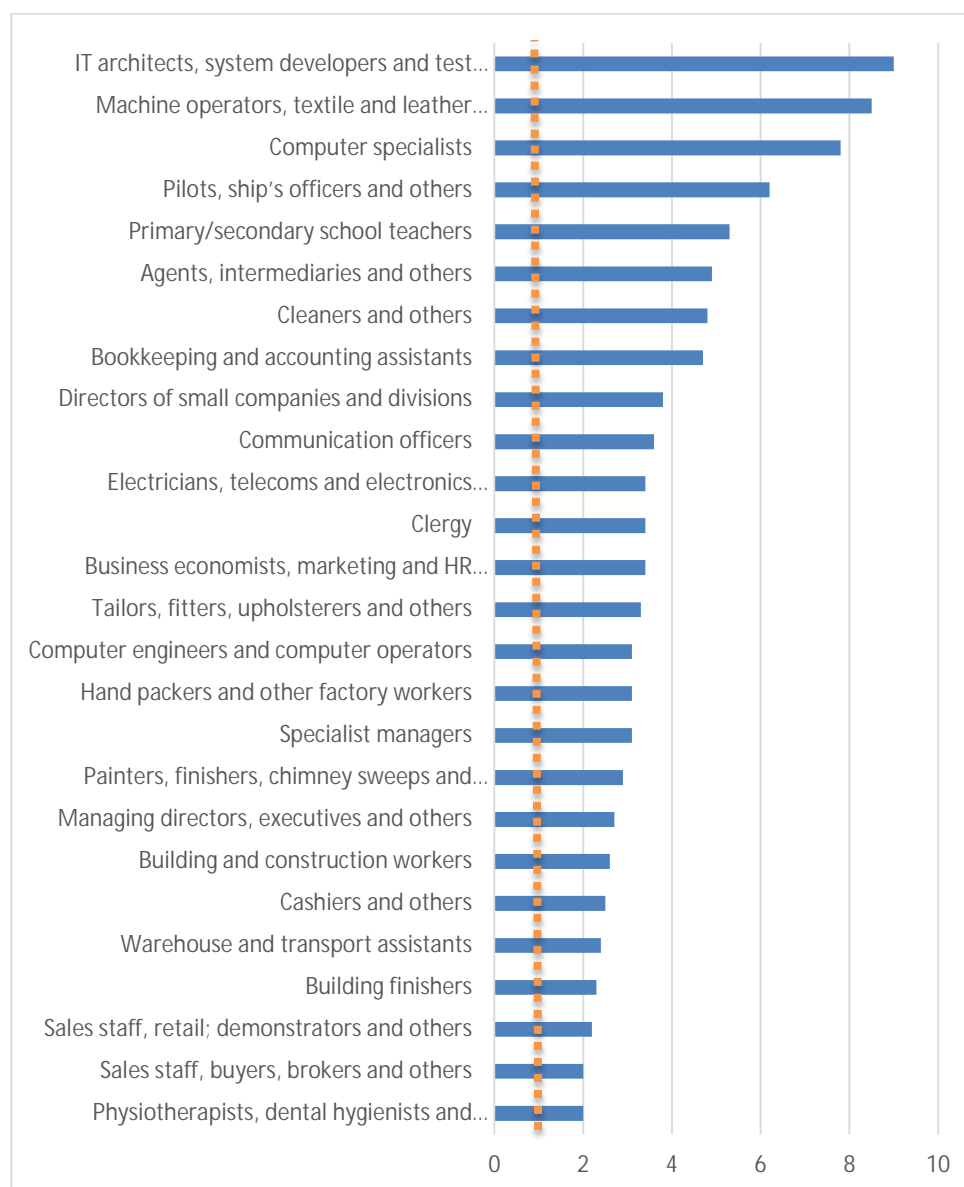
Source: Swedish Migration Board. Processed by DAMVAD. To avoid distortionary effects, only
professions with more than 50 work permits granted in the County of Stockholm or Sweden excl.
Stockholm have been processed in the analysis. For reasons of space, niche areas with a
specialisation index that exceeds 2 are displayed. See Appendix for table with details of all niche
areas with a specialisation index that exceeds 1. Data from 2009 – October 2014.
Comparison region: Rest of Sweden

National patent applications

The final indicator at a detailed level is patent data, which is presented in Figure 29 and Figure 30 below. Figure 29 describes national patent applications compared with Sweden excluding Stockholm. Environmental technology shows the greatest degree of specialisation, followed by Basic communication processes. The ICT areas Digital communication and IT methods for management are also high up in the ranking.

Figure 29 – Specialisation in national patent applications – Stockholm compared with Sweden excl. Stockholm
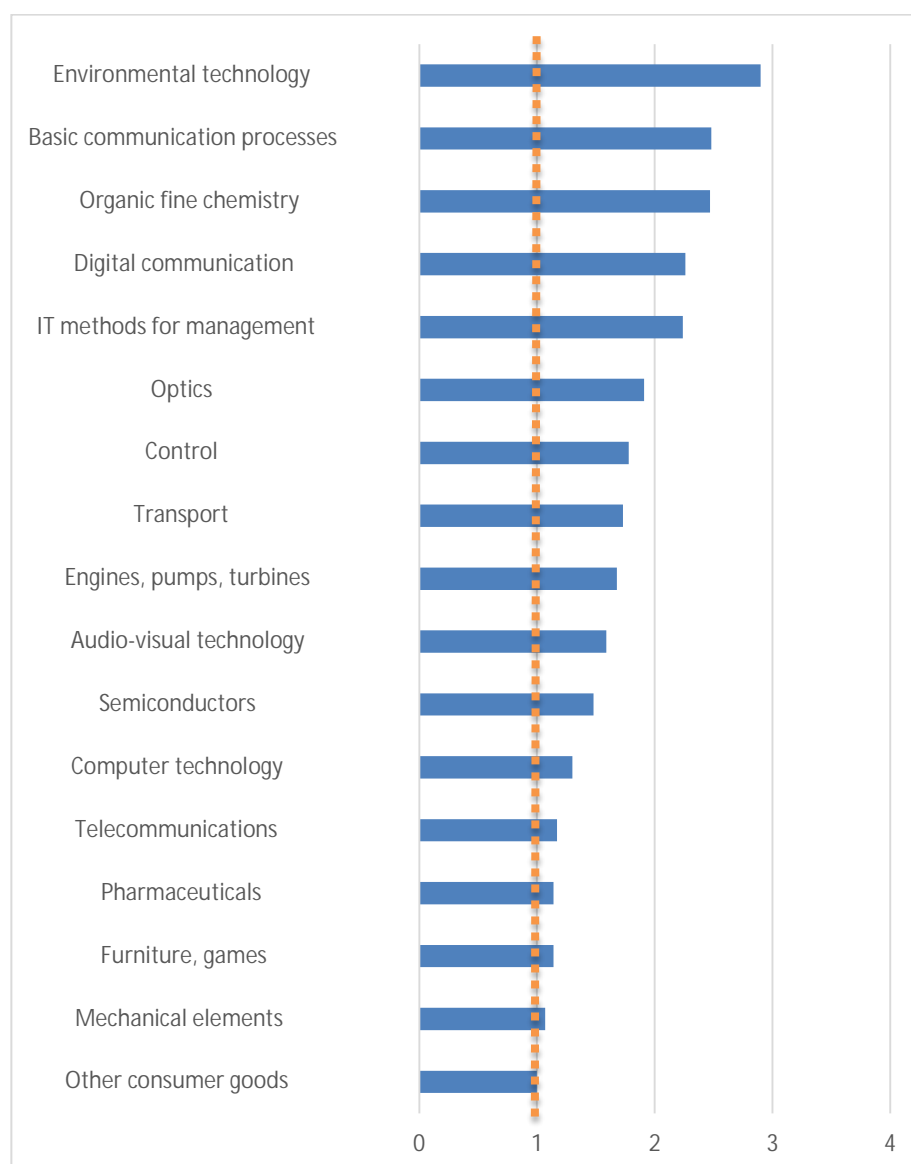
Source: Swedish Patent and Registration Office. Processed by DAMVAD
Note: The table shows specialisation compared with the rest of Sweden excluding Stockholm. Only technical areas where the County of Stockholm's specialisation value amounts to at least 1 are shown. See Appendix for a more detailed description of the data. Data from 2009–2013.

European patent applications

Figure 30 shows European patent applications, with Digital communication way out in front, followed by Basic communication processes and Telecommunications. Once again we can see that ICT has a strong position in Stockholm.

Figure 30 – Specialisation in European patent applications – Stockholm compared with Sweden excl. Stockholm
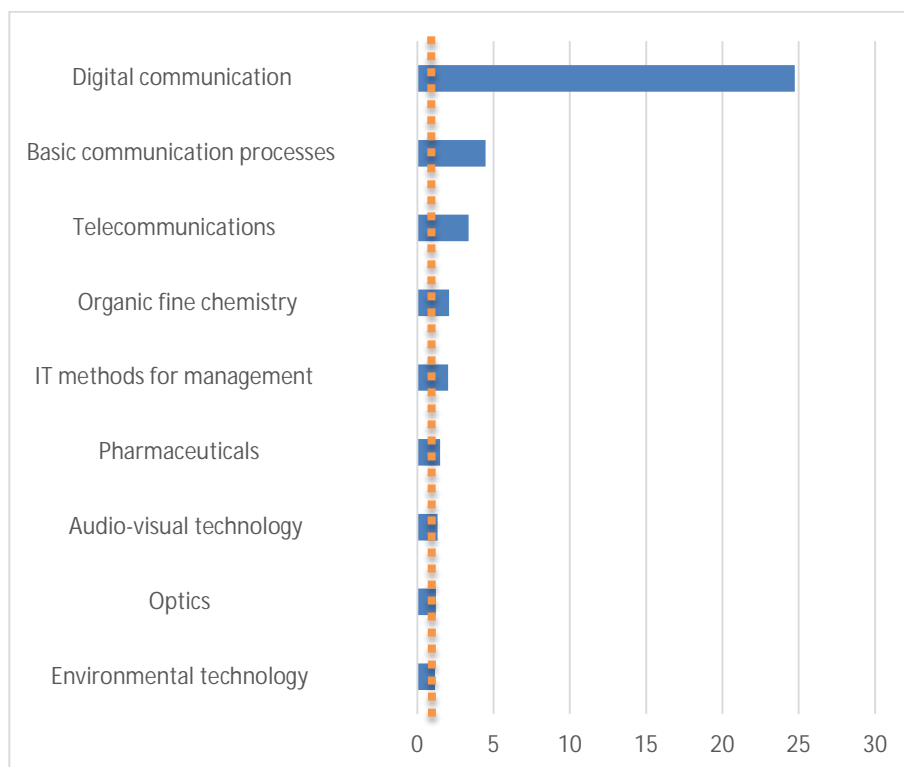
Source: Swedish Patent and Registration Office. Processed by DAMVAD.
Note: The table shows specialisation compared with the rest of Sweden excluding Stockholm. Only technical areas where the County of Stockholm's specialisation value amounts to at least 1 are shown. See Appendix for a more detailed description of the data. Data from 2009–2013.

Postgraduate students and lecturers at educational establishments

This section examines postgraduate students and visiting lecturers at educational establishments in the Stockholm region. The analysis includes Stockholm University, Karolinska Institutet, KTH Royal Institute of Technology, Södertörn University and Stockholm School of Economics. These establishments are compared with other establishments in Sweden.

Active postgraduate students

Initially, Figure 31 describes the degree of specialisation in terms of active postgraduate students per discipline, by 35 different areas. The diagram reveals that medical technology is the area with the highest degree of specialisation in the Stockholm region, followed by chemical engineering. We see that the specialised subject areas are dominated by natural science subjects.

Figure 31 – Specialisation in active postgraduate students per discipline – Stockholm compared with Sweden excl. Stockholm
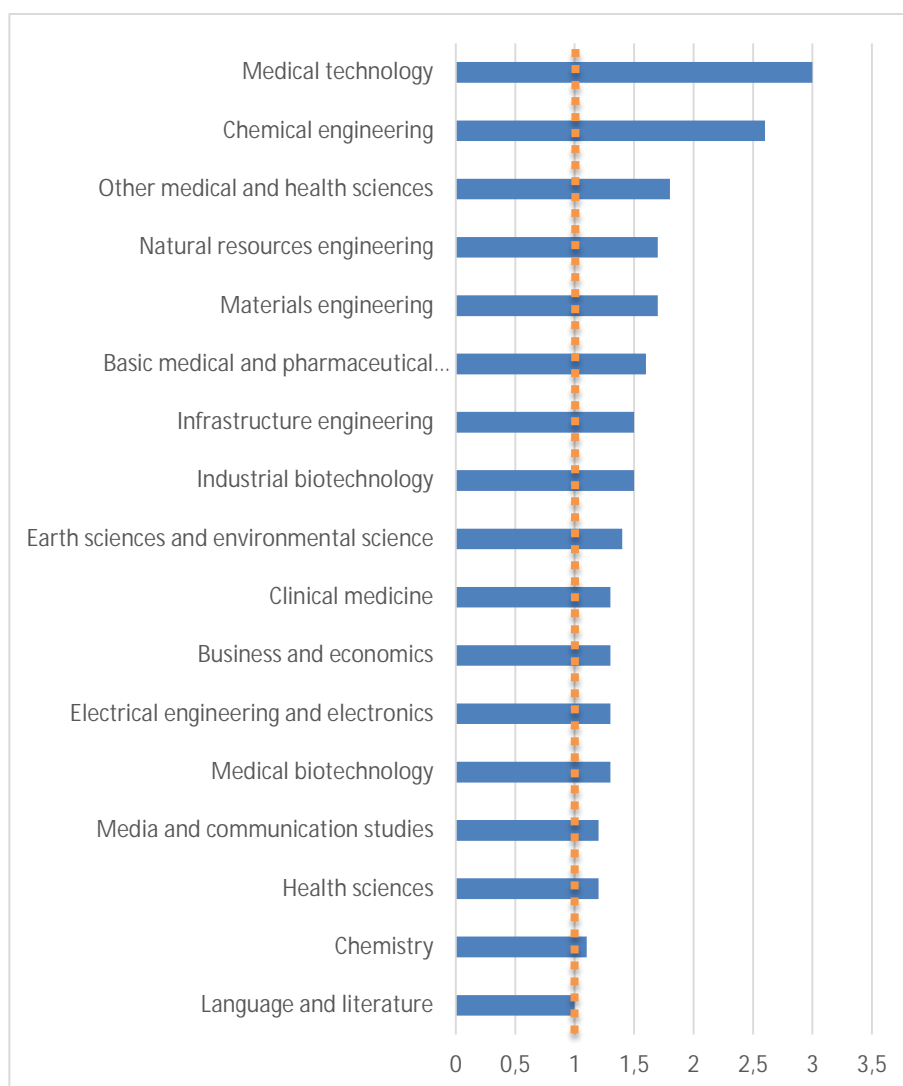
Source: Swedish Higher Education Authority. Processed by DAMVAD. Data from autumn term 2013. Stockholm's major educational establishments (Stockholm University, Karolinska Institutet, KTH Royal Institute of Technology, Södertörn University and Stockholm School of Economics) are compared with establishments in the rest of Sweden.

We can also see a connection between the degree of specialisation and the difference in the proportion of women and men per sector. This is illustrated in Figure 32 below.

We can see that the pattern with regard to gender distribution and specialisation on the labour market presented in Figure 25 is again repeated for this variable – the more equal the gender distribution, the clearer the subject area's specialisation.

Although in this case too it is difficult to talk about causal effects, it is nevertheless an interesting observation that more gender equal subject areas display a strong specialisation.

The Appendix gives details of the data set in table format.

Figure 32 – Link between gender equality and specialisation

Source: Statistics Sweden. Processed by DAMVAD.
Note: The difference in the proportion of women/men is defined as: 0=even distribution, 1=only men or women in the specified sector. Four extreme values have been excluded from the diagram for visual reasons; however, these observations do not affect the conclusions. Comparison region: Rest of Sweden. See Appendix for details of specialisation and gender distribution within each subject area. Data from autumn term 2013.

First-time postgraduate students
Figure 33 below shows the degree of specialisation for foreign first-time postgraduate students in the Stockholm region compared with the rest of Sweden. Medicine and health sciences, as well as technology are the areas in which Stockholm stands out the most.

Figure 33 – Specialisation in foreign first-time postgraduate students per subject area – Stockholm compared with Sweden excl. Stockholm

Visiting lecturers

Figure 34 below shows the proportion of visiting lecturers to Stockholm's and the rest of Sweden's educational establishments by five different subject areas. We see that compared with the rest of Sweden, lecturers travel to Stockholm quite often to teach technical subjects. However, it is worth mentioning that there is relatively little data, which is why caution should be exercised when drawing general conclusions.

Figure 34 – Specialisation in visiting lecturers per subject area – Stockholm compared with Sweden excl. Stockholm
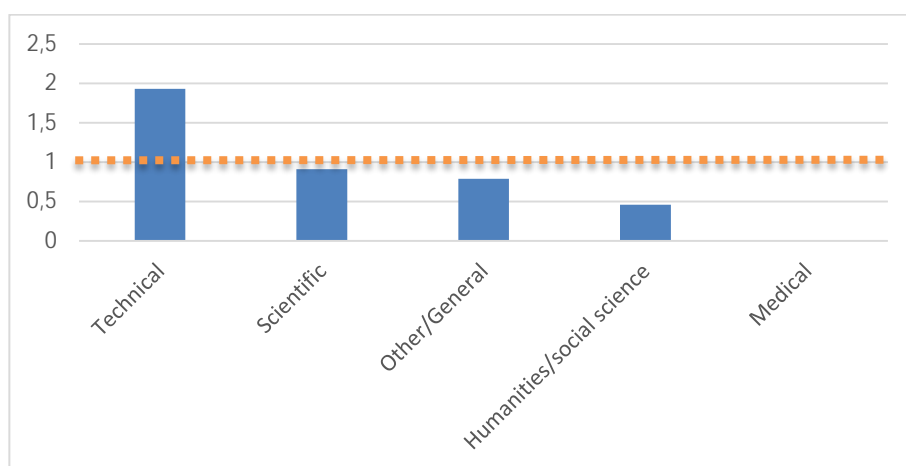
Analysis

A total of 11 categories have been identified based on our method. See Table 9 below for a summary of these overall areas.

Table 9 – Summary of overall areas of strength

Areas of strength	
KIBS	Finance
ICT	Cultural and Creative Businesses
CleanTech	Life Science
Professional Services and Research Expertise	Manufacturing
Trade	Transport
Education	

For the sake of clarity we have grouped these overall areas of strength into three different clusters. The clusters have been constructed in a way that aims to effectively illustrate overlapping niche areas.

In Figure 35 below we have compiled areas of strength within KIBS, ICT, CCB and finance. The large bubbles represent the overall areas of strength, while the smaller bubbles represent the more detailed areas of strength. We can note that many of the detailed areas of strength cannot be categorised into a single overall area, but instead build combinations of strengths. One specific example is the FinTech sector, which mainly provides services within the finance sector, but is largely based on skills found within the ICT sector. Another example is the computer games sector, which is located in the intersection between ICT, KIBS and CCB.

Figure 35 – Strong niche areas within ICT, KIBS, CCB and finance
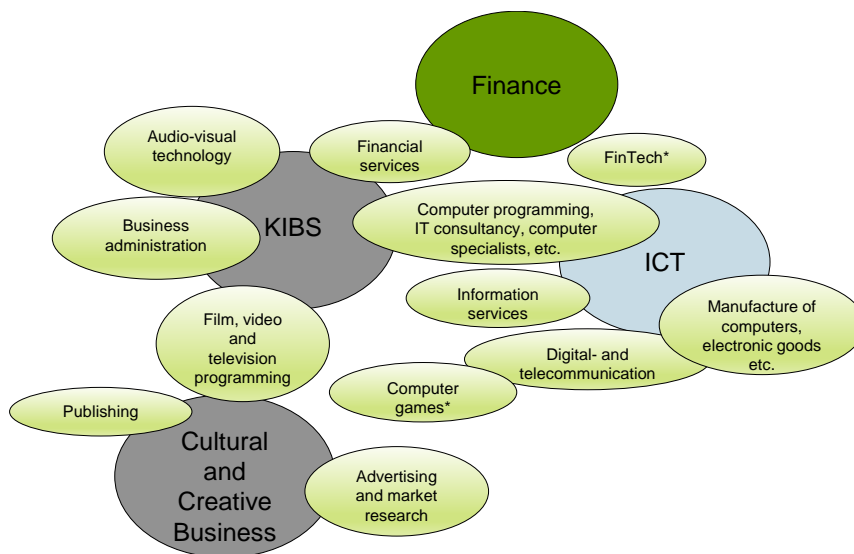
*Data is based on interviews and/or document studies

Figure 36 below shows strong niche areas within the overall areas of Life Science, CleanTech and Professional Services and Research Expertise.

Here we see a number of strong areas that are found between the various overall areas. For example, earth sciences and environmental science, natural resources engineering and environmental technology can be categorised under both CleanTech and Professional Services and Research Expertise. Information about detailed niche areas within CleanTech has primarily been compiled through interviews and document studies. Environmental safety, smart cities, recycling, energy and traffic solutions are subjects that came up in interviews or literature.

Figure 36 – Strong niche areas within CleanTech, Life Science and Professional Services
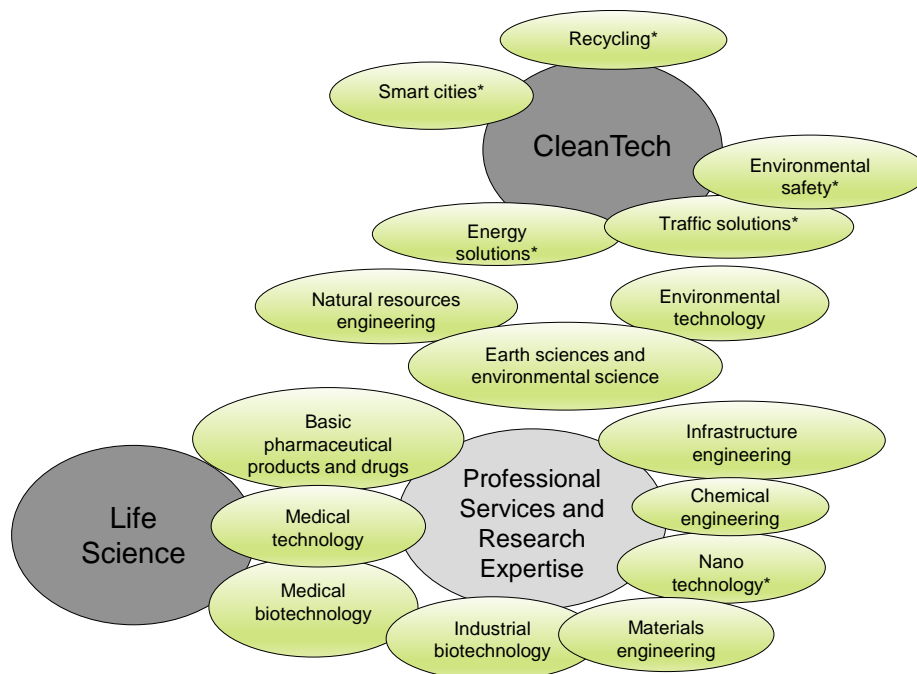
*Data is based on interviews and/or document studies

Figure 37 shows other strong sectors that have emerged during the study. The Stockholm region is a major transport hub with two airports, Bromma and Arlanda, within the county. We can also see several strong niche areas within manufacturing. Education and Trade also emerge as two overall areas of strength, although our method does not reveal any specific niches within these areas.

Figure 37 – Strong niche areas within Manufacturing, Transport, Trade, Education
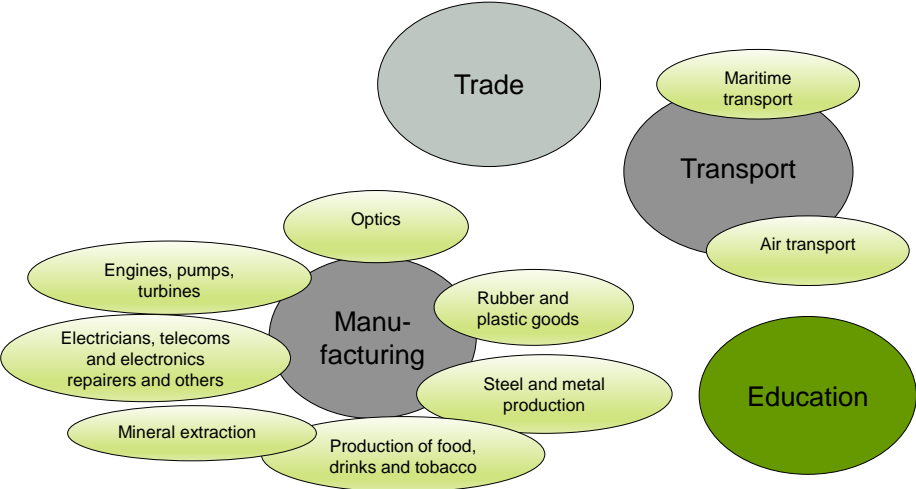
Areas of strength in the public sector

In this chapter we present strengths within the Stockholm region's public sector. The chapter analyses the role of public sector organisations as potential customers of, and support to research (e.g. public procurement of various systems, solutions within healthcare, health/social care, housing construction, infrastructure, etc.). This is in the first instance an overview of public sector strengths, and we should be aware that these strengths have mainly emerged through explorative approaches and that there may therefore be additional areas where public sector organisations in the Stockholm region stand out. The following have been highlighted as areas of strength:

- *Access to unique biobanks and patient registers*
- *Healthcare systems of the future*
- *Development of healthcare choice*
- *Open data and extensive IT services*
- *IT and sustainable urban development*
- *Sustainable buildings*
- *IT to reduce climate and energy impact*
- *New business models*
- *Creative businesses*

One particular challenge emphasised in interviews is the need for the public sector to do more to support the process of bringing innovation to the market. This could happen through innovation procurement, where many feel that there is untapped potential among public sector organisations to contribute towards getting innovative solutions to the market.

Method

Unlike previous sections that examined research and business, we will use a qualitative approach to analyse areas of strength within the public sector. The public sector's strengths are not visible to the same extent in the form of quantitative indicators, as for the above-mentioned areas.

To be able to identify areas of strength in the public sector, we have used a bottom-up process. To analyse areas of strength in public sector organisations in the Stockholm region, we base these on areas that have emerged in document studies, an examination of municipal websites, surveys and in-depth interviews with organisations in both the public sector, business, academia, trade organisations, collaboration platforms and other stakeholders.

We have limited ourselves to regional public sector organisations within the County of Stockholm, and their role as potential customers. To gain as broad a picture as possible of the combined strengths, we have adopted an explorative approach to identify who the public sector organisations actually are. Specifically, this means that the interviewees have themselves mentioned public organisations with particular strengths. These have included mainly Stockholm County Council and the City of Stockholm, with mention of strengths within health and healthcare, along with sustainable urban development. In document studies we have used keywords such as "public sector"; "municipality"; "county council" and "county administrative board" combined with "strengths" and "Stockholm region". This has provided us with a picture of what public organisations do in the region and what has been highlighted as a strength. These areas have been tested and variegated during workshops, in interviews and surveys to give an overall picture. When it comes to international competitiveness, we can note from international FP7 research funding that Stockholm County Council has taken part in a total of 14 projects and is among one of the leading participants that have been granted funding.

Results

An overview of the areas of strength is given inFigure 38, and an analysis of each main area follows below.

Figure 38 – Overview of cited examples of areas of strength among public sector organisations.
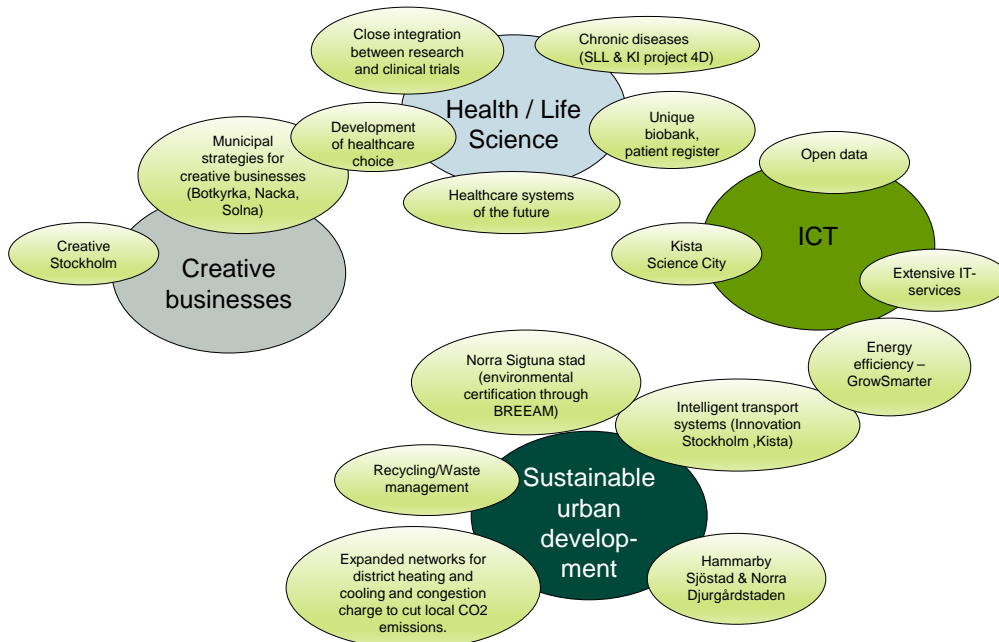
Source: DAMVAD 2014

Health/Life Science

In document studies and interviews, Health/Life Science is mentioned as an area of strength for the Stockholm region. Stockholm County Council (SLL) is responsible for healthcare and medical services and dental care in the region. With approximately 43,000 employees, SLL is one of the biggest employers in Sweden[8]. Services encompass care and health promotion work, as well as research and development. The healthcare budget for 2014 is roughly SEK 50 billion.[9]

In "Vision 2025 – Science City", the ambition is for the Stockholm region to be a world-leading life-science region (biotechnology, pharmaceuticals and medical technology) by the year 2025. The vision is to create a Scandinavian centre and a catalyst within life science. Business, academia, clinical research and healthcare all have a part to play. The originators behind this joint vision are the City of Stockholm, Solna stad, New Karolinska Solna, Karolinska Institutet, Akademiska Hus, Locum, the Swedish Transport Administration, Stockholm Science City Foundation and a number of private landlords.[10]

The following examples of areas of strength among public sector organisations have been highlighted in interviews:

Close integration between research and clinical trials
Interviews revealed that one area of strength is the close integration between research and clinical trials. This means that the public sector and academia work together to enable research to be put into practice.

Development of healthcare choice
SLL has also been at the forefront in relation to the development of healthcare choice in the Stockholm region. Stockholm County Council has developed some 30 different healthcare choices, most of which are within specialist treatment. [11]

Access to unique biobanks and patient registers
2014 saw the creation of the regional biobank organisation, Stockholm Medical Biobank, by Stockholm County Council and Karolinska Institutet. This is a joint initiative to support bio-banking of research samples from healthcare and medical treatment. The purpose is to take charge of all tissue and blood samples that need to be stored from healthcare and clinical research. This will contribute to better care and also boost clinical research and act as a link between healthcare and research. The fact that access to patient registers in the Stockholm region enables the monitoring of health trends in the region was also highlighted in interviews.

---

[8] http://www.sll.se/om-landstinget/det-har-ar-landstinget/
[9] http://www.sll.se/verksamhet/halsa-och-vard/
[10] http://www.nyakarolinskasolna.se/sv/det-nya-sjukhuset/stockholm-science-city/
[11] https://www.almega.se/press/pressmeddelanden/almega-delar-ut-priset-som-arets-tjansteinnovationsframjare

Healthcare systems of the future

In its future plan, SLL gives details of one of the biggest investments in healthcare in the County of Stockholm. To cope with the huge increase in population, SLL is investing an additional SEK 42 billion in healthcare in the Stockholm region, which will lead to greater availability, better buildings and new approaches in healthcare. The highly specialised care at the newly built university hospital will be supplemented by an expanded acute care hospital and increased specialist care at other hospitals and local emergency clinics. E-health is an area that is regarded as a strength, which is also corroborated by the mini survey that we sent out to research policy organisations in Sweden. More e-health services will be developed to facilitate the process for patients and care providers, and care providers will cooperate more in networks around the patient's health and medical needs. The county council is pursuing a special project together with Karolinska Institutet, 4D, which is focusing on the chronic diseases heart failure, rheumatology, diabetes and breast cancer.

ICT

With regard to the strengths of public sector organisations within ICT, the City of Stockholm has been identified in particular. In Ericsson's report The Networked Society City Index 2014[12], Stockholm is ranked first of 40 cities around the world, followed by London, Paris, Singapore and Copenhagen.

Open data and extensive IT services

A third of all open agency data in Sweden originates from the City of Stockholm. The City of Stockholm has carried out major initiatives when it comes to open data. In October 2011, a decision was taken to implement an open data initiative via an action plan. Open data allows citizens, companies and institutions free, unrestricted access to all digital information regarding the municipality. This is partly a result of the EU's PSI Directive, which aims to improve opportunities for the general public and businesses to use the information that exists within the public sector for various purposes. There are currently over 60 online e-services that citizens can use 24 hours a day.

IT and sustainable urban development

The link between sustainable urban development and IT has also been highlighted in the City of Stockholm. Several innovative projects are in progress in the City of Stockholm, which bring together digital technology and sustainable development. One example is the EU project Grow Smarter, which is being led by the City of Stockholm. The objective of Grow Smarter is to achieve far-reaching energy efficiency improvements with lower emissions of greenhouse gases, alongside sustainable and increased economic growth. The project is aimed at technical solutions within areas such as smart buildings, traffic solutions, integrated infrastructure and sustainable mobility.

---

[12] http://www.ericsson.com/res/docs/2014/networked-society-city-index-2014.pdf

Another initiative linked to IT and smart cities is the development of the environmental city district Norra Djurgårdsstaden, in which the City of Stockholm has been one of the key participants. VINNOVA has allocated SEK 10 million to the project Smart ICT for living and working in Norra Djurgårdsstaden (NDS), within the framework of the programme Challenge-driven Innovation. The project aims to develop an information and communications infrastructure to support sustainable development in NDS, and in the long term in other housing areas as well. The project is about IT support for issues that affect the district and its inhabitants, such as sustainable energy consumption, transport, media or home healthcare.

Environment

Stockholm was named Europe's first Green Capital in 2010 and the City of Stockholm has a leading role when it comes to reducing local emissions of greenhouse gases. This is largely owing to an expanded network for district heating and district cooling and the introduction of a congestion charge (OECD 2009). This also emerges in the interviews conducted as part of the study.

Sustainable urban development

The interviews reveal that one area of strength for the Stockholm region in which public sector organisations play a major role, is the opportunity to develop system solutions in relation to sustainable districts. *Recycling* and *waste management, energy efficiency and transport solutions* were identified as strengths.

The integration that has been created between environmental issues and urban planning in Hammarby Sjöstad has generated a huge amount of national and international interest. Consequently, in 2009 the City of Stockholm's city council decided that Norra Djurgårdsstaden (NDS) will be one of three new environmental profile areas. The vision is for Norra Djurgårdsstaden to become a world-class environmental district and serve as an international model of sustainable urban planning. NDS has also been selected by the Clinton Climate Initiative as one of 18 projects around the world that have good conditions for becoming a climate positive city district. The objective is for Norra Djurgårdsstaden to take the lead in making the latest innovations regarding climate, environmental technology and sustainable development a reality. Particular strengths that came up in interviews in relation to NDS included:

- *The unique collaboration model, linking public sector organisations with business and research*
- *Sustainable buildings*
- *IT to reduce climate and energy impact*
- *New business models*

In 2014, Sigtuna municipality was awarded the Sweden Green Building Award for its work with the new district Norra Sigtuna stad. The aim is for the district to be eco-friendly and low carbon in the long-term, which is why BREEAM environmental certification is being used, covering requirements relating to land use, infrastructure, ecology, pollution, energy, water, materials, waste, internal environment, construction phases, management processes and life-cycle analysis.[13]

Creative businesses

One of the measures being carried out as part of RUFS 2010 to achieve the vision of the Stockholm region as the most attractive metropolitan region in Europe is to create the conditions for a world-class cultural life in the Stockholm region. Several municipalities in the county, including Botkyrka, Nacka and Solna, also have strategies linked to creative businesses.

Creative Stockholm

Creative Stockholm was a regional fund project that ran from 2009–2011. It was a collaboration between the culture and business sectors in the Stockholm region. The aim was to strengthen enterprise based on artistic, cultural and creative activities. One of the special initiatives was to develop a regional action programme for cultural and creative businesses.[14]

Creative Stockholm is made up of Botkyrka municipality (project owner), Stockholm County Council's cultural administration via the initiative "Transit Kulturinkubator", Stockholm County Council's cultural administration via the initiative "Innovativ kultur", Stockholm Business Region, Stockholm County Council's regional planning office, Nacka municipality, Värmdö municipality, Södertörn University and KTH CEFIN.

Funding to boost innovation in public administration

We have also examined innovation in public administration and how public sector organisations can become more innovative on their own initiative. We have looked at the VINNOVA programme FRÖN, which aims to boost innovation in public administration. The results reveal that the Stockholm region's public sector organisations have been granted funding mainly within healthcare, which can also be linked to the strong research areas.

Under the 2014 programme, a total of 27 projects received a total of SEK 22 million; eight of the projects were from organisations in Stockholm, corresponding to SEK 9.8 million. As shown inFigure 39, six of the projects are linked to public innovation within healthcare.

---

[13] http://www.sigtuna.se/sv/Pressmeddelanden1/Sweden-Green-Building-Award/

[14] http://www.botkyrka.se/SiteCollectionDocuments/Kommun%20och%20politik/Handlingsplan%20Kreativa%20Stockholm.pdf

Figure 39 – Projects funded by FRÖN 2014
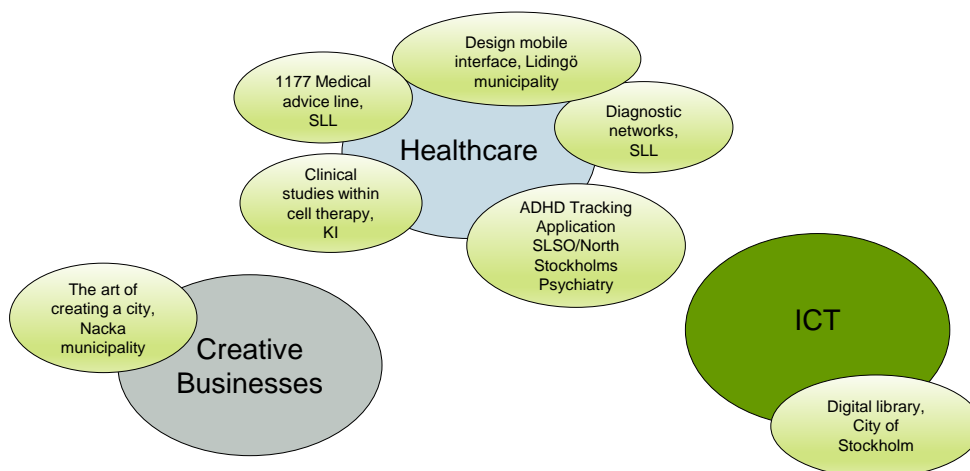
Source: DAMVAD 2014

Reflections from interviews on the role of the public sector

As part of this study we have used interviews to ask respondents about the public sector's capacity to support business and research, as well as its role as a potential customer in the Stockholm region. The conclusions and comments that emerged from the interviews with key organisations in the Stockholm region on the role of the public sector are summarised below. The conclusions are based on the respondents' own assessments and it should be noted that work is already under way in the region on certain areas. For example, the City of Stockholm and county council constitute relatively strong clients via Norra Djurgårdsstaden, services for the elderly and the Environment Administration.

- The application of the regulatory procurement rules is regarded as being one of the biggest hindrances in channelling innovation and research to the market. Respondents highlight the need for public sector organisations to improve at innovation procurement and innovation-friendly procurement.

- Inadequate procurement expertise among public sector organisations. Respondents say they feel the public sector does not know what to ask for, or how.

- Inability to involve SMEs in urban development projects.

- The region needs to offer more test and demonstration facilities, where SMEs can test and develop ideas.

- Good examples of collaboration, where public sector organisations play a key role: SciLifeLab, Swetox and Open Lab (unique collaboration in which public sector and academic organisations have joined forces to tackle regional challenges)

- Greater focus on everyday innovation in the public sector. Respondents say that public sector organisations need to reflect more on how they can be more innovative and not regard business as the sole source of innovation.

- Public sector organisations need to cultivate the right conditions to encourage the development of ideas. One way of achieving this is to have spontaneous meetings, where what emerges is not always known in advance.

Possible areas of strength for smart specialisation in the Stockholm region

This analysis is based on a combination of document studies, statistical data, bibliometric analysis, an overview of research funding and in-depth personal interviews, surveys and a final workshop with invited experts. The ambition has been to compile the first evidence-based data set for organisations in the Stockholm region to use to formulate a regional strategy for smart specialisation. This data set reveals a large number of positions of strength within a number of areas. The data should therefore be used to inspire further work on smart specialisation, examining and defining in more detail the positions of strength proposed in this report. The broad approach of this report also allows opportunities to expand the definition of areas of strength, and to see which sectors and organisations can work together in various ways to generate synergy effects.

We have identified a large number of areas of strength for the Stockholm region using this combination of methods. Since the County of Stockholm represents a metropolitan region that is home to a relatively large proportion of Sweden's population, businesses and research, one would also expect the areas of strength that have been established to be great in number and more varied compared with other regions. As a metropolitan region, Stockholm benefits, and should provide benefit for the whole of Sweden. It is therefore important for the numerous areas of strength that have been highlighted for the Stockholm region to be able to work together with the areas identified in other regions in Sweden.

As a result of the principles described above and the method applied, we have put together an initial preliminary proposal below regarding how the identified areas of strength might be packaged. This has been done based on the aim that they should contribute to urban development, which is the overriding objective of the regional Structural Fund Programme in Stockholm 2014–2020.

In the study we have identified five overall themes where the empirical evidence is consistent with the Stockholm region's strengths. These five themes are "Healthy City", "Green City", "Smart City", "Inclusive City" and "Attractive City". We can see that business, research and the public sector display strengths in these areas.

Healthy City
The Stockholm region has a strength within health and life science, which applies to research, niche areas of business and the public sector alike. Of the

97 positions of strength identified from the region's research, 44 percent are within the health science[15] discipline. With close integration between research and clinical trials, the region has the tools for rapidly putting research into practice. This is also confirmed when we look at the national funding that is allocated by the Swedish Research Council, where 43 percent of the funding granted that has gone to the Stockholm region's organisations are within medicine and health. Karolinska Institutet is the primary engine for research in the areas of health sciences and psychology (placed under humanities), and is consistently above the Nordic average in relation to the impact of the research. In business and at postgraduate level as well there is a high degree of specialisation with a relatively high proportion of employees in manufacturing of basic pharmaceutical products and drugs, and many active postgraduate students within medical subjects. The region has examples of concentrated efforts to strengthen the area. In "Vision 2025 – Science City", the ambition is for the Stockholm region to be a world-leading life-science region (biotechnology, pharmaceuticals and medical technology) by the year 2025. In addition, the region has unique access to patient registers and biobanks, with Stockholm's medical biobank constituting an example of combined efforts between research and public sector organisations. The population in the County of Stockholm is expected to increase by 350,000 from 2010 to 2020. This places increased demands in terms of meeting future healthcare needs. The county council is implement-ting one of the biggest ever investments in healthcare in the County of Stockholm. The investment totals roughly SEK 42 billion and will result in greater availability, better buildings and new working methods. The focus is on increased e-health services, which will enable secure and effective systems for care providers. The building of the university hospital New Karolinska Solna is an additional example of the region's investment in building the healthcare system of the future.

Green City
In the Stockholm region we identify both research and business strengths within areas linked to CleanTech and Transport. This is corroborated in the research, where we see that the natural sciences come second in the list of areas of strength, [16]both in terms of impact and specialisation. The area Urban Studies, which traditionally belongs to the humanities discipline, is one of the 38 strongest areas of strength, which further highlights the strength in the region. In addition, interviews with key organisations in Stockholm reveal that environment and climate research along with research into transport solutions are regarded as strengths and/or potential areas of strength. The national funding from VINNOVA confirms this, as just short of half the distributable funding to organisations in the Stockholm region has

---

[15] More specifically, the areas include Urology, Pathology & Forensic Medicine, Mental Health, Psychiatry and Parasitology, Clinical Neurology, Transplantation, Geriatrics and Gerontology, Epidemiology, Hepatology, Health Policy.
[16] These include Structural Biology, Astronomy and Astrophysics, Catalysis, Cognitive Neuroscience, Fluid Flow and Transfer Processes, Inorganic Chemistry, Radiation, Genetics, Space and Planetary Science, Nuclear and High Energy Physics.

been allocated to projects connected with the transport industry (SEK 1,289 million). However, a single programme pushes the average up – Strategic motor vehicle research and innovation, which has been allocated over SEK 1 billion. The Stockholm region is also home to strong niche areas of business within CleanTech. Areas that stand out include energy solutions, material and natural resources engineering, recycling, environmental safety and other areas that aim to create a sustainable society.

The City of Stockholm has a strategy in place – Promenadstaden (The Walkable City) – to help meet the demands of an increasing population and migration to the Stockholm region, while maintaining quality of life. The strategy includes active initiatives for expanding the metro, and completely new green districts that offer additional potential for building on strengths within sustainable urban development. OECD's evaluation of green growth in Stockholm shows that the City of Stockholm has a leading role when it comes to reducing local emissions of greenhouse gases. This is largely owing to an expanded network for district heating and district cooling and the introduction of a congestion charge to develop system solutions with regard to sustainable districts. Public sector strengths are found within work with recycling and *waste management, energy efficiency and transport solutions.*

Smart City
The Stockholm region is a smart city with both research and business strengths in technology and ICT. Positions of strength within technology[17] confirm this in a number of areas. In national funding, relatively large sums have been paid out from VINNOVA in the area of ICT. Funding from the Swedish Research Council also confirms this, as 34 percent of funding granted has been allocated to projects within Natural Sciences and Technology. We can see that the Stockholm region has several strong components within business that can contribute towards being a Smart City. The region has an extremely strong ICT sector, with niche areas such as computer games and FinTech. Within this there are also innovative niche areas in fields of technology such as nanotechnology and other material production. The extensive access to open data also reveals a robust public sector strength linked to the Smart City. A third of all open agency data in Sweden originates from the City of Stockholm.

Inclusive City
The research-related strengths confirm the Stockholm region's prominent role in humanities and social science research[18]. However, projects linked to humanities and social sciences are underrepresented in national funding. In the analysis of business strengths we can also see that the degree of

---

[17] Engineering (miscellaneous), Materials Chemistry, Metals and Alloys, Surfaces, Coatings and Film, Automotive Engineering, Ceramics and Composites, Nuclear Energy and Engineering, Polymers and Plastics, Mechanics, Computational, Biomaterial.
[18] Positions of strength within humanities and social science research: Experimental and Cognitive Psychology, Arts and Humanities, Clinical Psychology, Neuropsychology and Physiological Psychology, Archaeology, Health (social science), Economics, Econometrics, Finance (general), Urban Studies.

specialisation defined as number of employees is closely linked to how equal the gender distribution is within the respective niche area. We can also note that Stockholm's public sector organisations clearly prioritise social inclusion as a dimension of sustainable urban development in the regional Structural Fund Programme. The focus here is plainly on inclusion of young people and those born in another country.

Attractive City

The Stockholm region has a business sector with a strong focus on areas that create a diversified and attractive city. We can see strong niche areas within KIBS, Finance, CCB and Manufacturing. The niche areas include financial services, advanced manufacturing of materials and areas with a focus on resource usage.

The results are illustrated in Figure 40 and should primarily be seen as the inspiration for continued dialogue:

Figure 40 – Preliminary proposal for combined areas of strength in RIS3

Source: DAMVAD 2014

The next stage following this initial basic identification of what we could term a "gross" list of areas of strength is for representatives from business, research and the public sector to be invited to discuss, develop, choose and package the prioritised areas of strength to be included in a strategy for smart specialisation in the Stockholm region.

Based on the strengths identified in this study and that have been described above, we recommend the following points be considered in the next stage of choosing and packaging areas of strength:

- Areas should be relatively narrow and well-defined, but should equally be of benefit to a large number of organisations in and outside the region.

- Areas should have a focus on technology and/or knowledge.

- Areas should encompass regional strengths within business, skills and research.

- Areas should be based on companies, academia and public sector organisations.

- Areas should be the most promising ones with regard to innovation, entrepreneurship and growth.

- It should be possible to relate areas to challenges and they should contribute to promoting sustainable regional development and growth.

Six possible areas for continued and more in-depth analysis

To strengthen the evidence base for designing a regional strategy for research, innovation and smart specialisation for the Stockholm region, we propose six areas for continued and more in-depth analysis:

1. Attracting talent to Stockholm's areas of strength

Bringing to fruition a research and innovation strategy for Stockholm based on the region's areas of strength within research and business will require talent. There is a need to attract the best students and researchers to Stockholm, as well as to recruit and retain a highly qualified workforce. The Stockholm region is an extremely knowledge-intensive region in which there is a considerable need for a highly qualified workforce. Labour immigration is extremely significant for individual companies and sectors – finding skilled employees can be crucial to a company's survival. The Stockholm region is therefore particularly dependent on labour immigration. During the period 2009–2013, the County of Stockholm has welcomed roughly 30,000 labour immigrants, half of whom work within professions that demand specialist theoretical expertise. Relatively little is currently known regarding which specialists come to the Stockholm region, where they come from, where in the region they are employed, what kind of companies/organisations they work for and type of job, and the impact on business, research and education. There is virtually no information at all about which company categories and areas of strength see the greatest effects of talent immigration. Neither do we know where these individuals go when they leave the Stockholm region after completing a research post, university course or expert job. We propose conducting an analysis of the need for talent in the Stockholm region based on register data, which will produce a far more detailed picture compared to what has been possible to ascertain using existing data in this analysis.

2. Synergies and collaboration between policy areas and sources of funding

In order to implement and achieve the maximum effect of a research and innovation strategy for the Stockholm region, it is important to have knowledge of where and how the identified public sector strengths, initiatives and sources of funding for research and innovation complement and/or overlap with other national, private and EU-related control mechanisms and funders. The Swedish research and innovation system does not only have many users, it also has many funders. This is not a problem in

itself, but it places demands for a high degree of transparency to ensure that specialisation, strengths and skills come to the fore. Within the limited resource framework of this investigation we have only been able to examine funding streams from programmes under the Swedish Research Council, VINNOVA, EU (FP7) and Stockholm County Administrative Board. But Sweden has many other funders of research and innovation that support organisations in the Stockholm region, e.g. foundations, funds, private funders, Formas and the Swedish Energy Agency. Organisations are also supported by various EU programmes, Nordic programmes, etc. There is no overview of how the various funders complement or overlap one another, which areas of strength and organisations receive public and private funding and for what purposes and initiatives. We propose a funding and collaboration analysis of funders of research and innovation that support organisations in the Stockholm region. This will identify the areas, themes and organisations that are being supported and the scope and focus of the support. Such an analysis could also include a review of EU FP7 projects, focusing on themes, Stockholm organisations and direction, which is also currently lacking.

3. Future areas of strength and entrepreneurs

The strategic focus on areas of strength within research and business can advantageously be supplemented by a proactive focus on establishing elements and themes that could be included to create future areas of strength and entrepreneurs. This requires both an outward-looking and a forward-looking approach. Several data sources can be used. Bibliometric data allows us to identify research areas that are not yet strong, but that have high impact or high specialisation and display increasing strength over time. This can be supplemented by register data, which reveals where the job growth is happening among start-ups and which companies have been set up by students and other young people. Data from job websites and LinkedIn etc. can help show talent mobility, which is also a guide to future positions of strength. Finally, a media analysis of blogs, articles and business reports can contribute by showing definite and less definite trends and patterns that may shape future areas of strength and entrepreneurs.

4. Supportive technology with innovative procurement

Smart specialisation and strategies for sustainable urban development require supportive technologies. Stockholm County Administrative Board and the region's other public sector organisations can contribute towards the development of supportive technologies by using innovative public procurement. This is an instrument that can be used within health and welfare, energy, life science, transport and ICT. The region's public sector organisations can influence the development and utilisation of new

supportive technologies by being a major, vital and demanding customer within these areas. We suggest that the County Administrative Board carry out further work on identifying up to 20 specific areas of strength in which it would be particularly useful to launch innovative procurement processes and come up with proposals as to who should have operative responsibility for implementing them.

5. Stockholm as a strong metropolitan region for the whole of Sweden

Stockholm is not a small region with a few areas of strength, but should instead be regarded as a metropolitan region with many areas of strength within both research and business. This should also be reflected in the Stockholm region's strategy for research, innovation and smart specialisation. As a result of the Stockholm region's variation and size, it is natural for there to be considerable cooperation with other regions in Sweden, which may need to have recourse to and supplement their areas of strength with research and expertise in order to be able to develop. In order to be able to prioritise and work on strengthening this cooperation between the Swedish regions, we propose an investigation into how the strong research areas in Stockholm and growth in the business sectors identified can contribute towards supporting growth and areas of strength in other regions, for the benefit of the whole of Sweden.

6. Interplay between big data and open data

As observed in this report, the Stockholm region has a number of niche areas within the area of ICT. In this sector in Stockholm, several initiatives are under way, aimed at being at the forefront in terms of big-data technology and open data – something that could enable huge progress within the healthcare sector, for example. To further improve skills in this area, we propose an analysis of the work that is happening within big data and open data in the Stockholm region. Such an analysis should focus on which areas the Stockholm region should concentrate on within big data and open data (e.g. health), and how the public, private and academic sectors can support such a process.

Appendix

Research-related areas of strength

Table 10 – Detailed breakdown of the Stockholm region's research areas compared with the Nordic average

Research areas	Impact	Specialisation	Discipline
Arts and Humanities (miscellaneous)	1.38	1.02	Humanities
History	1.22	0.71	Humanities
Language and Linguistics	1.40	0.82	Humanities
History and Philosophy of Science	1.79	0.86	Humanities
Literature and Literary Theory	1.18	0.63	Humanities
Philosophy	1.00	0.97	Humanities
Visual Arts and Performing Arts	0.58	1.07	Humanities
Psychology (general)	1.29	0.83	Humanities
Applied Psychology	1.33	0.88	Humanities
Clinical Psychology	1.39	1.50	Humanities
Developmental and Educational Psychology	1.13	0.85	Humanities
Experimental and Cognitive Psychology	1.48	1.16	Humanities
Neuropsychology and Physiological Psychology	1.43	1.22	Humanities
Social Psychology	1.22	0.72	Humanities
Archaeology	1.67	1.48	Humanities
Agricultural and Biological Sciences (general)	1.04	1.24	Natural Sciences
Agronomy and Crop Science	1.37	0.19	Natural Sciences
Animal Science and Zoology	1.24	0.18	Natural Sciences
Aquatic Science	1.13	0.37	Natural Sciences
Ecology, Evolution, Behaviour and Systematics	1.54	0.56	Natural Sciences
Food Science	0.90	0.13	Natural Sciences
Forestry	0.86	0.28	Natural Sciences
Insect Science	1.81	0.35	Natural Sciences
Plant Science	1.63	0.38	Natural Sciences
Soil Science	1.20	0.28	Natural Sciences
Biochemistry, Genetics and Molecular Biology (general)	1.08	1.43	Natural Sciences
Ageing	1.07	1.46	Natural Sciences
Biochemistry	1.21	1.34	Natural Sciences
Biophysics	1.14	1.36	Natural Sciences
Biotechnology	1.13	0.70	Natural Sciences
Cancer Research	1.02	1.98	Natural Sciences
Cell Biology	1.20	1.67	Natural Sciences

Clinical Biochemistry	0.98	1.00	Natural Sciences
Developmental Biology	1.16	1.50	Natural Sciences
Endocrinology	0.98	1.18	Natural Sciences
Genetics	1.48	1.16	Natural Sciences
Molecular Biology	1.17	1.44	Natural Sciences
Molecular Medicine	1.00	1.35	Natural Sciences
Physiology	1.21	0.96	Natural Sciences
Structural Biology	1.92	1.26	Natural Sciences
Chemical Engineering (general)	1.22	0.57	Natural Sciences
Bioengineering	1.13	1.03	Natural Sciences
Catalysis	1.28	1.23	Natural Sciences
Colloid and Surface Chemistry	1.17	1.24	Natural Sciences
Fluid Flow and Transfer Processes	1.21	1.31	Natural Sciences
Process Chemistry and Technology	1.48	0.73	Natural Sciences
Chemistry (general)	1.42	1.01	Natural Sciences
Analytical Chemistry	0.92	0.79	Natural Sciences
Electrochemistry	0.93	1.08	Natural Sciences
Inorganic Chemistry	1.42	1.14	Natural Sciences
Organic Chemistry	1.19	1.14	Natural Sciences
Physical and Theoretical Chemistry	1.11	1.20	Natural Sciences
Spectroscopy	1.05	0.76	Natural Sciences
Information Systems and Management	0.95	0.38	Natural Sciences
Management Science and Operations Research	1.31	0.51	Natural Sciences
Statistics, Probability and Uncertainty	0.88	0.88	Natural Sciences
Earth and Planetary Sciences (general)	1.20	0.51	Natural Sciences
Earth and Planetary Sciences (miscellaneous)	1.11	0.89	Natural Sciences
Atmospheric Science	0.95	0.99	Natural Sciences
Earth-surface Processes	1.06	0.74	Natural Sciences
Geochemistry and Petrology	1.35	0.42	Natural Sciences
Geology	1.25	0.59	Natural Sciences
Geophysics	1.20	0.53	Natural Sciences
Geotechnical Engineering and Engineering Geology	1.43	0.35	Natural Sciences
Oceanography	1.01	0.59	Natural Sciences
Palaeontology	1.28	0.77	Natural Sciences
Space and Planetary Science	1.82	1.30	Natural Sciences
Environmental Science (general)	1.20	0.79	Natural Sciences
Ecology	1.33	0.55	Natural Sciences
Environmental Chemistry	1.05	1.03	Natural Sciences
Environmental Engineering	1.07	0.57	Natural Sciences
Global and Planetary Change	1.05	1.01	Natural Sciences
Health, Toxicology and Mutagenesis	0.98	1.02	Natural Sciences
Management, Monitoring, Policy and Law	1.02	0.51	Natural Sciences

Nature and Landscape Conservation	1.04	0.43	Natural Sciences
Pollution	1.03	0.77	Natural Sciences
Waste Management and Disposal	1.06	0.61	Natural Sciences
Water Science and Technology	1.41	0.79	Natural Sciences
Mathematics (general)	1.41	0.70	Natural Sciences
Algebra and Number Theory	0.75	0.95	Natural Sciences
Analysis	0.96	0.60	Natural Sciences
Applied Mathematics	1.03	0.67	Natural Sciences
Computational Mathematics	2.35	0.83	Natural Sciences
Control and Optimisation	0.90	1.61	Natural Sciences
Discrete Mathematics and Combinatorics	0.74	0.92	Natural Sciences
Mathematical Physics	0.62	1.25	Natural Sciences
Modelling and Simulation	1.11	1.00	Natural Sciences
Statistics and Probability	1.00	0.94	Natural Sciences
Theoretical Computer Science	0.88	0.44	Natural Sciences
Neuroscience (general)	1.06	1.75	Natural Sciences
Neuroscience (miscellaneous)	0.93	1.57	Natural Sciences
Behavioural Neuroscience	1.07	1.30	Natural Sciences
Biological Psychiatry	1.19	1.87	Natural Sciences
Cellular and Molecular Neuroscience	1.10	1.80	Natural Sciences
Cognitive Neuroscience	1.26	1.51	Natural Sciences
Developmental Neuroscience	1.13	1.77	Natural Sciences
Endocrine and Autonomic Systems	0.86	1.66	Natural Sciences
Neurology	1.12	1.33	Natural Sciences
Sensory Systems	0.72	1.06	Natural Sciences
Physics and Astronomy (general)	1.11	1.20	Natural Sciences
Physics and Astronomy (miscellaneous)	1.08	1.36	Natural Sciences
Acoustics and Ultrasonics	0.94	0.93	Natural Sciences
Astronomy and Astrophysics	1.76	1.51	Natural Sciences
Condensed Matter Physics	1.02	1.08	Natural Sciences
Instrumentation	1.04	0.96	Natural Sciences
Nuclear and High Energy Physics	1.90	1.49	Natural Sciences
Atomic and Molecular Physics, and Optics	0.96	1.03	Natural Sciences
Radiation	1.25	1.10	Natural Sciences
Statistical and Nonlinear Physics	0.88	1.18	Natural Sciences
Surfaces and Interfaces	1.12	0.87	Natural Sciences
Business, Management and Accounting (general)	1.00	0.80	Social Sciences
Accounting	1.20	0.98	Social Sciences
Business and International Management	1.11	0.49	Social Sciences
Management of Technology and Innovation	0.87	0.57	Social Sciences
Marketing	0.75	0.58	Social Sciences
Organisational Behaviour and Human Resource Management	1.00	0.56	Social Sciences

Strategy and Management	0.98	0.54	Social Sciences
Economics, Econometrics and Finance (general)	1.27	1.11	Social Sciences
Economics and Econometrics	1.27	0.82	Social Sciences
Finance	1.22	0.94	Social Sciences
Social Sciences (general)	1.08	0.83	Social Sciences
Social Sciences (miscellaneous)	0.80	0.83	Social Sciences
Development	0.99	0.54	Social Sciences
Education	1.11	0.65	Social Sciences
Geography, Planning and Development	1.25	0.72	Social Sciences
Health (social science)	1.09	1.16	Social Sciences
Human Factors and Ergonomics	1.15	0.74	Social Sciences
Law	1.12	0.71	Social Sciences
Library and Information Sciences	0.99	0.69	Social Sciences
Linguistics and Language	1.50	0.76	Social Sciences
Safety Research	0.96	0.77	Social Sciences
Sociology and Political Science	1.09	0.65	Social Sciences
Transportation	1.37	0.96	Social Sciences
Anthropology	1.23	0.56	Social Sciences
Communication	0.63	0.73	Social Sciences
Cultural Studies	0.86	0.62	Social Sciences
Demography	0.84	1.06	Social Sciences
Political Science and International Relations	0.76	0.44	Social Sciences
Urban Studies	1.20	1.46	Social Sciences
Immunology and Microbiology (general)	1.07	1.15	Health
Applied Microbiology and Biotechnology	1.30	0.34	Health
Immunology	1.17	1.88	Health
Microbiology	1.10	0.68	Health
Parasitology	1.20	1.77	Health
Virology	1.03	1.44	Health
Medicine (general)	1.04	1.39	Health
Medicine (miscellaneous)	0.93	1.35	Health
Anaesthesiology and Pain Medicine	1.12	1.14	Health
Biochemistry, medical	0.86	1.00	Health
Cardiology and Cardiovascular Medicine	1.08	0.99	Health
Critical Care and Intensive Care Medicine	1.17	1.30	Health
Complementary and Alternative Medicine	1.01	0.95	Health
Dermatology	1.16	1.03	Health
Emergency Medicine	0.98	1.31	Health
Endocrinology, Diabetes and Metabolism	0.98	1.15	Health
Epidemiology	1.20	1.42	Health
Gastroenterology	1.07	1.38	Health
Genetics (clinical)	1.07	1.50	Health

Geriatrics and Gerontology	1.24	1.68	Health
Health Informatics	1.49	0.94	Health
Health Policy	1.27	1.44	Health
Haematology	1.17	1.87	Health
Hepatology	1.24	1.45	Health
Histology	0.88	1.09	Health
Immunology and Allergy	1.20	1.71	Health
Internal Medicine	0.95	1.22	Health
Infectious Diseases	1.17	1.39	Health
Microbiology (medical)	1.19	1.01	Health
Nephrology	1.08	2.39	Health
Clinical Neurology	1.21	1.28	Health
Obstetrics and Gynaecology	1.02	1.43	Health
Oncology	1.03	1.88	Health
Ophthalmology	0.80	0.93	Health
Orthopaedics and Sports Medicine	0.95	1.06	Health
Otorhinolaryngology	0.87	1.34	Health
Pathology and Forensic Medicine	1.23	1.08	Health
Paediatrics, Perinatology and Child Health	0.97	1.49	Health
Pharmacology (medical)	1.18	1.43	Health
Physiology (medical)	1.10	1.21	Health
Psychiatry and Mental Health	1.23	1.65	Health
Public Health, Environmental and Occupational Health	1.05	1.26	Health
Pulmonary and Respiratory Medicine	0.93	1.10	Health
Radiology, Nuclear Medicine and Imaging	1.00	1.17	Health
Rehabilitation	1.02	1.44	Health
Reproductive Medicine	1.08	1.24	Health
Rheumatology	1.15	1.61	Health
Surgery	1.08	1.06	Health
Transplantation	1.23	2.26	Health
Urology	1.59	1.37	Health
Nursing (general)	1.09	1.00	Health
Advanced and Specialised Nursing	1.09	1.03	Health
Gerontology	0.94	0.93	Health
Issues, ethics and legal aspects	0.91	1.06	Health
Maternity and Midwifery	1.18	2.56	Health
Nutrition and Dietetics	1.15	1.00	Health
Oncology (nursing)	0.90	2.13	Health
Pharmacology, Toxicology and Pharmaceutics (general)	1.30	1.17	Health
Drug Discovery	1.05	0.91	Health
Pharmaceutical Science	1.17	0.62	Health
Pharmacology	1.19	1.29	Health

Toxicology	1.16	1.33	Health
Veterinary (general)	1.42	0.35	Health
Dentistry (general)	0.89	0.74	Health
Oral Surgery	0.96	0.71	Health
Health Information Management	1.30	0.76	Health
Physical Therapy, Sports Therapy and Rehabilitation	1.19	1.09	Health
Radiological and Ultrasound Technology	0.96	1.14	Health
Speech and Hearing	1.16	1.44	Health
Computer Science (general)	0.92	0.48	Technology
Artificial Intelligence	0.81	0.58	Technology
Computational Theory and Mathematics	1.47	0.69	Technology
Computer Graphics and Computer-Aided Design	0.79	0.56	Technology
Computer Networks and Communications	0.84	0.83	Technology
Computer Science Applications	1.23	0.67	Technology
Computer Vision and Pattern Recognition	0.88	0.67	Technology
Hardware and Architecture	0.28	0.88	Technology
Human-Computer Interaction	1.05	0.68	Technology
Information Systems	0.91	0.65	Technology
Signal Processing	1.23	0.89	Technology
Software	0.82	0.65	Technology
Energy (general)	1.25	0.83	Technology
Energy Engineering and Power Technology	1.41	0.68	Technology
Fuel Technology	1.24	0.74	Technology
Nuclear Energy and Engineering	1.13	1.71	Technology
Renewable Energy, Sustainability and the Environment	0.96	0.70	Technology
Engineering (general)	0.66	0.75	Technology
Engineering (miscellaneous)	1.35	1.36	Technology
Aerospace Engineering	0.80	1.05	Technology
Automotive Engineering	1.04	1.07	Technology
Biomedical Engineering	1.28	0.92	Technology
Civil and Structural Engineering	1.29	0.89	Technology
Computational Mechanics	1.18	1.16	Technology
Control and Systems Engineering	1.08	0.97	Technology
Electrical and Electronic Engineering	1.11	0.89	Technology
Industrial and Manufacturing Engineering	0.75	0.45	Technology
Mechanical Engineering	0.93	0.96	Technology
Mechanics of Materials	1.03	1.30	Technology
Safety, Risk, Reliability and Quality	1.00	0.52	Technology
Building and Construction	0.74	0.67	Technology
Materials Science (general)	1.08	1.00	Technology
Biomaterials	1.27	1.09	Technology
Ceramics and Composites	1.27	1.26	Technology

Electronic, Optical and Magnetic Materials	0.96	1.00	Technology
Materials Chemistry	1.12	1.31	Technology
Metals and Alloys	1.08	1.31	Technology
Polymers and Plastics	1.20	1.42	Technology
Surfaces, Coatings and Films	1.04	1.02	Technology

Source: DAMVAD (2014)

Table 11 – Detailed breakdown of the Stockholm region's top 38 positions of strength compared with the Nordic average

Research areas	Impact	Specialisation	Discipline
Arts and Humanities (miscellaneous)	1.38	1.02	Humanities
Clinical Psychology	1.39	1.50	Humanities
Neuropsychology and Physiological Psychology	1.43	1.22	Humanities
Experimental and Cognitive Psychology	1.48	1.16	Humanities
Archaeology	1.67	1.48	Humanities
Radiation	1.25	1.10	Natural Sciences
Cognitive Neuroscience	1.26	1.51	Natural Sciences
Catalysis	1.28	1.23	Natural Sciences
Inorganic Chemistry	1.42	1.14	Natural Sciences
Chemistry (general)	1.42	1.01	Natural Sciences
Genetics	1.48	1.16	Natural Sciences
Astronomy and Astrophysics	1.76	1.51	Natural Sciences
Space and Planetary Science	1.82	1.30	Natural Sciences
Nuclear and High Energy Physics	1.90	1.49	Natural Sciences
Structural Biology	1.92	1.26	Natural Sciences
Health (social science)	1.09	1.16	Social Sciences
Urban Studies	1.20	1.46	Social Sciences
Economics, Econometrics and Finance (general)	1.27	1.11	Social Sciences
Parasitology	1.20	1.77	Health
Clinical Neurology	1.21	1.28	Health
Psychiatry and Mental Health	1.23	1.65	Health
Pathology and Forensic Medicine	1.23	1.08	Health
Transplantation	1.23	2.26	Health
Geriatrics and Gerontology	1.24	1.68	Health
Hepatology	1.24	1.45	Health
Health Policy	1.27	1.44	Health
Pharmacology, Toxicology and Pharmaceutics (general)	1.30	1.17	Health
Urology	1.59	1.37	Health
Surfaces, Coatings and Films	1.04	1.02	Technology
Materials Science (general)	1.08	1.00	Technology
Metals and Alloys	1.08	1.31	Technology

Materials Chemistry	1.12	1.31	Technology
Nuclear Energy and Engineering	1.13	1.71	Technology
Computational Mechanics	1.18	1.16	Technology
Polymers and Plastics	1.20	1.42	Technology
Biomaterials	1.27	1.09	Technology
Ceramics and Composites	1.27	1.26	Technology
Engineering (miscellaneous)	1.35	1.36	Technology

Source: DAMVAD (2014)

Business-related areas of strength

Table 12 – Interpretation of specialisation

Index value	Interpretation
>1	The Stockholm region demonstrates a specialisation compared with the comparison region.
1	The Stockholm region demonstrates neither a specialisation nor a non-specialisation compared with the comparison region.
<1	The Stockholm region does not demonstrate a specialisation compared with the comparison region.

Table 13 – Export values (2013). Stockholm region's specialisation compared with four regions

Business sector	Specialisation index in relation to each comparison region				Absolute values
	County of Skåne	County of Västra Götaland	Sweden	Sweden excluding Stockholm	Export value, County of Stockholm (SEK million)
Public administration and defence; compulsory social insurance	-	13236.37	3.39	258.07	2.920
Supply of electricity, gas, heating and cooling	11.36	1538.71	3.32	77.87	7.771
Hotel and restaurant	188.33	10.47	3.18	31.93	263
Information and communication	9.18	3.53	2.65	8.26	3.977
Finance and insurance	2.15	21.2	1.96	3.25	78
Trade; motor vehicle and motorcycle repair	1.12	1.46	1.59	2.11	83.059
Education	0.63	1.5	1.47	1.82	25
Rental, property services, travel services and other support services	0.33	1.65	1.38	1.63	366
Health and social care; social services	2.72	3.87	1.31	1.49	21
Culture, entertainment and leisure	0.85	0.51	0.95	0.92	18
Manufacturing	0.94	0.86	0.87	0.83	181.563
Other service businesses	2.07	0.92	0.79	0.72	13
Agriculture, forestry and fishing	0.32	0.52	0.68	0.6	273
Businesses within law,	0.5	1.01	0.63	0.55	3.338

economics, science and technology					
Construction	0.11	0.5	0.5	0.41	235
Real estate activities	2.7	0.09	0.29	0.22	44
Water supply; sewage, waste management and sanitation	0.23	0.08	0.2	0.15	236
Transport and warehousing	0.19	0.13	0.18	0.13	931
Mineral extraction	0.01	0.01	0	0	1

Table 14 – Number of employees in different niche areas of business (2012). Stockholm region's specialisation compared with Sweden, excl. Stockholm

Ranking	Business sector	Specialisation index	Number of employees in Stockholm	Number of women (in Stockholm County)
1	Film, video and television programme activities, sound recordings and music publishing	6.7	8153	30%
2	Air transport	6.4	3842	45%
3	Information services	6.0	5071	35%
4	Support services for financial services and insurance	6.0	9751	40%
5	Financial services excluding insurance and pension funds	3.8	29943	59%
6	Activities performed by head offices; management consultancy	3.3	29022	39%
7	Programme planning and broadcasting	3.2	3986	48%
8	Manufacture of basic pharmaceutical products and drugs	3.2	6536	56%
9	Insurance, reinsurance and pension fund activities excluding compulsory social insurance	2.9	10222	49%
10	Advertising and market research	2.8	13576	42%
11	Telecommunication	2.7	10012	31%
12	Computer programming, IT consultancy and similar	2.6	43028	21%
13	Manufacture of computers, electronic goods and optics	2.5	15731	27%
14	Publishing	2.3	13696	41%
15	Artistic and cultural activities and entertainment	2.3	10531	45%
16	Travel agencies, tour operators and other travel services and related services	2.3	4549	66%
17	Other activities within law, economics, science and technology	2.3	10972	46%
18	Gaming and betting businesses	2.1	1687	55%
19	Law and financial consultancy	2.0	18353	58%
20	Security and surveillance	2.0	8213	29%
21	Manufacture of drinks	1.7	1524	25%

22	Manufacture of coal products and refined petroleum products	1.6	769	18%
23	Restaurant, catering and bar businesses	1.5	36299	50%
24	Wholesale and commission-based trade excluding with motor vehicles	1.5	68419	28%
25	Rental and leasing	1.4	4093	18%
26	Maritime transport	1.4	1620	38%
27	Property services, and management and maintenance of green spaces	1.4	23996	53%
28	Library, archive and museum activities, etc.	1.4	5014	65%
29	Manufacture of tobacco products	1.4	445	35%
30	Employment services, recruitment and other staffing-related services	1.3	25201	41%
31	Monitoring; religious activities	1.3	17725	53%
32	Architecture and technical consulting; technical testing and analysis	1.2	25515	22%
33	Public administration and defence; compulsory social insurance	1.1	70039	54%
34	Postal and courier services	1.1	9998	32%
35	Hotels and accommodation	1.1	10428	64%
36	Other consumer services	1.1	12934	77%
37	Scientific research and development	1.1	5145	39%
38	Repairs of computers, household articles and personal items	1.1	1655	18%
39	Home construction	1.1	20685	6%

Table 15 – Number of employees in different niche areas of business (2012). Ranking based on difference in distribution between men/women.

Ranking	Business sector	Difference in proportion women/men	Number of employees in Stockholm	Specialisation index
1	Other activities within law, economics, science and technology	0.003	10972	2.3
2	Financial services excluding insurance and pension funds	0.004	29943	3.8
3	Programme planning and broadcasting	0.034	3986	3.2
4	Office services and other business services	0.036	10013	0.9
5	Artistic and cultural activities and entertainment	0.044	10531	2.3
6	Employment services, recruitment and other staffing-related services	0.052	25201	1.3
7	Air transport	0.063	3842	6.4
8	Advertising and market research	0.084	13576	2.8
9	Property services, and management and maintenance of green spaces	0.085	23996	1.4

10	Gaming and betting businesses	0.097	1687	2.1
11	Manufacture of basic pharmaceutical products and drugs	0.099	6536	3.2
12	Public administration and defence; compulsory social insurance	0.108	70039	1.1
13	Scientific research and development	0.112	5145	1.1
14	Sports, leisure and entertainment	0.117	9412	0.9
15	Insurance, reinsurance and pension fund activities excluding compulsory social insurance	0.118	10222	2.9
16	Textile manufacturing	0.126	469	0.3
17	Activities performed by head offices; management consultancy	0.129	29022	3.3
18	Other	0.138	7254	0.5
19	Restaurant, catering and bar businesses	0.145	36299	1.5
20	Publishing	0.150	13696	2.3
21	Production of leather and leather goods, etc.	0.15	40	0.1
22	Extraction of metal ores	0.160	81	0.0
23	Support services for financial services and insurance	0.164	9751	6.0
24	Real estate activities	0.168	17826	1.0
25	Law and financial consultancy	0.171	18353	2.0
26	Monitoring; religious activities	0.193	17725	1.3
27	Retail, excluding with motor vehicles and motorcycles	0.198	69656	1.0
28	Other manufacturing	0.215	2194	0.6
29	Manufacture of chemicals and chemical products	0.218	2254	0.4
30	Hotels and accommodation	0.224	10428	1.1
31	Manufacture of food products	0.225	6895	0.5
32	Other	0.231	7254	0.5
33	Film, video and television programme activities, sound recordings and music publishing	0.231	8153	6.7
34	Wholesale and commission-based trade excluding with motor vehicles	0.253	68419	1.5
35	Library, archive and museum activities, etc.	0.256	5014	1.4
36	Maritime transport	0.273	1620	1.4
37	Agriculture and hunting, and related services	0.276	2671	0.1

38	Forestry	0.278	1427	0.1
39	Manufacture of coal products and refined petroleum products	0.282	769	1.6
40	Information services	0.300	5071	6.0
41	Telecommunication	0.305	10012	2.7
42	Supply of electricity, gas, heating and cooling	0.306	4990	0.7
43	Clothing manufacture	0.315	324	0.7
44	Manufacture of tobacco products	0.339	445	1.4
45	Steel and metal production	0.345	452	0.0
46	Warehousing and transport support services	0.347	10960	1.0
47	Travel agencies, tour operators and other travel services and related services	0.348	4549	2.3
48	Manufacture of drinks	0.349	1524	1.7
49	Graphic production and reproduction of recorded media	0.395	3617	0.9
50	Postal and courier services	0.400	9998	1.1
51	Rental and leasing	0.400	4093	1.4
52	Security and surveillance	0.403	8213	2.0
53	Manufacture of paper and paper products	0.431	1589	0.2
54	Architecture and technical consulting; technical testing and analysis	0.432	25515	1.2
55	Manufacture of electrical appliances	0.452	2052	0.3
56	Manufacture of rubber and plastic goods	0.458	908	0.1
57	Education	0.460	109624	0.9
58	Water supply	0.467	548	0.9
59	Manufacture of computers, electronic goods and optics	0.490	15731	2.5
60	Computer programming, IT consultancy and similar	0.501	43028	2.6
61	Other consumer services	0.518	12934	1.1
62	Manufacture of other machinery	0.531	4877	0.2
63	Non-residential care services	0.542	39817	0.7
64	Manufacture of motor vehicles, trailers and semi-trailers	0.548	9804	0.6
65	Furniture production	0.549	807	0.1
66	Production of other non-metallic mineral products	0.563	1544	0.3
67	Healthcare and medical services	0.585	64539	0.8
68	Residential health and social care	0.595	34628	0.6

69	Construction work	0.601	4931	0.5
70	Waste management; recycling	0.608	2774	0.8
71	Manufacture of other means of transport	0.619	845	0.2
72	Other mineral extraction	0.619	168	0.2
73	Wastewater treatment	0.620	384	0.4
74	Repairs of computers, household articles and personal items	0.635	1655	1.1
75	Land transport; pipeline transport	0.700	33405	1.0
76	Manufacture of metal products, excluding machines and appliances	0.717	5067	0.2
77	Trade in, and repair of motor vehicles and motorcycles	0.717	14793	0.8
78	Manufacture of wood and wood products, cork, rattan, etc. excluding furniture	0.735	1101	0.1
79	Home construction	0.745	20685	1.1
80	Decontamination and after-treatment of soil and water and other pollution control measures	0.750	64	0.6
81	Repair and installation of machinery and appliances	0.753	4571	0.8
82	Veterinary medicine	0.755	800	0.6
83	Specialist building and construction	0.829	45413	0.9
84	Mineral extraction services	1.000	27	0.6
85	Fishing and aquaculture	1.000	34	0.1

Note: The difference in proportion women/men is defined as: 0=even distribution, 1=only men or women in the specified sector

Table 16 – Number of workplaces in different niche areas of business (2012). Stockholm region's specialisation compared with Sweden, excl. Stockholm

Ranking	Business sector	Specialisation index	Number in Stockholm
1	Film, video and television programme activities, sound recordings and music publishing	3.6	5707
2	Support services for financial services and insurance	2.8	2813
3	Activities performed by head offices; management consultancy	2.5	24596
4	Advertising and market research	2.5	6411
5	Artistic and cultural activities and entertainment	2.5	17071
6	Other activities within law, economics, science and technology	2.4	13259
7	Computer programming, IT consultancy and similar	2.4	14449
8	Information services	2.4	1160

9	Publishing	2.3	2905
10	Maritime transport	2.2	528
11	Air transport	1.9	122
12	Extraction of metal ores	1.9	14
13	Law and financial consultancy	1.8	9336
14	Office services and other business services	1.8	1800
15	Employment services, recruitment and other staffing-related services	1.7	1648
16	Mineral extraction services	1.6	39
17	Property services, and management and maintenance of green spaces	1.6	5630
18	Scientific research and development	1.6	1286
19	Healthcare and medical services	1.6	10123
20	Manufacture of computers, electronic goods and optics	1.6	523
21	Financial services excluding insurance and pension funds	1.5	3453
22	Programme planning and broadcasting	1.5	111
23	Travel agencies, tour operators and other travel services and related services	1.4	1175
24	Postal and courier services	1.4	346
25	Non-residential care services	1.4	2881
26	Manufacture of basic pharmaceutical products and drugs	1.4	44
27	Home construction	1.4	6138
28	Manufacture of other means of transport	1.4	280
29	Restaurant, catering and bar businesses	1.3	7399
30	Telecommunication	1.3	396
31	Architecture and technical consulting; technical testing and analysis	1.3	10499
32	Graphic production and reproduction of recorded media	1.3	892
33	Wholesale and commission-based trade excluding with motor vehicles	1.2	13896
34	Education	1.2	10264
35	Security and surveillance	1.1	310
36	Other manufacturing	1.1	1175
37	Other consumer services	1.1	11310
38	Insurance, reinsurance and pension fund activities excluding compulsory social insurance	1.0	243
39	Clothing manufacture	1.0	486
40	Real estate activities	1.0	19234

Table 17 – Level of education in different niche areas of business (2012). Stockholm region's specialisation compared with Sweden, excl. Stockholm

Ranking	Business sector	Specialisation index	Proportion of employees in Stockholm with university education	Proportion of women (in Stockholm County)
1	Steel and metal production	3.1	0.36	34%
2	Mineral extraction	2.7	0.30	26%
3	Telecommunication	2.6	0.31	35%
4	Manufacture of computers, electronic products, optics, electrical appliances and other machines and appliances	2.4	0.49	25%
5	Agriculture, forestry and fishing	2.3	0.18	36%
6	Other manufacturing	2.1	0.26	35%
7	Manufacture of rubber and plastic goods	2.0	0.15	27%
8	Production of food, drinks and tobacco	2.0	0.16	37%
9	Rental and leasing	2.0	0.13	30%
10	Production of other non-metallic mineral products	2.0	0.14	23%
11	Trade in, and repair of motor vehicles and motorcycles	2.0	0.07	14%
12	Transport and warehousing	2.0	0.13	22%
13	Insurance, reinsurance and pension fund activities excluding compulsory social insurance	2.0	0.40	56%
14	Manufacture of paper and paper products	1.9	0.21	29%
15	Travel, surveillance, property services and office services	1.9	0.13	46%
16	Postal and courier services	1.9	0.13	30%
17	Supply of electricity, gas, heating and cooling	1.9	0.41	35%
18	Wholesale and commission-based trade excluding with motor vehicles	1.9	0.24	37%
19	Manufacture of metal products, excluding machines and appliances	1.9	0.12	14%
20	Construction	1.8	0.08	11%
21	Manufacture of coal products and refined petroleum products	1.8	0.35	36%
22	Repair and installation of machines and appliances	1.8	0.11	12%
23	Vehicle manufacturing	1.8	0.35	22%
24	Unknown	1.8	0.27	57%
25	Real estate activities	1.8	0.28	42%
26	Retail, excluding with motor vehicles and motorcycles	1.7	0.13	60%
27	Support services for financial services and insurance	1.7	0.45	42%
28	Other service businesses and personal	1.6	0.29	64%

	services			
29	Waste management, recycling and decontamination	1.6	0.13	19%
30	Manufacture of textile, clothing and leather goods	1.5	0.13	59%
31	Residential health and social care	1.5	0.16	80%
32	Culture, entertainment and leisure	1.4	0.34	49%
33	Advertising and market research	1.4	0.29	46%
34	Graphic production and reproduction of recorded media	1.4	0.09	30%
35	Hotel and restaurant	1.4	0.08	47%
36	Financial services excluding insurance and pension funds	1.4	0.45	50%
37	Manufacture of wood and wood products, rattan, etc. excluding furniture	1.4	0.07	15%
38	Manufacture of chemicals and chemical products	1.4	0.30	38%
39	Employment services, recruitment and other staffing-related services	1.3	0.31	53%
40	Non-residential care services	1.3	0.22	77%
41	Architecture and technical consulting; technical testing and analysis	1.2	0.51	28%
42	Law and financial consultancy	1.2	0.57	59%
43	Water supply and wastewater treatment	1.2	0.21	23%
44	Public administration and defence; compulsory social insurance	1.2	0.50	55%
45	Activities performed by head offices; management consultancy	1.2	0.52	44%
46	Publishing, production of films, videos and television programmes, broadcasting	1.1	0.36	42%
47	Healthcare and medical services	1.1	0.59	79%

Table 18 – Labour immigration (2009 - October 2014). Stockholm region's specialisation compared with Sweden, excl. Stockholm

Ranking	Business sector	Specialisation index	Number in Stockholm
1	IT architects, system developers and test managers, etc.	9.0	288
2	Machine operators, textile and leather industry	8.5	91
3	Computer specialists	7.8	13468
4	Pilots, ship's officers and others	6.2	93
5	Primary/secondary school teachers	5.3	298
6	Agents, intermediaries and others	4.9	55
7	Cleaners and others	4.8	2242
8	Bookkeeping and accounting assistants	4.7	65

9	Directors of small companies and divisions	3.8	253
10	Communication officers	3.6	87
11	Business economists, marketing and HR officers	3.4	834
12	Clergy	3.4	75
13	Electricians, telecoms and electronics repairers and others	3.4	281
14	Tailors, fitters, upholsterers and others	3.3	106
15	Specialist managers	3.1	510
16	Hand packers and other factory workers	3.1	97
17	Computer engineers and computer operators	3.1	171
18	Painters, finishers, chimney sweeps and others	2.9	161
19	Managing directors, executives and others	2.7	116
20	Building and construction workers	2.6	833
21	Cashiers and others	2.5	58
22	Warehouse and transport assistants	2.4	264
23	Building finishers	2.3	263
24	Sales staff, retail; demonstrators and others	2.2	409
25	Physiotherapists, dental hygienists and others	2.0	68
26	Sales staff, buyers, brokers and others	2.0	496
27	Upper secondary school teachers and others	2.0	57
28	Sociologists and linguists	1.9	51
29	Other office staff	1.7	124
30	Kitchen and restaurant assistants	1.7	1539
31	Hairdressers and other service personnel, personal services	1.7	347
32	Other service workers	1.7	91
33	Operational managers	1.6	99
34	Drivers	1.5	61
35	Physicists, chemists and others	1.4	55
36	Journalists, artists, actors and others	1.4	377
37	Health and social care staff	1.4	605
38	Machine operators, food industry etc.	1.3	91
39	Founders, welders, sheet-metal workers and others	1.2	138
40	Engineers, architects and others	1.2	1295
41	Illustrators, entertainers, professional athletes and others	1.1	1562
42	Accountants, administrative assistants and others	1.1	168
43	Newspaper distributors, porters	1.1	316

Table 19 – Swedish patent (2009 – 2013). Stockholm region's specialisation compared with Sweden, excl. Stockholm

Technical field	Specialisation index in relation to each comparison region				Absolute values
	County of Skåne	County of Västra Götaland	Sweden	Sweden excluding Stockholm	Number in Stockholm
Environmental technology	2.8	2.68	1.69	2.9	28
Basic communication processes	4.56	2.51	1.59	2.48	77
Organic fine chemistry	1.38	3.63	1.59	2.47	12
Digital communication	1.29	1.7	1.54	2.26	43
IT methods for management	2.22	2.22	1.53	2.24	30
Optics	1.24	3.17	1.42	1.91	74
Control	1.59	2.54	1.38	1.78	203
Transport	3.03	1.34	1.36	1.73	143
Engines, pumps, turbines	2.21	1.02	1.34	1.68	148
Audiovisual technology	2.38	0.93	1.3	1.59	60
Semiconductors	0.78	2.78	1.25	1.48	160
Computer technology	0.5	2.52	1.17	1.3	253
Telecommunications	1.16	0.91	1.1	1.17	216
Furniture, games	2.1	0.87	1.08	1.14	13
Pharmaceuticals	0.51	1.44	1.09	1.14	224
Mechanical elements	1.39	0.65	1.04	1.07	94
Other consumer goods	1	1.11	1	1	93
Electrical machinery, apparatus, energy	1.21	1.11	0.98	0.96	96
Measurement	1.13	0.9	0.97	0.95	10
Microstructural and nanotechnology	0.37	1.1	0.96	0.94	34
Other special machines	1.39	1.39	0.94	0.91	171
Medical technology	0.54	0.81	0.89	0.84	225
Analysis of biological materials	1.01	1.06	0.82	0.74	224
Thermal processes and apparatus	0.55	0.76	0.81	0.73	10
Basic materials chemistry	0.44	0.81	0.81	0.72	43
Materials, metallurgy	0.62	0.47	0.65	0.54	51
Chemical engineering	0.45	0.83	0.62	0.51	107
Machine tools	1.23	0.7	0.63	0.51	182

Macromolecular chemistry, polymers	0.22	1.08	0.63	0.51	87
Biotechnology	0.39	1.01	0.59	0.47	31
Civil engineering	0.55	0.6	0.59	0.47	21
Handling	0.56	0.37	0.57	0.45	36
Food chemistry	0.17	0.72	0.56	0.44	26
Surface technology, coating	0.43	0.38	0.51	0.39	106
Textile and paper machines	0.43	0.53	0.48	0.37	561

Table 20 – European patent (2009 – 2013). Stockholm region's specialisation compared with Sweden, excl. Stockholm

Technical field	Specialisation index in relation to each comparison region				Absolute values
	County of Skåne	County of Västra Götaland	Sweden	Sweden excluding Stockholm	Number in Stockholm
Digital communication	9.42	84.04	0.08	24.75	2003
Basic communication processes	2.79	16.23	0.37	4.48	86
Telecommunications	1.2	15.14	0.47	3.36	488
Organic fine chemistry	1.22	15.16	0.66	2.08	65
IT methods for management	1.45	1.65	0.67	2.01	52
Pharmaceuticals	1.02	1.98	0.81	1.5	150
Audiovisual technology	0.52	3.77	0.86	1.33	140
Optics	0.5	3.1	0.9	1.23	49
Environmental technology	1.29	1.11	0.92	1.17	73
Semiconductors	0.54	4.64	1.01	0.98	26
Microstructural and nanotechnology	0.72	-	1.02	0.96	7
Computer technology	0.34	2.73	1.05	0.91	265
Other consumer goods	0.8	0.58	1.12	0.79	32
Medical technology	0.5	0.54	1.21	0.64	210
Control	0.49	0.92	1.22	0.63	54
Furniture, games	1.35	0.43	1.25	0.59	71
Analysis of biological materials	0.74	0.83	1.25	0.58	31
Electrical machinery,	0.63	0.67	1.25	0.58	86

apparatus, energy					
Engines, pumps, turbines	1.36	0.37	1.26	0.57	78
Macromolecular chemistry, polymers	0.27	1.25	1.27	0.55	11
Measurement	0.83	0.42	1.29	0.53	122
Other special machines	1.32	0.97	1.3	0.53	78
Basic materials chemistry	0.34	0.29	1.41	0.39	17
Food chemistry	0.17	2.24	1.45	0.36	6
Biotechnology	0.37	0.9	1.47	0.34	34
Thermal processes and apparatus	0.19	1.04	1.5	0.31	43
Transport	1.49	0.13	1.52	0.29	152
Handling	0.24	0.21	1.66	0.18	30
Mechanical elements	0.67	0.08	1.66	0.17	74
Machine tools	0.76	0.25	1.68	0.16	41
Civil engineering	0.23	0.44	1.69	0.15	47
Materials, metallurgy	0.22	0.24	1.69	0.15	17
Textile and paper machines	0.43	0.11	1.7	0.15	10
Chemical engineering	0.11	0.64	1.72	0.14	32
Surface technology, coating	0.25	0.22	1.75	0.11	6

Table 21 – Number of postgraduate students (HT2013). Stockholm region's specialisation compared with Sweden, excl. Stockholm

Ranking	Subject area	Specialisation index	Number in Stockholm	Difference in proportion women/men
1	Medical technology	3.0	15	0.467
2	Chemical engineering	2.6	134	0.030
3	Other medical and health sciences	1.8	27	0.037
4	Materials engineering	1.7	210	0.486
5	Natural resources engineering	1.7	88	0.136
6	Basic medical and pharmaceutical sciences	1.6	617	0.141
7	Industrial biotechnology	1.5	87	0.126
8	Infrastructure engineering	1.5	215	0.386
9	Earth sciences and environmental science	1.4	178	0.034
10	Medical biotechnology	1.3	78	0.051

11	Electrical engineering and electronics	1.3	288	0.639
12	Business and economics	1.3	343	0.160
13	Clinical medicine	1.3	1187	0.174
14	Health sciences	1.2	449	0.336
15	Media and communication studies	1.2	86	0.372
16	Chemistry	1.1	238	0.261
17	Language and literature	1.0	124	0.387
18	History and archaeology	0.9	87	0.080
19	Data and information science (Computer engineering)	0.9	211	0.517
20	Biology	0.8	268	0.119
21	Physics	0.8	210	0.438
22	Law	0.8	62	0.000
23	Art	0.8	56	0.393
24	Educational science	0.7	165	0.539
25	Sociology	0.7	85	0.294
26	Mathematics	0.7	88	0.545
27	Mechanical engineering	0.6	207	0.652
28	Other humanities	0.6	33	0.636
29	Philosophy, ethics and religion	0.5	43	0.302
30	Social and economic geography	0.4	19	0.263
31	Political science	0.3	24	0.167
32	Psychology	0.3	33	0.273
33	Other technology	0.1	_18_	0.667

References

Interviews/discussions

Almega, Ulf Lindberg, Director of Political Policy

IVL and Stockholm Clean Tech, Östen Ekengren, Deputy CEO Business Development & Marketing

KTH Royal Institute of Technology, Arne Johansson, Vice President for Research

KI Science Park, Märit Johansson

KI, Hans-Gustaf Ljunggren, Dean of Research

Kista Science City (life science), Thomas Andersson, CEO

Stockholm Business Region, Olle Zetterberg, CEO

Association of Swedish Engineering Industries, Eva Wigren, Director of Industrial Development

VINNOVA, Göran Andersson, Administrative Officer

Stockholm County Administrative Board, Jan P Andersson, Director of Research

Stockholm Chamber of Commerce, Fredrik Sand, Business Policy Expert

Norra Djurgårdsstaden, Anna Karin Stoltz Ehn, Head of Division at Norra Djurgårdsstaden Innovation

Open Lab, Ivar Björkman, Operations Manager

Rise Institute, Olof Sandberg, Strategist

SICS, Markus Bylund, Senior Researcher

Stockholm Science City, Ylva Williams, CEO

City of Stockholm, Anette Eriksson, Procurement Strategist

Swedish Med Tech, Malin Hollmark, Project Manager Innovation & Growth

Document studies

ALMEGA, Press releases Almega presents award for Service Innovation Promoter of the Year
https://www.almega.se/press/pressmeddelanden/almega-delar-ut-priset-som-arets-tjansteinnovationsframjare 2013 2014-10-31

Botkyrka Municipality (2012), Creative Stockholm an action plan – proposal for an action plan for cultural and creative businesses in the Stockholm region

http://www.botkyrka.se/SiteCollectionDocuments/Kommun%20och%20politik/Handlingsplan%20Kreativa%20Stockholm.pdf 2014-11-19

Ericsson (2014), NETWORKED SOCIETY CITY INDEX 2014, http://www.ericsson.com/res/docs/2014/networked-society-city-index-2014.pdf 2014-11-19

Stockholm County Administrative Board (2014), Proposal for Regional Action Plan for European Social Fund in Stockholm 2014-2020

Stockholm County Administrative Board (2011), the Stockholm region's innovative strength – a general functional analysis

Stockholm County Administrative Board (2009), the Stockholm region's capacity for renewal and development

Stockholm County Administrative Board (2010), Factsheet: Knowledge, skills and capacity for renewal in Stockholm, Copenhagen and Helsinki

New Karolinska Solna, Hagastaden and Life Science, http://www.nyakarolinskasolna.se/sv/det-nya-sjukhuset/stockholm-science-city/ 2014-11-18

Nordforsk (2014), Comparing Research at Nordic Universities using Bibliometric Indicators, NordForsk Policy Paper 2-2014

Olivera.S, and Wefer. J., (2013), Year-book 2013 – Swedish participation in European programmes for research & innovation, VINNOVA, the EU coordination function (Swedish Energy Agency, Formas, Forte, Swedish National Space Board, Swedish Research Council & VINNOVA).

Regional Planning & Transportation Administration, Stockholm County Administrative Board (2009), Stockholm – an attractive region for international experts

Sigtuna Municipality, Sweden Green Building Award, Press release,http://www.sigtuna.se/sv/Pressmeddelanden1/Sweden-Green-Building-Award/ 2014-11-19

Stockholm's regional development strategy (RUFS 2010)

Stockholm Territorial Review (OECD, 2006)

City of Stockholm (2006), Facts and findings from the Stockholm congestion charge trial, version 2 – August 2006, http://www.stockholmsforsoket.se/upload/Rapporter/Fakta%20och%20resultat%20stockholmsf%C3%B6rs%C3%B6ket%20aug%2006.pdf 2014-11-19

City of Stockholm (2006), Facts and findings from the Stockholm congestion charge trial, version 2

Stockholm County Council, About the council, http://www.sll.se/om-landstinget/det-har-ar-landstinget/ 2014-11-10

Stockholm County Council, operations, http://www.sll.se/om-landstinget/det-har-ar-landstinget/ 2014-11-10

Swedish Research Council's 2013 annual report, https://publikationer.vr.se/webbpdf/IV_0034.pdf 2014-11-14

Swedish Research Council, About the Swedish Research Council, http://vr.se/omvetenskapsradet.4.4b3ca0f810bf51c922780002034.html 2014-11-30

VINNOVA, About VINNOVA, http://vinnova.se/sv/Om-VINNOVA/VINNOVA---Sveriges-innovationsmyndighet/

30 November 2014

Länsstyrelsens rapportserie

Utkomna rapporter under 2015

1. Hur arbetar vid systematiskt med ett integrationsperspektiv i landsbygdsutveckling?, avdelningen för landsbygd

2. Skarvar och fågelskär i Mälaren 2014, avdelningen för miljö

3. Miljögifter i sediment i Stockholms skärgård och östra Mälaren, avdelningen för miljö

4. Kartläggning av styrkeområden i Stockholmsregionen, avdelningen för tillväxt

5. Jämställdhetsintegrering – genomförande av strategi för Stockholms län 2014-2016, avdelningen för tillväxt

6. Nationella minoriteter – rapport om tillämpningen av lagen om nationella minoriteter och minoritetsspråk år 2014, avdelningen för tillväxt

7. Uppföljning av bostadsbyggandet, avdelningen för samhällsbyggnad

8. Fjärde jämställdhetsmålet: Mäns våld mot kvinnor ska upphöra – länsstyrelsernas samordning av insatser, avdelningen för tillväxt

9. Häckande kustfåglar i Norrtälje kommun - resultat från inventeringar i skärgården 2014, avdelningen för miljö

10. Prostitutionen i Sverige 2014 – en omfattningskartläggning, avdelningen för tillväxt

11. Bostadsmarknadsenkäten – Stockholms län 2015, avdelningen för samhällsbyggnad

12. Romsk inkludering – årsrapport 2014, avdelningen för tillväxt

13. Ädellövsområden och ekmiljöer i Stockholms län, avdelningen för miljö

14. Utbildningsverkstad i strategiskt förändringsarbete – kursbeskrivning och lärarhandledning, avdelningen för samhällsbyggnad

15. Läget i länet – bostadsmarknaden i Stockholms län 2015, avdelningen för samhällsbyggnad

16. Ekosystemet ICT & Digital – kartläggning av Stockholmsregionens styrkeområden, avdelningen för tillväxt

17. Att vara förälder i Sverige – utvärdering av två föräldrastödsprogram, avdelningen för tillväxt

18. Prostitution in Sweden 2014 - the extent and development of prostitution in Sweden, avdelningen för tillväxt

19. Strategi för miljömålet Ett rikt växt och djurliv, avdelningen för miljö.

20. Strategi för miljömålet Ingen övergödning, avdelningen för miljö.

21. Strategi för miljömålet En giftfri miljö, avdelningen för miljö.

22. Platsens smak, avdelningen för landsbygd.

23. Mapping of areas of strength in the Stockholm region, avdelningen för tillväxt

"The County Administrative Board works to ensure the Stockholm region is an attractive place in which to live, study, work and develop companies."