Prosperity and Growth Strategy Karlstad Region

Basic Report

TENTacle WP 4.1
Version: Final 9/6/2017

Content

1 Introduction

The Prosperity and Growth Strategy project, PGS, for Karlstad Region, is a partial project of the Central Scandinavia Borderland project in the TENTacle project package, which is financed by the EU program Interreg Baltic Sea Region. TENTacle involves 23 partners from 9 countries, as well as 67 associated organizations.

Karlstad Region, in this project, consists of Karlstad, Forshaga, Hammarö and Kil municipalities

The Värmland – Östfold Border Council is in charge of the Central Scandinavia Borderland project, while Transnorden Sweden is responsible for PGS.

Leif Lendrup and Urban Hermansson, Transnorden Sweden, are the PGS project team. The members of the steering committee are Kjell Eriksson, former member of the Swedish parliament, Lena Bergström, entrepreneur within the hotel business, and Alf Johansen, project leader of the Central Scandinavia Borderland project.

Associated organizations are Handelskammaren Värmland, Oslo region alliance, Värmlandstrafik, Östfold county, and the municipalities of Kristinehamn, Marker, and Årjäng

PGS has a budget of 104,700 Euro, of which 25% is unpaid voluntary work by the project team.

PGS addresses the leadership in the following sectors:

- Industry
- Culture
- University
- Public
- Transport

Other important target groups are the 23 TENTacle partners and city strategy developers, due to the conditions for the project.

The purpose of this basic report is to start a discussion with the above stakeholders and lay the foundation for PGS. The report will be updated due to the discussions and further facts and figures. In the next step, we will conduct strategy proposals based on this report

2 Goal

The goal of TENTacle is to improve stakeholder capacity to reap benefits of the Core Network Corridors implementation for the prosperity, sustainable growth and territorial cohesion in the Baltic Sea Region

The Core Network Corridors consist of 9 corridors, which are the backbone of the Trans-European Transport Network, TEN-T

This core network links major nodes:

- Urban nodes
- Ports
- Airports
- Other transport terminals

Through key:

- Rail
- Road
- Inland waterway
- Maritime connections
- Airport connections

The corridors are based on three pillars:

- Enhancing cross-border connections and removing bottlenecks
- Integrating different transport modes – multi modality
- Promoting technical interoperability

The Scandinavien – Mediterranean Corridor is the longest of the corridors and involves Austria, Denmark, Finland, Germany, Italy, Malta, Norway, and Sweden.

In the corridor decision process, Karlstad Region has obviously not been considered as a major urban node, why the link between Oslo and Örebro is not included in the above corridor, figure 2.1.

Figure 2.1. Scandinavian – Mediterranean Corridor in Sweden and Norway (EU, 2016)

To be included in the Scandinavien – Mediterranean Corridor will facilitate transport system investments in Karlstad Region and connect the region to a huge corridor, as well as large project, which are taking place e.g. eastwards, figure 2.2. If these projects are realized, Karlstad Region will be connected to a tremendous market in the east.

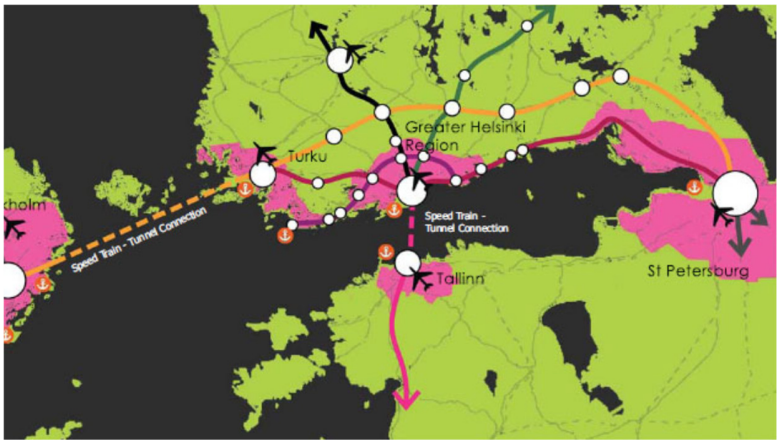


Figure 2.2. Projects in the east

Due to the goal of TENTacle, as well as the large collaboration of partners and countries, which is valuable when it comes to impact on the development of the Scandinavien – Mediterranean Corridor, it is important that Karlstad Region has been included in TENTacle.

The above background means that the specific goal of the PGS project in the context of the TENTacle goal is:

- That the corridors Oslo – Örebro and Göteborg - Karlstad shall be included in the Scandinavian – Mediterranean Corridor

A second goal is:

- That Karlstad Region´s labor market shall be extended with Oslo and Örebro regions and that a twin city co-operation between Karlstad and Örebro including Kristinehamn and Karlskoga shall be established

A labor market is defined by the time people are prepared to commute daily between home and work. This time is individual, due to values and occupation, as well as what the labor market offers in the city to which the person commutes. High speed and convenient transport systems, as well as attractive cities enlarge their labor market in terms of distance.

It is our opinion that increased growth in Karlstad Region is a prerequisite for the region to be included in the next Scandinavian – Mediterranean Corridor, as well as be object to large investments in transport systems, such as high speed railways, which in turn will drive growth. To attract government and private investments a region must qualify.

However, it not obvious that fast trains connections eastwards and westwards mean that Karlstad Region will grow. It may be the opposite. Crucially, Karlstad is attractive to work and live in compared to big cities along the corridor. A prerequisite for this is that Karlstad grows and becomes much larger than today. The population of smaller cities along the corridor some distance to Karlstad will probably reduce their populations as a result of fast trains.

PGS is the means of achieving the main goal. The project:

- Suggests specific activities which boost economic and population growth in Karlstad Region
- Calculates the expected growth generated by the activities
- Calculates the demand of different transport systems and the required capacity for the systems due to the calculated growth in the context of business, society and technology development
- Calculates the impact on economic growth from the transport systems

3 Approach

A basic approach in the development of PGS is first, to use general historical explanations for industrialization and economic development and apply them to find explanations for the development of Karlstad Region. Comparisons to other regions, and above all, successful and comparable, is part of the search for explanations. Can we completely or at least partially explain a certain development, then we have a first basis for developing a strategy for future growth.

The second basis for PGS is what is happening now and what alternative courses are possible in a longer perspective

Economic history is about to explain why some countries and regions have become rich while others remain poor. The research sought answers to why the industrial revolution took place precisely in the UK, right in the middle of the 1700s. The steam engine is often used as an explanation, but this was invented during the 60s AD by the Greek physicist and mathematician Heron. Technological breakthroughs alone are not sufficient but must have the right conditions.

Figure 3.1 is a summary description of the research on how countries and regions have been industrialized. It's about natural conditions and above all cultural conditions. According to professor Deirdre Mc Closkey the reasons why the industrial era was realized in western Europe depended on a series of coincidences. The reformation, the civil war in England and the Dutch freedom war were three steps leading to a real and lasting impact of liberalization. Freedom of thought, business, trade, speech and so on became the real drivers behind the development. Politics and religion have been the basic drivers of efficient education and qualified labor, growth of industrial traditions and development of good communications. These factors together with the natural preconditions have in turn generated the industrialization and modernization. It is a complex development for a very long time, where strong visionary leaders have played crucial roles and their efforts are still in the cultural preconditions, which we generally do not think about.

Martin Luther's reformation is an important explanation why Northern Europe had a better economic development than Southern Europe. Axel Oxenstierna, state administrative tradition, and Johan August Gripenstedt, free trade and the main railway tracks, are historical examples of significant people whose contributions were important in their ages for Sweden's industrialization and still are components in further development.

Examples of changes and modernization, which gave the industrialization of Sweden energy are; “laga skifte” that enabled efficient agriculture and freeing labor for other activities; elementary school, which laid the foundation for adult education, and that more could study further; emigration, which eased the financial pressure, as well as democracy and women's suffrage, which freed ideas and creativity.

What we see today often has its explanations many years back in time and how the legacy was managed and developed. The following are two local examples.

In 1771 Eskilstuna became the first Swedish sanctuary. Craftsmen had to establish themselves and compete freely with new services and products, without the rules of the guilds, and without the customs duties that prevailed in the domestic trade. Eskilstuna became the center of innovation with manufacturers of knives and pliers, as well as locomotives and tractors.

Four years later, in 1775, Marstrand became a free port, "porto franco", which meant free trade, abolition of obliteration, freedom of religion and free immigration. Marstrand quickly became one of Sweden's most powerful cities and the population tripled in a few years. However, the city did not succeed in the long term to take advantage of the opportunities brought by the free port.

The cultural conditions are the foundation for PGS and the possibilities to achieve results. Concerning the natural conditions in Sweden, and not least in the region of Värmland, the forests, minerals and rivers are obvious.

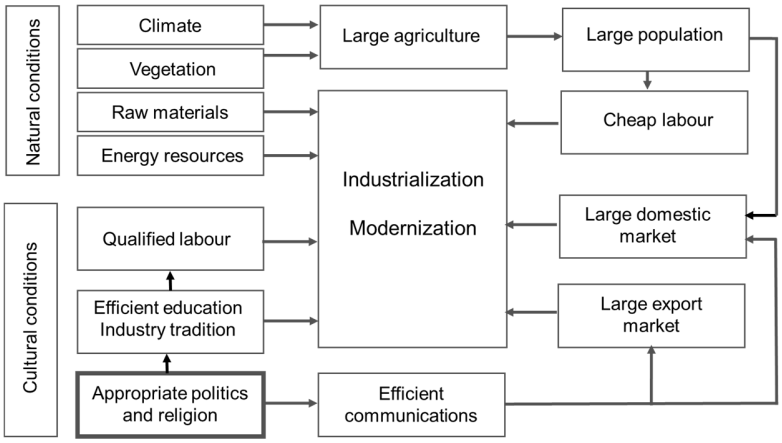


Figure 3.1. Industrialization of countries and larger regions (Christopher Lagerqvist, Reformer och revolutioner, Studentlitteratur, 2013)

With association to the importance of the above mentioned cultural conditions concerning industrialization and modernization, large companies have successful manufacturing in Sweden, when many other companies move to far east countries. Successful manufacturing is found in industrial environments, the companies have successful research and development.

Furthermore, the companies are strong concerning the following capacities:

- Structure
- Attitudes
- Change abillity
- Skill development
- Collaboration
- Technology integration

The six areas interact, why they are named the “honeycomb”.

Successful manufacturing companies underline that the industry environment is an important prerequisite. In Södertälje, Scania and AstraZeneca interact, and in turn cooperates with Siemens in Finspång. Despite completely different products there is much that unites the companies in terms of production. (Birgitta Södergren, Flaggskeppsfabriken, IPF, Uppsala University, 2016)

Structures
Structures are increasingly formalized and systematized in the business, from organizational charts to change methods. Structures are needed in all six areas. They form the infrastructure that makes business work. Key strengths of businesses are flat organizations and non-hierarchical approach, with a high degree of participation and activities near the responsibility. Information sharing on a broad front. Businesses do not have much faith that everything must be structured, but see the value of degrees of freedom at work. It uses very flexible structures, and change them if necessary.

Attitudes
Attitudes are about the approach to the work of leaders and employees. Some basic attitudes that characterize the working atmosphere in the successful companies are taking responsibility and participation, as well as a positive view of collaboration, learning and change. There's a trust and openness to listen to different perspectives. Ethics and values are important in the companies.

Change ability
Strengths in this area, including that companies have effective methods and resources to pursue change that allows many to contribute. Union co-operation provides a good basis for the implementation of changes. A coaching and listening leadership also promotes change.

Skill development
Skill development is seen in the companies as a strategic issue that should match the business and production strategy. The companies are working continuously and systematically with competence development, with clear methods and tools. Companies strive multi-skills of employees, as well as holistic and global understanding

Collaboration
The ability to collaborate across borders, both within and outside the organization, is the theme that is often highlighted as a strength in the Swedish production company. Sweden is unusual in its ability to "gather all in one room", employees, managers, customers, suppliers, professionals, politicians, researchers, unions and employers. Being able to interact "at eye level" between levels and functions, as well as with external stakeholders, is an important strength to build on.

Technology integration
Technology integration is about integrating new technology into the business, so that both man and machine are utilized in the best way. Strengths of the companies, including extensive experience in automation, many employees with high technical expertise, as well as health and safety are well integrated in the technology. Capacity for change and trade union cooperation will also strengthen the capacity for technology integration.

Successful manufacturing companies have many similarities to companies considered as knowledge companies. They are knowledge-based companies, which creates value by solving problems based on the employees' specialist knowledge. Machinery, anyone can buy them. However, it is the ability to use them, which is essential and the ability to constantly adapt and change. Soft benefits are difficult to copy.

Knowledge companies have special human capital characterized by employees who are:

- Well-educated
- Independent
- Motivated by development
- Attractive on the labor market
- Loyal to the profession rather than employers

Knowledge companies have special processes characterized by:

- Innovation and production flow together
- Tasks that motivates
- Learning in daily work
- Flat structures
- Coaching leadership
- Confidence as the basis for cooperation and knowledge integration

The ”honeycomb” is a kind of measure of the cultural conditions in figure 2, which is the foremost driving force behind industrialization and modernization. The “honeycomb” is applicable, not only on companies, but also when it comes to other sectors of the society.

“If I want to successfully bring a human being to an intended goal, I first must find her where she is and start just there”, (Danish philosopher Sören Kierkegaard)

We are using the “honeycomb” to evaluate where Karlstad Region is today and start PGS from there. The evaluation comprises the following:

- Politics
- Population
- Industry sector

- Culture sector
- University sector
- Public sector
- Transport sector

We have organized the “honeycomb” capacities in two groups:

Structure capacities
- Structure

Soft capacities
- Attitudes
- Change ability
- Skill development
- Collaboration
- Technology integration

Figure 3.2 describes the structure we have applied to analyze and evaluate what is happening in the present age and discuss what alternative topics these events may have in the future in the longer term in Karlstad Region

Globalization, urbanization and migration are overall global forces that affects change and development of our society and the way to carry out activities and do business. Technological innovations are strong driving forces and countries, regions and cities must adapt to be competitive. In this change, we are searching for durability and it's not just about the climate and environment, but just as much on economic and social sustainability. The structure is an equation with a huge number of variables, unknown and stochastic context and large number of outcomes. PGS presents the possible outcomes as the background to the strategic proposals.

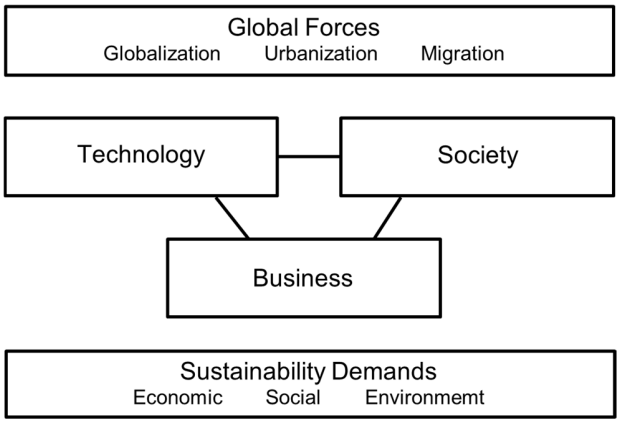


Figure 3.2. Analysis and evaluation of future development

It is in the historical legacy and the future scenarios we have the conditions for the development of Karlstad Region and thus the content of PGS. The acting space is between the global forces and the sustainability demands.

4 Contemporary Conditions and Future Courses

This part presents, evaluates and discusses the general contemporary conditions and future courses, we think will and must have strong impact on PGS, and which we will build the strategy on together with the evaluation of Karlstad Regions position today. It is up to the reader to make other conclusions and by that alternative strategies.

The model, figure 3.2, is our idea and all the content is from a large number of reports, books, articles and interviews.

Introduction

Arnold Brown, a distinguished futurist has written several papers about what is called the "global work force". A closer look at the idea split the concept in three main parts.

- Highly specialized groups travelling around the world to solve extremely complicated problems, e.g. plugging leaking off-shore oil wells
- Project groups located around the world to keep projects running 24 hours a day, e.g. product development in multinational manufacturing businesses.
- Realizing the view that all working people are members in a common labor market, e.g. outsourcing of large programming efforts to India.

Arnold forecasted that this development was irreversible and should be stronger over time. What has happened until now? There is not so much talked or written about the first two points as it was. Most energy is spent on the third. In fact, this is not a new trend. Already in the 1960s European and American businesses started to hire foreign workers and outsource manufacturing to low-cost countries. That has augmented ever since to a level that has triggered protests especially in the US.

In organized form the biggest change was established in the EU as one of the four freedoms. Earlier the Nordic countries had agreed on a common job market.

The conclusion might be that the forecast was correct to some extent but the pace has been slower and new elements change the pattern.

Today's debate over the future of jobs seems to move between two extreme points. One predicts that jobs will come to an end by automation in all corners of the job market. The other extreme claims that we can look forward to an era of powerful growth in the economies and the work opportunities. The latter supports its optimism by historical experiences. Technological break-throughs have so far meant more jobs in the regular market than before. Millions of jobs disappeared and many more were created. Has that come to an end? That is hard to predict. World economic forum has made an outlook to 2020 with some thinking of the years thereafter. It's neither as gloomy as the first extreme nor as optimistic as the second. It shows a balanced picture of the changes that are most possible to come. Highest on the negative scale is shrinking needs of personnel in administration and office work. The upside will be filled with people in the STEM, science, technology, engineering and mathematics area.

Irrespective of where different thinkers put themselves on the scale between the extremes, they are on the same side in one respect, skill demands. Most people are convinced that the demand for higher levels of skills is a dominant trend in practically every professional area. It means that the need for more theoretical knowledge increases. One can see it in the relations between job markets and education. In the western world, it becomes harder and harder to get a job if you miss a high school degree. Unemployment is higher and rising in groups without that background. The development is also evident in professions where earlier it was enough with a bachelor degree. It becomes ever more usual to ask for master or even doctoral competence. Job demands and the educational systems do not run in the same speed. The technological development is faster and the result is a growing skills gap. The Swedish organizations Arbetsförmedlingen, employment service, and Svenskt Näringsliv, employer´s association, reported in spring 2016 that about 20 % of all announced jobs cannot find a competent candidate. In the same time the unemployment scored around 7 %. Another effect of the development is a race to find talents meaning the best persons suited for the tasks. Some authors claim that this is going to decide which economies will flourish in the years to come. An example could be Yahoo Japan. The company offers its personnel 4-day weeks to attract young talents. In October 2016 Oxford Economics reports that Sweden has the highest index of the difference between demands and supply of highly edu-

cated workforce. Sweden has passed USA as the worst pupil in the classroom. For a region like Borderland Scandinavia it is even worse. Within Sweden and Norway attractive regions as Stockholm and Oslo will be more attractive than the rest of the countries. In the end, the skills gap will be an issue of survival. Many different solutions in order to appeal to young talents will be necessary and seen in the future.

We can see today that the job market polarizes. Automation reaches the so called middle class jobs leaving a gap between low paid and high paid jobs. Running parallel, jobs with low educational needs are replaced in industries like manufacturing, retail and office work. Extrapolation of these changes will result in a grim picture. If it is realized it will be very challenging for whole societies. If a growing part of a population are poorer and cannot afford today's consumption, markets will erode. Businesses will lose their base and cut down their personnel number. An evil circle is established. This happens now in a limited way in periods of recessions. What if the limits at the bottom are broken?

Fortunately, there are positive factors pointing in other directions. History teaches that we cannot see consequences and ramifications following technological break-throughs. There might be completely new areas growing that we don't notice today. Fifteen years ago, nobody understood the power of small mobile terminals in the hands of everybody. Now we have Facebook, Google, Wikipedia not to speak of an overwhelming number of apps.

Environment and climate problems force us to rebuild a great deal of our societies. Energy, food, water, materials, transportation are just some examples of the necessary change areas. Huge amounts of work is needed to fulfil the ambitions. Green products and systems must be invented, designed, manufactured and marketed over a long period of time.

Demography give headaches for politicians around the world. Populations in Europe, Japan and China are already ageing rapidly. The upside is that this create lots of jobs in many sectors not only health care.

Our question is how these general trends fit in Karlstad Region. We start with the following hypothesis.

The trends will work in the overall perspective but with differences on the local level. The region has more manufacturing and retail companies than the statistical average of Norway and Sweden. Consequently, it may be harder hit by automation. Moreover, the infrastructure is below the middle of the road measure. It also means a bigger threat than for other regions.

4.1 Global Forces

Our starting point is that globalization, urbanization and migration are overall forces that will remain to be fundamental conditions for PGS and any strategy, which addresses regional development.

Globalization

Globalization is an economic, cultural and political process that connects the world's countries closer. In general globalization has been aimed at economic integration between different national economies.

World trade in relation to world production is a measure of globalization's development. Just over 100 years ago, this trade accounted for 6% of production. Today it is just over 30%, which means that it's 70% that does not become part of world trade. Most of the production is about local markets. At the same time, major changes are taking place in the comparative benefits, which means that industries move from country to country, and especially in the manufacturing industry. Industry and company strengths and comparative advantages over other countries naturally have a major impact on the design of PGS.

Protectionism policy is currently expanding in important countries, in more sophisticated ways than before as Kommerskollegium states in a 2016 report. Even if this is going on now, we are still of the opinion, that in the long run globalization will increase, which thus has an increasing impact on Karlstad Region's development.

Urbanization

The UN estimates that almost all population and production growth over the next 30 years will occur in cities. Many cities will have doubled its population in the space of a few decades. Assessment is that about 60% of the world's population lives in urban areas in the middle of this century. Today, China's big cities are as big economies as Germany and France together.

Theoretical and empirical research shows that productivity, innovation and growth is improved by density and diversity in densely populated environments. This is explained by the scale and pace of gains, which enables productivity increases and costs decrease with the size of the local market. These agglomerations are self reinforcing. Large regions in terms of population and economic activity has improved conditions for economic development. Strong economic growth leads to job creation. New residents from other regions flow in, which improve the growth dynamic in the region further. These self reinforcing forces explains the strong urbanization underway in Sweden and most other parts of the world.

Economy of scale can be further enhanced by the fact that subcontractors, labor and transport systems in a region adapt to certain industrial specific requirements. Additionally, information and knowledge are easiest spread between companies and individuals engaged in similar activities. This kind of scale advantages results in concentration of certain industries into specialized clusters. In clusters, such commodities thrive. All companies in the cluster benefit from the interaction and exchange of knowledge.

The largest agglomerations are found especially in highly specialized areas. The highly specialized Mälardalen region is an example that shows greater agglomeration than other regions

Growing economies have significantly much higher incomes, higher proportion of highly educated and creative knowledge jobs, and not just more inhabitants but also higher population density. These economies also have lower council tax. More in salary gives social footprint, where the preferences and attitudes of major cities differ increasingly from smaller towns and rural areas.

Proximity to both customers and vendors often play a major role in the service sectors compared to the traditional manufacturing industry. The local market size is thus of great importance to service and support activities.

Ever since the 1980's, services in the form of separate activities and as part of industrial business have increased, and become the dominant employment, while employed in direct production has decreased. There is also the development of advanced and specialized services. The meeting between people is the core of the service society. It is in the meeting that services occur and then accelerates in activities. The need for meetings in the service society means that people must quickly be able to move to and from meetings. The travel time must be used to effective work. This means that transport systems are crucial for a city and a region's development in symbiosis with the nearby metropolitan regions.

The service society drives new jobs and economic growth is now primarily generated in the world's metropolitan areas. Access to excellence and skilled labor is facilitated in large populations. The cost to meet face to face increases and drive the growth of great cities. In large cities, economic growth increases more than the population growths, which accelerates urbanization. Every new job in the competitive sector in a city generates 1.6 new jobs in the service sector in the same city.

Mobility within and between jobs is an intrinsic feature of modern societies. It is reinforced in growth economies, where the boundaries between companies are deleted and structures are rapidly changing. It favors major cities and regions

The big cities´ highly specialized companies are reflected in a demand for labor with specialized knowledge. For a single employee in a big city, it is therefore less risky to invest in highly specialized knowledge, because the risk of being awarded a single employer is less than in a small town with a few companies

Urban lifestyles attract young people to move to big cities, therefore it is not only the service society that drives the urbanization. Education and work attracts young people to move from small towns, but also the overall supply in the large cities. It's about shops, restaurants, coffeehouses, and experiences. The feeling that something is happening in

the big cities are appealing to young generations. The farther away a community is from a large city, the greater the exodus. To this can be added that there is a connection between the size of the city and relative wage levels. Doubling the city generates about 15% higher wages.

Innovations, a positive development, high payrolls, and a growing number of jobs takes place in areas that have a lot to offer and are large enough for the young people.

Despite globalization, locally produced services account for an increasing proportion of the current consumption expenditure. It may be related to retail and transportation, but also specialized services such as restaurants as well as culture and specialized care and education services. An old rule of thumb teaches that around 50% of all jobs in a city or region are local services. The fact that many people live close to each other on a relatively small surface area is a prerequisite for the fact that there is at all times a supply of all kinds of goods and services. Producing specialized services at a reasonable cost requires high capacity utilization.

When young people move and fewer go out to e.g. visit restaurant or go shopping, opportunities disappear and also different kinds of stores. The places become less attractive. Companies do not establish where the labor market is not renewed and little knowledge is added

Statistics show that it is only 36 municipalities, including Karlstad, among 290 where the number of young people is not reduced. The numbers are changed somewhat after the flow of refugees in 2015.

However, not all rural regions are depopulated. One can see a rapid development in rural areas close to large cities, and even faster than in many cities. The new rurality is about families moving to countryside areas close to cities and bring with them urban lifestyle and urban ideas. This development creates diversified rural areas with a strong private and market oriented service sector. Mälardalen and Skåne are regions where the new rurality gets strong foothold. Good accessibility and a short distance to the city is a prerequisite.

With regard to Stockholm's development, there is now a certain change due to the lack of housing and problems to travel in combination with the workload's increased opportunities to work flexibly and to work elsewhere. You do not have to go to the workplace every day and can choose attractive accommodations not too far, in time, from the big cities. Visby and Stockholm, Halland and Gothenburg, Österlen and Malmö / Copenhagen as well as Umeå and Stockholm.

Another trend is that families stay in the center of towns and do not move to the suburbs because they choose not to have a car and do not always have a driving license.

In line with globalization, we believe that urbanization will continue and it is therefore a force PGS must relate to and integrate Karlstad Region into growing urban environments, and at the same time becoming an attractive urban environment.

Migration

Migration in this context is almost entirely about overseas refugee immigration to Europe and not least to Sweden, which has long been a major refugee recipient.

By the end of 2015, 65.3 million people were fleeing. It's the first time that it's more than 60 million. The number is based on data from governments, UNHCR and other organizations. Internally displaced persons, people in flight and left in their homelands amounted to 40.8 million, while the number of asylum seekers amounted to 3.2 million

There are three reasons for the increase in the number of refugees. Situations that cause major refugee flows are taking place longer time, such as the conflicts in Somalia and Afghanistan that have lasted for 30 and 40 years respectively. New conflicts or earlier conflicts that revolve come about more often, such as Syria, South Sudan, Yemen, Burundi, Ukraine and the Central African Republic. Finding lasting solutions for people on the run have been a declining trend since the end of the Cold War.

Little evidence indicates that the number of refugees will decrease, which means that asylum immigration continues to Sweden. Migration and employment of asylum immigrants will therefore, together with globalization and urbanization, be a very important starting point and component of PGS.

4.2 Sustainability Demands

Sustainability is a three-dimensional demand; environmental, economic and social. It is about new products and alternative business models that change climate deterioration to environment improvement. This change is not possible without economic growth built on belief in the future and a business climate that attracts capital, which breeds in a wealthy economy. However, in a society without trust and unity, the two other sustainability dimensions will fail.

4.3 Technologies

This section will throw a little bit of light on subjects that we expect will have a great impact on societies in the future. It is not a full painted map of what is dawning but covers the driving powers that influences a whole range of second stage application areas. The choice of areas among an overwhelming variety of alternatives is made due to a hypothesis that they are of special importance in Karlstad Region. It means they should be watched with a certain attention in industries and education.

Digital Technologies

Information technology today permeates nearly every realm of human activities and will in increasing pace continue to change industries and the way of doing business, as well as the whole society. This global shift will, of course, make strong influences on transport systems and the users of the systems. Here we will give some glimpses of areas that will affect societies in a broader perspective.

Hardware

Moore´s law have been the lodestar for hardware development since the 1960s. Sometimes you can hear predictions that this era soon will be over. So far, they have been wrong. There is of course a border put up by nature itself, which will not easily be passed. But we are far from that border set by quantum theory. The quantum computer has long been discussed. Much research is made and experimental devices built. It is probable that it will be a reality in a technical meaning in the future. Nobody can say if and when it will be ready for the market. More important in the near future is the shrinking size and price for the smallest hardware entities, circuits and chips. That makes it possible to manufacture e.g. sensors in big volumes for low prices. Merging IT with sensor technology is a driving factor behind internet of things.

Big data

One of the most discussed topics in IT is the concept of “big data”. In general, it means colossal collections of data from which you can “mine”, the expression is “data mining”, derive and present meaningful descriptions and conclusions. The basis for this is the remarkable development of memory technology. It is not only a question of storing capacity on physical memories. It is to an even greater extent a result of falling costs. Big data can give new and more precise knowledge. One well known application is Gapfinder, Hans Roslings use of big data to map health problems and development around the world. Another example is the world leading company in the GIS, Geographical Information Systems, market, Esri, that combines it’s GIS technology with big data. The purpose is to give users access to information connected to the geographical data. It has already been used in e.g. disaster management, community planning and crime combating. Yet the most well-known examples are found in retail business. Large companies like Walmart, JC Penney, Tesco and ICA collect data from their customers and use them for internal and external purposes.

The examples have a common denominator, merging big data and one or several technologies and/or application areas. This is what Facebook, Google and others dealing with social media develop, to reach an ever greater picture of their user groups.

It seems that the return on investment using big data is growing. One obstacle in the way forward is the lack of standards. If data should be accessible and understood beyond borders of companies, hospitals or whatever they must have a standardized meaning.

Artificial Intelligence

Advances in AI technology have opened up new markets and new opportunities. In recent years, machines have surpassed humans in the performance of certain specific tasks. Experts forecast that rapid progress in the field of specialized artificial intelligence will continue. Although it is very unlikely that machines will exhibit broadly-applicable intelligence comparable to or exceeding that of humans in the next 20 years, it is to be expected that machines will reach and exceed human performance on more and more tasks

AI has the potential to help address some of the biggest challenges that society faces. Smart vehicles may save hundreds of thousands of lives every year worldwide, and increase mobility for the elderly and those with disabilities. Smart buildings may save energy and reduce carbon emissions. Precision medicine may extend life and increase quality of life. Smarter government may serve citizens more quickly and precisely, better protect those at risk, and save money. AI-enhanced education may help teachers give every child an education that opens doors to a secure and fulfilling life. These are just a few of the potential benefits if the technology is developed with an eye to its benefits and with careful consideration of its risks and challenges.

AI's central economic effect in the short term will be the automation of tasks that could not be automated before. This will likely increase productivity, but it may also affect particular types of jobs in different ways, reducing demand for certain skills that can be automated while increasing demand for other skills that are complementary to AI. The negative effect of automation will be greatest on lower-wage jobs, and that there is a risk that AI-driven automation will increase the wage gap between less-educated and more-educated workers, potentially increasing economic inequality. Public policy can address these risks, ensuring that workers are retrained and able to succeed in occupations that are complementary to, rather than competing with, automation. Public policy can also ensure that the economic benefits created by AI are shared broadly, and assure that AI responsibly ushers in a new age in the global economy.

The current wave of progress and enthusiasm for AI began around 2010, driven by three factors that built upon each other. The availability of big data from sources including e-commerce, businesses, social media, science, and government, which provided raw material for dramatically improved machine learning approaches and algorithms, which in turn relied on the capabilities of more powerful computers. During this period, the pace of improvement surprised AI experts. For example, on a popular image recognition challenge that has a 5% human error rate according to one error measure, the best AI result improved from a 26% error rate in 2011 to 3,5% in 2015.

Simultaneously, industry has been increasing its investment in AI. In 2016, Google Chief Executive Officer, CEO, Sundar Pichai said, "Machine learning, a subfield of AI, is a core, transformative way by which we're rethinking how we're doing everything. We are thoughtfully applying it across all our products, be it search, ads, YouTube, or Play. And we're in early days, but you will see us, in a systematic way, apply machine learning in all these areas." This view of AI broadly impacting how software is created and delivered was widely shared by CEOs in the technology industry, including Ginni Rometty of IBM, who has said that her organization is betting the company on AI.

There is no single definition of AI that is universally accepted by practitioners. Some define AI loosely as a computerized system that exhibits behavior that is commonly thought of as requiring intelligence. Others define AI as a system capable of rationally solving complex problems or taking appropriate actions to achieve its goals in whatever real world circumstances it encounters.

Remarkable progress has been made on what is known as Narrow AI, which addresses specific application areas such as playing strategic games, language translation, self-driving vehicles, and image recognition. Narrow AI underpins many commercial services such as trip planning, shopper recommendation systems, and ad targeting, and is finding important applications in medical diagnosis, education, and scientific research.

General AI, sometimes called Artificial General Intelligence, or AGI, refers to a notional future AI system that exhibits apparently intelligent behavior at least as advanced as a person across the full range of cognitive tasks. A broad chasm seems to separate today's Narrow AI from the much more difficult challenge of General AI. Attempts to reach General AI by expanding Narrow AI solutions have made little headway over many decades of research.

Machine learning is one of the most important technical approaches to AI and the basis of many recent advances and commercial applications of AI. Modern machine learning is a statistical process that starts with a body of data and tries to derive a rule or procedure that explains the data or can predict future data. This approach, learning from data, contrasts with the older expert system approach to AI, in which programmers sit down with human domain experts to

learn the rules and criteria used to make decisions, and translate those rules into software code. An expert system aims to emulate the principles used by human experts, whereas machine learning relies on statistical methods to find a decision procedure that works well in practice. In a sense, machine learning is not an algorithm for solving a specific problem, but rather a more general approach to finding solutions for many different problems, given data about them.

In recent years, some of the most impressive advancements in machine learning have been in the subfield of deep learning, also known as deep network learning. Deep learning uses structures loosely inspired by the human brain, consisting of a set of units, or neurons. Each unit combines a set of input values to produce an output value, which in turn is passed on to other neurons downstream. New theories of how to construct and train deep networks have emerged, as have larger, faster computer systems, enabling the use of much larger deep learning networks. The dramatic success of these very large networks at many machine learning tasks has come as a surprise to some experts, and is the main cause of the current wave of enthusiasm for machine learning among AI researchers and practitioners.

AI is often applied to systems that can control physical actuators or trigger online actions. When AI comes into contact with the everyday world, issues of autonomy, automation, and human-machine teaming arise.

Autonomy refers to the ability of a system to operate and adapt to changing circumstances with reduced or without human control. For example, an autonomous car could drive itself to its destination. Despite the focus in much of the literature on cars and aircraft, autonomy is a much broader concept that includes scenarios such as automated financial trading and automated content curation systems. Autonomy also includes systems that can diagnose and repair faults in their own operation, such as identifying and fixing security vulnerabilities.

Automation occurs when a machine does work that might previously have been done by a person. The term relates to both physical work and mental or cognitive work that might be replaced by AI. Automation, and its impact on employment, have been significant social and economic phenomena since at least the Industrial Revolution. It is widely accepted that AI will automate some jobs, but there is more debate about whether this is just the next chapter in the history of automation or whether AI will affect the economy differently than past waves of automation have previously.

In contrast to automation, where a machine substitutes for human work, in some cases a machine will complement human work. This may happen as a side-effect of AI development, or a system might be developed specifically with the goal of creating a human-machine team. Systems that aim to complement human cognitive capabilities are sometimes referred to as intelligence augmentation.

In many applications, a human-machine team can be more effective than either one alone, using the strengths of one to compensate for the weaknesses of the other. One example is in radiology. In one recent study, given images of lymph node cells, and asked to determine whether or not the cells contained cancer, an AI-based approach had a 7,5% error rate, where a human pathologist had a 3,5% error rate. A combined approach, using both AI and human input, lowered the error rate to 0,5%.

AI have already begun reaping major benefits for the public in fields as diverse as health care, transportation, the environment, criminal justice, and economic inclusion. In transportation, AI-enabled smarter traffic management applications are reducing wait times, energy use, and emissions. Autonomous sailboats and watercraft are already patrolling the oceans. Digital tutor and education is another promising AI field.

The application of AI to vehicles and aircraft has captured the public imagination. Today's new cars have AI-based driver assist features like self-parking and advanced cruise controls that keep a car in its lane and adjust speed based on surrounding vehicles. Experimental fully automated cars monitored by humans can already be seen driving on the roads. The consensus of experts is that automated surface vehicle technology will eventually be safer than human drivers and may someday prevent most of the fatalities that occur annually on roads.

Automated vehicles also offer the possibility of greater mobility for the elderly and people with disabilities who may not be able to drive. First- and last-mile access to transit and other novel transportation approaches may provide communities isolated from essential services such as jobs, health care, and groceries unprecedented access to opportunity. A well-designed system of automated vehicles able to predict and avoid collisions may also significantly reduce transportation-related emissions and energy consumption.

Moving to the air, unmanned aerial systems or drones are already a commercial application of AI. This industry will have a tremendous growth the years to come and create many jobs over the next 10 years.

Applying techniques of AI in such safety-critical environments as vehicles and air raises several challenges. First among these is the need to translate human responsibilities while driving or flying into software. Unlike in some other successful applications of Narrow AI, there are no concise descriptions for the task of operating ground or air vehicles. Each of these operations is multifaceted, with responsibilities including guiding the vehicle, detecting and avoiding obstacles, and handing mechanical failures such as flat tires. While subtasks such as navigation or certain types of perception may align with certain existing Narrow AI solutions, the integration and prioritization of these tasks may not. It may seem straightforward to simply obey all traffic laws, but a skilled human driver may cross a double-yellow road boundary to avoid an accident or move past a double-parked vehicle. Though such situations may be rare, they cannot be ignored, simple arithmetic dictates that in order for failures to occur at least as infrequently as they do with human drivers, a system must handle many such rare cases without failure. The challenge is how to develop a data set that includes enough of the rare cases that contribute to the risk of an accident. The lack of consistently reported incident or near-miss data increases the number of miles or hours of operation necessary to establish system safety, presenting an obstacle to certain AI approaches that require extensive testing for validation.

A line of research in the AI field is to survey expert judgments over time. As one example, a survey of AI researchers found that 80% of respondents believed that human-level General AI will eventually be achieved, and 50% believed it is at least 50% likely to be achieved by the year 2040. Most respondents also believed that General AI will eventually surpass humans in general intelligence.

A major challenge in safety and control is building systems that can safely transition from the closed world of the laboratory into the outside open world, where unpredictable things can happen. In the open world, a system is likely to encounter objects and situations that were not anticipated when it was designed and built. Adapting gracefully to unforeseen situations is difficult yet necessary for safe operation.

AI's central economic effect in the short term will be the automation of tasks that could not be automated before. Like past waves of innovation, AI will create both benefits and costs. The primary benefit of previous waves of automation has been productivity growth, today's wave of automation is no different. For example, a 2015 study of robots in 17 countries found that they added an estimated 0.4 percentage point on average to those countries' annual GDP growth between 1993 and 2007, accounting for just over 10% of those countries' overall GDP growth during that time. One important concern arising from prior waves of automation, however, is the potential impact on certain types of jobs and sectors, and the resulting impacts on income inequality

The rapid growth of AI has dramatically increased the need for people with relevant skills to support and advance the field. The AI workforce includes AI researchers who drive fundamental advances in AI, a larger number of specialists who refine AI methods for specific applications, and a much larger number of users who operate those applications in specific settings.

Computer science is a basic skill necessary for economic opportunity and social mobility. An AI-enabled world demands a data-literate citizen that is able to read, use, interpret, and communicate about data, and participate in policy debates about matters affected by AI. Data science education as early as in elementary school can help to improve nationwide data literacy, while also preparing students for more advanced data science concepts and coursework after high school. Integrating AI, data science, and related fields throughout the education system is essential to developing a workforce that can address the applications. Educational institutions must establish and growing AI programs at all levels.

Networks

Internet of things, IoT, combined with a rising use of internet around the world put pressure on the construction of network capacity. One example is the number of addresses you can handle. When Internet was introduced in the open market during the 1980s the protocol, IPV4, permitted maximum 2^{32}, ca 4,29 billion, addresses judged as a level you would never exceed. Already in the 1990s this began to look wrong. Today a new protocol is launched with 2^{128} possible addresses. It is a huge number that probably will last for many years from now. It is necessary when the communicators in the network are not limited to terminals, computers, pads, mobile phones and so on, in the hands of human beings. In the future lots of devices, often very small, will communicate directly with other devices, computers and sometimes with humans. The enormous amounts of transactions in the networks will also demand higher speed.

Physical links are built with fibers with broadband capacity. New technologies are tried for wireless communication. One example is Light fidelity, LiFi, with potential to replace WiFi with speed ten times more. It is even easier to protect from non-permitted listening. Still there is some development to do to sink installation costs and improve reliability. Satellites and the coming 5G will also have place in an integrated network system.

Internet of things
Every large company in IT business work with IoT. The idea is that devices of different kinds communicate and control some sort of action. It is not a new idea. Already in the 1980's there were seminars and development projects discussing "intelligent homes". E.g. your car could tell your garage door that you were close to your house and would drive into the garage and it would open automatically. Even today most real examples come from cars interacting with something else e.g. the road you are driving on. Nanotechnology and the development of sensor technology could mean a vast spread of the idea. When things can talk to each other the limits of automation disappear. It will be normal to have full control of goods and products in every step of the manufacturing chain. Already companies like Atlas Copco put electronic equipment and sensors in their industrial products. Completely unmanned factories seem to be possible, 99 % secure traffic even so. Health care can leap to a higher level by controlling your body standard every second. There might be some questions of privacy but in the light of survival it seems to weigh light. Still, the most common applications will be unseen by human eyes. They will be parts of all kinds of products and send data to the suppliers and manufacturers continuously. They will have monitoring systems watching what is going on and use the information to support sales, repairs, demand forecasting and so on. Nothing of this is science fiction. IoT will be a component in our future lives. How much remains to see.

Fraud and integrity
A growing concern when digital technologies penetrates societies is security. Fraud and threatened privacy are common subjects in conferences and among decision makers. Swedish television news reported in November 2016 that computer fraud in Great Britain had a bigger turnover than other crime together. Even with insecure statistics in that area it is enough to conclude that it is a problem. Privacy is threatened from several directions. Integrated IT-systems make it possible to find out a lot from everyone. Personal data might be used by criminals but also authorities, businesses and ordinary people. Much noise is heard around the large companies in social media especially Facebook and Google. Their information stores are attractive for all kinds of commercial use. Other industries as insurance is interested to reach information about individual's health status. The war on terrorism has lowered the thresholds for police and military to get access to personal data.

It is not an audacious suspicion that security issues will need continuous and growing attention. The protection models used so far as pin codes, encryption, firewalls, security devices and so on has not shown to be good enough. New technologies are tried like Blockchain. It is a distributed database concept developed to handle Bitcoin, the digital currency. Blockchain has a structure and built-in security measures on a higher level than ordinary data base systems. Others have noted the opportunity to improve security. At a conference on e-health in Sweden one speaker talked about the needs for standards and security when handling patient's journals and in general information about patients.

Vulnerability
It exists a conflict between efficiency and security. So far, the race for efficiency has had highest priority. Security has been applied after incidents and fraud has been discovered. The highly connected society we can see growing in front of us demand a change. The rising vulnerability risks calls for a more intentional attention on the issues. IoT will make it possible to attack systems important for society using "neutral" devices. Probably we look forward at an ever ongoing fight between those who want to hurt sensible systems and the defenders. It also widens the security business sector with software development and education as the most obvious topics. Cyber warfare is already a discussion worldwide. For companies, information thefts are a growing concern. One conclusion is that protection should not only be a separate knowledge area but an integrated and sophisticated part in all kinds of IT-systems.

Transport Technologies

Some general trends will have a strong impact on different kinds of transportation. The most obvious is the urbanization. The development of thriving cities seems to go in a direction ending up with some megacities, a larger set of medium-sized big cities, local administrative cities and wide sparsely populated area covering most of the territories. Megacities in Europe might be London, Paris, Istanbul, Moscow and S:t Petersburg. Examples of medium-sized in Scandinavia are Stockholm, Copenhagen and Oslo. In Europe, most capitals are in this category. Local administrative cities are e.g. Karlstad and Örebro. The picture is probably simplified and built on an idea of stability and extrapolation

of the trends of today. A red flag should be risen for the impacts of global warming and other environment disturbances. Consequences like huge amounts of climate refugees, conflicts over water resources and shrinking food supplies in certain areas could dramatically change current patterns.

Anyway, if the running trends hold over the coming decades we will see a big rise in different kinds of transportation. People will travel between the cities and there will be an enormous need for moving goods, not the least food and waste.

The total transport work in Sweden for car, bus, train and air in passenger kilometers is expected to increase by 29% by 2030. The total mileage for the Swedish national road haulage is expected to increase by 52%.

The development of the society means that a key objective in the development of the transport systems is to provide coherent and functional labor market regions, which is also reflected in the national plans, which aim among others is to create larger working areas. Large cities need of specialized staff expects to lead to commuting over longer distances. The focus is to develop rail routes that have the potential to attract profitable commercial traffic between metropolitan areas and major cities.

Trafikverket´s overall view is that investment in transport systems should be implemented when the economic revenues exceed the economic costs, which appears to be a good principle. It is almost impossible, however, to determine what these revenues and expenses are and by what time perspective.

Trafikverket´s own conclusion regarding the economic calculations is that several effects are not calculable, but must be described in another way. These include agglomeration effects, more hours worked, higher average wage and underestimating the value of shorter travel time. As for metropolitan projects, one notes that the overall objectives in most cases include the impact, which is not quantifiable and therefore not included in the calculation. Several studies indicate a weak correlation between profitability on the society level and the investments carried out.

New technologies are evolving and will have impact on the transport systems and the users. Two examples are automated vehicles and trucks, which are connected as trains are to electric wires above the road. Other examples are trains, which are driving on other ways than traditional railways

Train and Railway
Over 60 countries in the world have invested in high speed railways and in a further large number of countries, it is planned for the high speed on separate paths. Japan inaugurated the first high speed railway already in 1963. In Europe, France is in the lead in Europe when it comes to high speed trains, which has almost completely replaced domestic flights.

Technology development has accelerated both in rail and vehicle construction. The speeds have risen and shortened the travel times. High-speed trains, over 300 kilometers per hour have become commonplace in many European countries, and not least in China. The Chinese have taken the lead in development and are building high-speed railways in several places around the world. Spectacular plans are available for rail over very long distances e.g. Shanghai-St. Petersburg.

High speed trains are today travel time competitive against air travel at distances up to about 800 kilometers. This is one important reason, why major airports are pushing development of high speed railways. It creates greater uptake areas. The EU prioritizes the expansion of high speed railways to provide more environmentally friendly transportation and has decided that major airports shall be served by high speed trains. With high speed train between Oslo and Stockholm, Värmland travelers reach Oslo Gardermoen and Stockholm Arlanda convenient and in desirable short time.

The above high speed trains are state of the art technologies. The long-term perspective of PGS means that new technologies that may emerge are highly interesting. Two such technologies are Maglev, magnetic levitation, and Hyperloop.

The advantages of Maglev are primarily that the trains become lighter because they do not have rolling stock in the form of wheels and shoulders and can travel at higher speeds than conventional trains. The wear is lower when the

train "floats" on a magnetic bed without contact with surrounding material. The technology development in the electronic equipment has gone fast and Maglev is competitive in comparison with standard high-speed trains. Maglev is in operation in China, Japan and Germany. Japan intends to invest heavily in the technology, while others hesitate. In Sweden, more debaters advocate an initiative on Maglev.

The Hyperloop idea is launched by the Tesla entrepreneur Elon Musk. The concept is a capsule that tears along in a pipe, where the air friction is low. The capsule floats on a magnetic field and the speed will be 1200 kilometer per hour. So far, the technology is in the stage of a first workable solution.

Dubai was 2016 the first region to move forward with hyperloop testing. In 2017 Finland seems to be following suit in colder climates. Last year, the dream of a hyperloop-connected Nordic super-region inched forward as FS Links, an Åland-based development company, formed a task force to study the feasibility and price of ultrafast connection between Sweden and Finland. Joint conclusions came back positive, and Ramböll, an engineering consultancy involved, moved forward to explore a permanent connection between Helsinki and Turku, Finland's fifth largest city, with a stopover in Salo. Ramböll is now moving forward to explore a hyperloop test section that would run from Salo towards Turku.

Car and Road
The tremendous development of computer hardware, big data, artificial intelligence are the enablers of automated vehicles, AV, and today, we experience a fierce race from a broad range of actors to get strong footholds in a promising technology and a huge expected market.

All the automakers, and new ones as Tesla, as well as Google, Apple, Uber, and many other companies are ply the field. No one cares about the cars, but by developing the software, sensors, services, such as mapping, and the passenger interface, since there won´t be drivers, to make the package work. Huge amounts of money are flowing into it, and there will be delays, setbacks, and gruesome accidents, but already today automated vehicles are tested on the roads. When it comes to the automakers, General Motors and Ford are considered to lead the development. They say that AV´s will be launched on the market a few years after 2020. Most observers think that a fully autonomous vehicle, one that is completely safe for use in residential areas, where vehicles contend with pedestrians and children playing, won't be a reality until 2025 at the earliest.

Uber says, they will change their business from a network of private car drivers to a fleet of AV´s without drivers.

No one is going to switch to fully autonomous cars and trucks next year. This will take some time. But given the amount of resources pouring into it, it won't take all that much time. A few years perhaps before the first significant numbers are starting to crop up. Then what? What is happening in the commercial sector will be a mini-version of the industrial revolution, doing away with the professional drivers.

One forecast says, that private car ownership will drop 80% by 2030 in the USA. The number of passenger vehicles on American roads will go from 247 million in 2020 to 44 million in 2030. Using AV´s will be 4 to 10 times cheaper per mile than buying a new car by 2021.

The AV´s and new ways of transporting humans and goods in urban areas, we will get new opportunities when it comes to city planning. Fewer cars will travel more miles by 2030, because AV´s may never need to park. On average, cars are parked most of the time. When AV´s would drop off passengers, they would keep going to pick up new passengers, which would open up vast tracts of land for new uses, like wider sidewalks and more housing, parks, and zones where cars are banned. Some cities in USA are already preparing for this future. San Francisco, for example, has turned a number of parking spaces into "parklets," small grassy public spaces that include benches, plants, and artworks. Pittsburgh has also said it will likely stop building more street lanes within the next two decades, in anticipation of a wider adoption of driverless vehicles.

Other Technologies
Technologies within materials and energy are other areas which are developing rapidly and are of importance. Combinations of technologies can disrupt industrial sectors that seem relatively stable. At the same time, they also create development opportunities for offensive innovators and entrepreneurs

Nanotechnology
In 1959 Richard Feynman gave a famous speech ending in the slogan “there is plenty of room at the bottom”. He meant that scientists and technicians should not be satisfied until they could manipulate matter in its smallest scale. The subject of nanotechnology was born. As there were no tools available for the purpose yet scientists had to wait some years before they could start the journey in real life. 1981 the scanning tunneling microscope was invented by two researchers Gerd Binnig and Heinrich Rohrer at the IBM laboratories. It made manipulation of atoms possible. Since then development has run fast. Nanotech is used on everyday basis in industries as cosmetics and huge efforts are made in other areas. In 2007 Alex Zettl and his colleagues presented a radio built of one nanotube. Sensors are developed for all kinds of applications from “intelligent roads” to health control. 2016 the Nobel prize in chemistry was given to researchers who had succeeded to build molecular machinery showing that most visions are within reach. Electronics and medicine are among the areas which nanotech is forecasted to revolutionize. Professor Maria Strömme at Uppsala university predicts that nanotech will influence every thinkable area where nature is involved like green technologies, materials, electronics, biomedicine and so on. The most visionary thinkers mean that we are at the edge of the next industrial revolution maybe as great as the information technology.

Materials
According to several future thinkers, development of new materials will be the most revolutionary technology of all. In the same time, it is a highly promising area concerning environmental issues like reducing CO_2-emissions, transforming energy from heat and waste to electricity and open new ways toward a circular economy. The scientific breaktroughs behind the optimism are fairly new and the technologies following in its childhood. A few examples are described here.

High-throughput computational materials design, HTCMD, is a new technique enabled by merging super-computing, quantum mechanics and materials chemistry. The extremely complex mathematical equations of quantum mechanics cannot be solved without the help from super-computers. Computers today have the needed capacity. That makes it possible to go through thousands of different compounds both real and theoretical and reveal their properties. One way of using HTCMD is to specify some criteria you want in a material and then try to find a materials composition that matches them. This has been done before by laborious trial and error in chemical research laboratories and taken huge amounts of work and long-time not always with a happy end. HTCMD makes the process much shorter and open possibilities to design materials never known before. Research in this area give promises of a fundamental revolution in materials design with results hard to embrace.

Graphene is looked at as a miraculous material with lots of applications. Researchers at the University of Manchester focus on energy, membranes, composites and coatings, biomedical, sensors and electronics. Only in energy the savings might be astonishing as graphene is ultra-light, strong and a dream for everybody outside some mineral industries.

Plastics have grown to be a highly discussed issue in light of sustainability. The advantageous properties of plastics materials, due to its useful flexibility and manufactural economy have made them superior to a lot of other materials in many applications. Environmental problems with plastics have got a growing attention over the years. Especially the “plastics islands” floating in the oceans have made the public aware of the negative side. Today huge investments are made in research to find solutions. Renewable plastics i.e. those who can be used over and over again have been focused a long time. In another area, biodegradable plastics are launched in the markets in ever greater volumes. Experiments with microbes able to eat plastic waste is another branch of development. The results are difficult to forecast but the technologies will probably develop fast in the future as sustainability becoming more and more important.

Manufacturing
The industry has been at the forefront of technology development in all areas for natural reasons. Automation is a password for growth and profitability. IT and materials technology unquestionably point to new possibilities. Today, the press from environmental and climate issues also plays a major role and forcing new solutions to old problems. A spectacular technique that has gone from the laboratory to practice is 3D printing.

3D printing, or additive manufacturing, can be seen as a further development of CAD/CAM, which has long been normal in the engineering industry. 3D means that the product is manufactured in its entirety in a kind of "printer". Not only smaller products e.g. components of machines can be obtained in this way. Tests have been made with entire

houses, which can go from drawing to finish on hours or days depending on complexity. So far, the technology is best suited for single-piece or short series products.

If the technology will revolutionize the manufacturing industry or stay as an effective addition to the current one remains to be seen. However, experience points to the fact that processes based on electronics and IT become cheaper afterwards, which indicates that the changes can be profound. One forecast says that 3D printers will outnumber humans in most modern factories in 2033

Energy technologies
Energy supply is the basis for all human activities. The negative consequences of today's environment and climate system have become increasingly evident. It is thus consequent that large resources are allocated to research and development in that sector. Investments in alternative energies are growing in a hurry. Technical advances mainly on solar technology have been remarkable and pushed prices to more competitive levels. Land-based wind power can be considered a mature technology, although storage issues have many quarreling issues. Generally, the energy sector shows an increasingly diversified pattern, where it is hard to predict if a few alternatives will dominate in the future.

In the more innovative areas, there are many ideas about how energy can be used more environmentally and cost-effectively. One example is the idea of using the energy generated between car and road or even pedestrians towards the street. Waste heat and reuse of all kinds of waste are other areas in focus. Circular economy is based on waste that includes waste heat, which can be used to reduce the pressure on the environment and the climate. The question is not whether it goes, but if the development is going fast enough.

Smart grid is a collective term for more efficient energy use. It encompasses the entire field from power electronics and new technology in the transmission grid to new products and services based on information technology, knowledge of energy flow and management opportunities at the users. It is a power grid that cost-effectively is able to integrate the behavior and decision of all producers and consumers to ensure a sustainable power system with low losses and high quality, security of supply and security. This is an example of IoT.

Systems theory
Systems theory may not be judged as a technology. However, it has a great impact on technological development and application. It is a very old subject. Learned readers might go back to Plato and Aristotle to find its roots. System thinking reached a first peak in the 17th century with giants as Leibniz and Newton. Still it wasn't until after World War 2 that it was developed in a strict way. The theory has been extremely successful in describing and analyzing system structures meaning the connections and relations between elements in a defined system. Looking at systems as a whole instead of subsystems as functions or procedures is an established way of working in technological areas. Airplanes, nuclear power plants and computer software are obvious examples. The condition is that the structure is stable when the system is in use. The progress in the more complicated area of dynamics is not as impressing, which recurrent financial crises teaches the hard way. Dynamic systems include different kinds of change during its operational time. If all variables influencing a system could be precisely identified, described and formalized it would be possible to anticipate its behavior and control the outcome. This is not the usual case. Much work is made to improve the situation and more powerful computers are helpful by offering means for advanced simulations. A completely deterministic view of all systems is probably impossible. One approach to get closer is to use chaos theory where it is applicable. Trends of today point at a world growing together with more complexity and bigger systems as a result. There is a need to develop systems theory beyond the limits of today.

4.4 Society
Society is the fundamental backbone and prerequisite for building PGS. It is in the society area we find the cultural conditions, with the highest influence on industrialization and modernization. The evolvement of democracy and values, as well as demography changes and increasing immigration are profound society conditions for PGS.

Democracy
The emergence of parliamentary democratic society over the past hundred years has gradually created a hierarchical and collective governance based on party programs with the welfare society and the welfare citizen as a goal. At the beginning of this community building, citizens were co-creating subjects. Over the years, they slowly changed into

passivity as Robert Putnam states in his book “Bowling Alone. In essence, everything can be subject to rights and community involvement is reduced.

With growing alienation and the establishment of parallel societies, we will get a polarized society. The lack of ability of politicians and authorities to deal with the problems causes the gaps to increase. Ultimately this reduces the trust of citizens, one of the most important characteristics of a society to keep it together. The social sustainability that is expressed in the sense that the citizens feel safe, that society is fair, and that each individual can independently develop, is put to the test

Social sustainability and democracy are affected by social risks in the economy. The household debt ratio increases and Sweden´s banking sector is one of the world's largest in relation to the population. Alienation and parallel societies can lead to growth of the informal economy. The increased life expectancy requires more healthcare. The large refugee reception affects public finances.

How we develop cities are of great importance to democracy and the potential for effecting faster transport and thereby growth through larger labor market regions. Is it too far from the residence to the travel center, we do not achieve the result we want. Cities need to develop proximity and this is also central to a sustainable environment.

The automobile city has been the dominating model for urban development since decades. It is a city where the car takes place at the expense of other uses of the land, such as parks, bicycle and pedestrian areas and cultivation. In an urban area, 20% usually constitute traffic and 20% of this traffic area consists of parking spaces.

The automobile city also disperses the city into sparsely residential areas as well as external shopping centers. The car is a prerequisite for both of these elements in the city. Sparsely populated villages need three times as much asphalt per capita as the densely populated city, and a 10% increase of residential areas rises carbon dioxide emissions by more than 5% per person, and other air pollution by almost 10%. The car's ecological footprint of fuel and material is 800 times its own area of 10 m2. Considering shopping centers, it is interesting to note that in the United States, the home of retail format innovations, 30% of all external shopping centers perform so bad economically, that they are settled in many cases.

Car congestion in the big cities has meant that in Paris, for example, 60% of residents had no car 2016. In 2011, it was 40%. In Munich, there are severe restrictions on parking at the center and the city has introduced this instead of congestion charges. In major cities in the United States, they cover or rive highways, which are being converted to boulevards.

Sparse urban environments have lower productivity due to travel costs and investment costs in infrastructure, and are also a threat to agriculture.

Future urban development is focused on multi-core cities and compact city centers. It's about removing the cars and filling streets, squares and parks with life as well as connecting city districts to each other, which contributes to social sustainability. What attracts people most is other people.

UN Habitat has the opinion that a durable density means at least 150 people per hectare, which corresponds to at least 4 floors buildings. Duplexing of housing density means a reduction in car usage by 20-60%.

There are many examples of this new urban development. One of them is Oslo and the city's encompassing municipalities. The regional planning goals for the Oslo region are first, efficient land use based on the principles of polycentric development and preservation of the overall green structure, and second, a transport system that is efficient, environmentally friendly and with the lowest possible reliance on cars. It will be a densification in many towns and transport nodes.

In transformation and renewal of cities there may be a gentrification by the renovation of residential areas. This means that tenants can´t afford to stay, but move to other areas and are replaced by resourceful groups. At the same time, if the areas are not renovated, there is a risk of deterioration into a slum. Those who can move, while the economically weak remains. In both cases, the result is segregation, which effects social sustainability

The picture of the social development creates need for a social change characterized by co-operative political leadership, which strengthens and extends democracy so that citizens again are co-creating, that society is governed in networks, and that the civil society is much more involved. This transformation will be extremely demanding for politicians. In addition, citizens must acquire insights and knowledge of the changes, necessary to be made. Moreover, their innovation power should be released for local needs, supported by local capital, attracted of innovations, and investments in transport infrastructure are necessary, if the development shall take place. (Hans Abrahamsson, Vår tids stora samhällsomdaning, Sveriges Kommuner och Landsting, 2016)

Several examples illustrate the difficulties of this social change. The international Reclaim the Street movement started in London where the organization, 1991, opposed the development of roads by occupying streets and preventing car traffic. The movement spread rapidly and actions occurred throughout Europe as well as in Australia and the United States. Eventually, the movement became increasingly militant and marginalized. There have been other, less confrontational movements taking place and affecting public space. The phenomenon is called Do It Yourself Urbanism or Tactical Urbanism. Groups are initiating projects to make the city room a more social and meaningful place to stay. One challenges the urban systems by creating change by finding holes and openings in the systems. San Francisco adopted a law that people should not sit or lie on the sidewalks. The DoTank group put out chairs. Some places became so popular that they were permanent. In Stockholm, Happy Sweden requested that chairs in a parking lot should be held for three hours. This initiative was encountered by a large number of license tests and measures, which would ultimately cost SEK 9,000 and have taken 3 months to process. Happy Sweden solved it all by placing the chairs on wagons and pay parking fees.

Values

The way in which we choose to act is governed by our values. The ability of Sweden and Karlstad Region to develop is therefore determined by the overall driving force of individuals´ values. What society does Sweden's population want to live in? And what values do the Swedes consider permeating the society we live in today?

Our values, beliefs and behaviors describe what is important to us, where we have our energy and where our focus is. The values are partly the ones in the present and partly what we wish for, as well as either positive or limiting. The latter arise from fear and concern and contribute to counterproductive behaviors. Energy leakage is how much energy is used for counter-productive behavior and describes the level of frustration, friction and conflict.

A strategy for the Karlstad Region can never achieve results if it works in the headwinds of the values. Success requires short-term adjustment to values in the present and long-term change towards desirable values.

Values change in the long term and in line with new generations, but also short-term of the current social climate. When we are safe, it is reflected in the values and when we feel threatened, our focus changes in the values.

The following values are taken from Sverigestudien 2016, which is a cooperation between Sveriges Kommuner och Landsting, and the companies Volvo and Preera.

The personal values are those that change at least from year to year. Care about the family is the most important value and health has become increasingly important in personal values across all age groups. It has become more important to devote us to ourselves and the family, rather than based on our environment, other people and their needs. In the personal values, there is no greater social commitment. In comparison with other countries, Swedes are the only ones who have economic stability as personal value. Ambition and creativity are important in the age group below 21 years and less important in the age group 21-30 years. Thereafter these values disappear, while family become the center. Important issue is, what is required of workplaces and leadership in order to keep up with young people's ambition and creativity?

New companies establish faster than ever as market leaders and expel established companies. Industries that have not previously existed occur in a short period of time. This demands constant change and development of organizations and companies. In times of concern and insecurity, people join closer to their inner circle. Preserving organizational stability becomes a way to deal with external concern. What does this mean for our organizations and for Sweden in the longer term? What does this mean for the society we want to create? Are we ready for the changes that need to be implemented as a result of globalization, digitalization and the need for sustainable solutions?

Year 2016 shows a Sweden where fear-driven values increase. An increasing number of people choose negatively charged words to describe what values they consider characterize the community and the municipalities they live in. Words like hatred and violence increase in the description of Sweden, as well as maintain law and order.

Valuations at the national level are dominated by energy leakage. There is a weakening of confidence in society and general decline in the confidence of the political parties. Terrorism is chosen by more than 10% to describe the current climate in Sweden. There is concern about the challenges and problems that increased immigration bring.

As regards the desired values at the national level, women choose more and more sustainability and relation oriented values, such as protection of nature, care for elderly and human rights, while men choose to a greater extent values with structural emphasis such as economic stability, democratic processes and law enforcement. The values with the greatest difference between current and desired are jobs, responsibility for future generations and economic stability.

The present, constructive, open and courageous leadership is today, according to the survey, needed more than ever, which makes us feel a great need for collective, positive and focused forces at national and municipal level.

Regarding the values at the municipal level, Sweden's residents want to be involved and have influence on matters related to them personally, where the municipality has the role of service actor, and in the local community, where the municipality has the role of democracy actor. But how do the municipalities live up to this? Highest on the wish list, as always, are the values of jobs, financial stability and responsibility for future generations. Citizens also, as before, raise a wish for democratic processes, citizen influence and trustworthy service. However, the municipalities do not seem to fully live up to the role of service and democracy actors. Bureaucracy has since the first measurement been found among the values most respondents chose to describe the current situation. Bureaucracy is found at the top of the list.

Several other studies show the importance of a perspective shift from authority perspective to customer focus at the municipalities. A customer focus that also includes co-creation. This means completely new demands on the municipalities and actually dare to invite their citizens.

A trend that prevails at municipal level is that environmental awareness and protection of nature corresponds between the current and desired culture. The values at the municipal level that have the greatest difference between current and desired are jobs, responsibility for future generations, and financial stability. It is exactly the same as at national level

Energy leakage is lower at municipal level compared to national level, but still significant. But the biggest difference is that at national level energy leakage is more extreme fearsome. The big question is whether we will see a similar development at the municipal level in the future? The trend has previously been that something is first reflected at national level and the following year at the municipal level. The big challenge is how to avoid the trends that we see at the national level being spread at the municipal level. How can we make use of the existing desire to be involved and co-creating at municipal level to build the desired society?

Demography

According to the latest population forecast, Sweden's population will increase by 22.5% by 2050, from 10.1 million to 12.4 million. The proportion of the age group 65- is expected to increase from 19.8% to 23.2%, figure 4.1, and age group 85- from 2.6% to 4.8%, figure 4.2

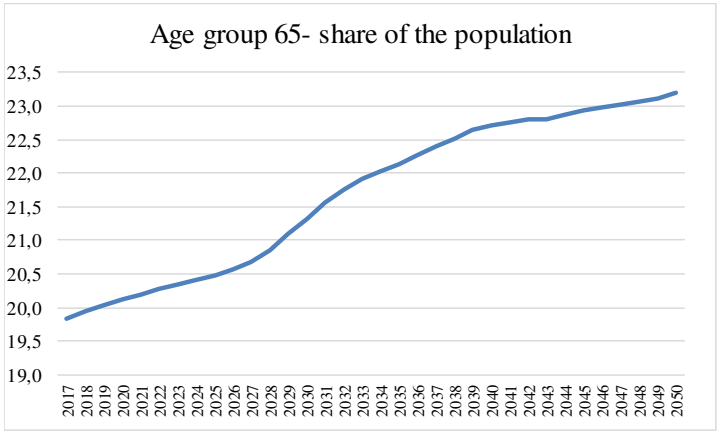


Figure 4.1. Age group 65- share of the population (SCB, 2017)

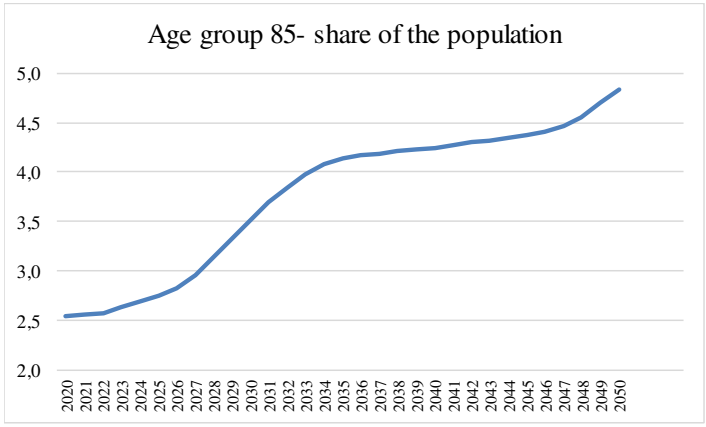


Figure 4.2. Age group 85- share of the population (SCB 2017)

The increase of older age groups is a very positive trend, as a result of increased life expectancy. When you reach 65 you can statistically expect 13 healthy years. These years, and that we grow older, opens business opportunities in the service and care sectors and that creates growth.

Immigration

By the turn of the millennium, the forecast was a total net immigration between 2000 and 2015 of 240,000, which in reality became 750,000. The majority of these are in the age group 15-39 years, which means that immigration has affected the Swedish age structure along with high birth rates in the late 1980s.

The very large asylum immigration demands the nation and the municipalities to bring about opportunities for immigrants to find productive employment strengthening Sweden's GDP. Finding homes in an already strained situation is another challenge. The requirement for immigrants is that they accept the laws and values of Swedish society. All this is a huge work and must be an essential feature of PGS in order to claim prosperity and growth.

Figures 4.3 and 4.4 present the proportion of foreign born 2015 and the change in the proportion from 1995 to 2015. In this respect, the challenges are less in Karlstad Region than in many other regions. In 2006, there were 156 areas of alienation, which had increased to 186 in 2012. Of these, the police authority defined 53 as vulnerable areas. None of these are found in Karlstad and Värmland. In Växjö, Araby is such an area. North of the city Gävle, there is no vulnerable area.

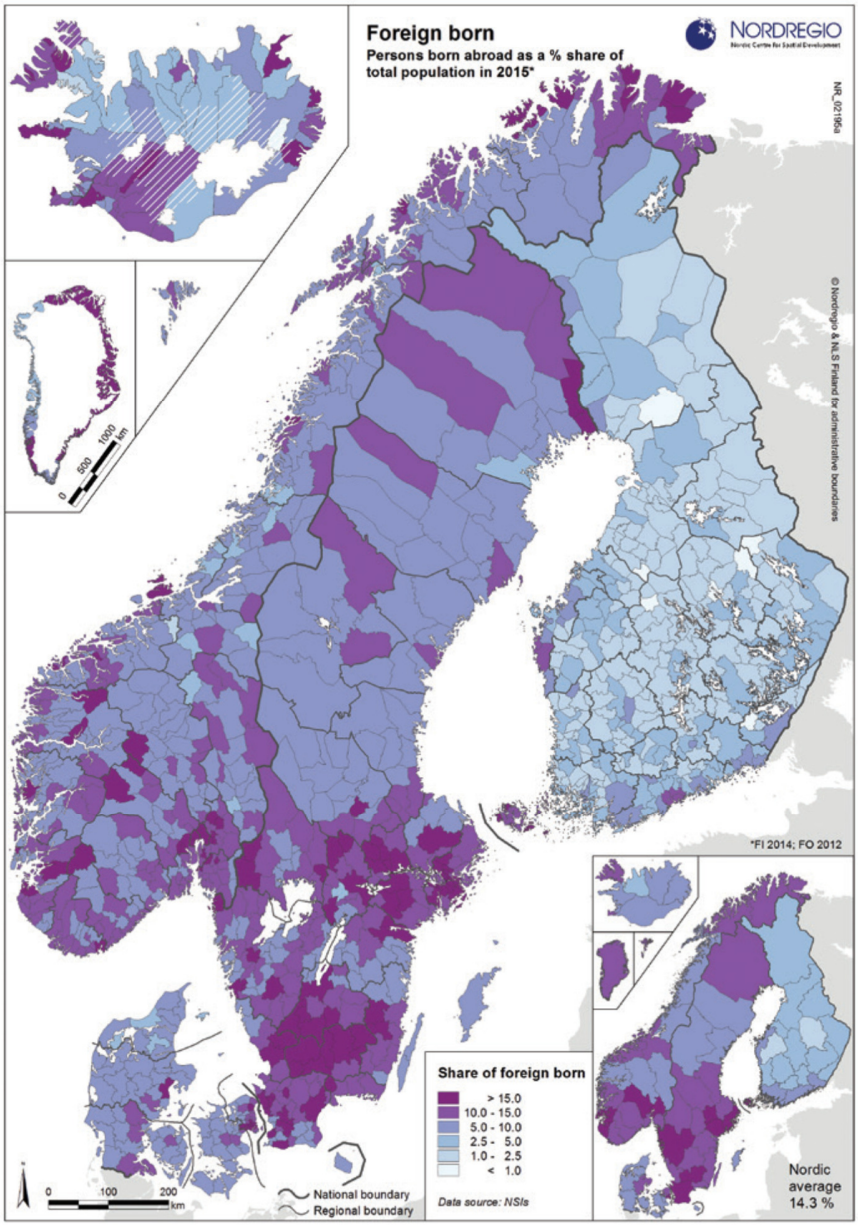


Figure 4.3: Share of foreign born 2015 (Nordregio 2016)

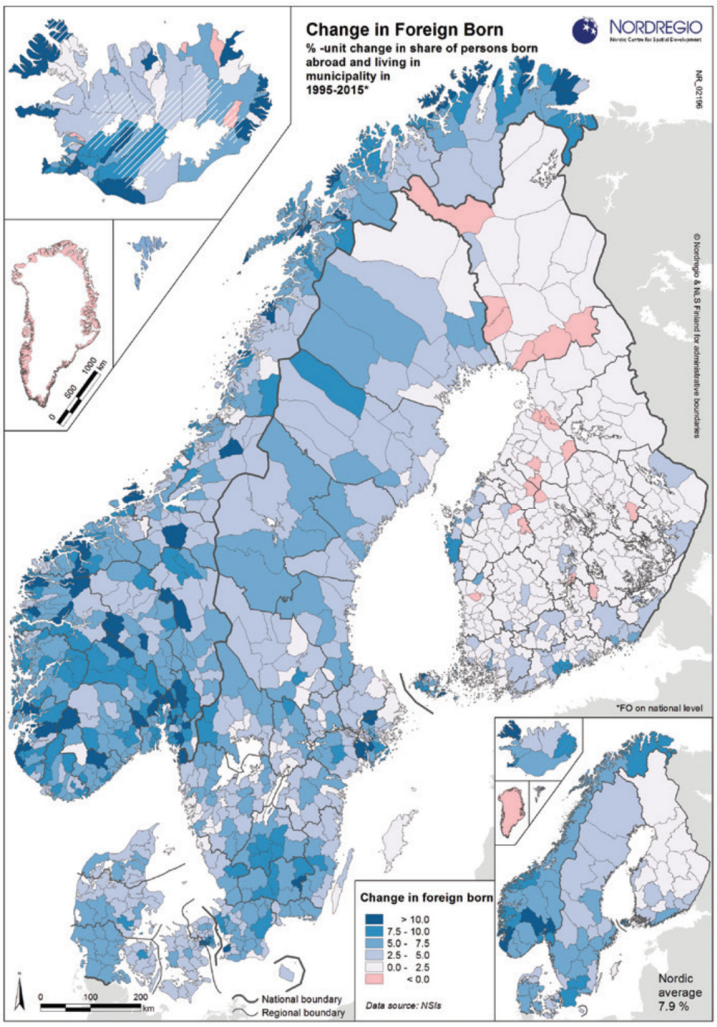


Figure 4.4: Change of foreign born 1995 – 2015 (Nordregio 2016)

By 2015, the share of foreign born had increased to 17% from 12% in 2002. This percent foreign born is higher than in the United States, a traditional immigration country. The share of people born in Sweden with two parents born in Sweden declined to just 70% of the population from 79% in 2002. Second generation immigrants increased to 5,2% of the total population from 3,4% in 2002. The increase in the second generation is most telling when focusing on school age children. Among children ages 0 to 14, second generation immigrants increased from 9% to 14% of the population causing adjustments in the school system, with more attention on this group

Experience from 1945 to the end of the 1990s shows that economic growth is increasing when a large proportion of the population is in working age, but falls as the proportion of children and the elderly increases. It is extremely doubtful to use these experiences for forecasts in the current situation. During the second half of the 1940s, birth rates were very high. Economic growth after World War II and during the war in Korea was very high, and to Sweden many immigrant workers came from Finland and Italy. Manufacturing industry went uphill. Now, the increase of working age people is dominated by overseas asylum immigrants. Most of them are low-educated, while the labor market requires much more and specialized education. A complicating factor is the value gap shown in the studies made by "World values survey". They clarify why integration in many cases is a giant step taking a long time to manage.

The fact that previous experiences are not useful shows several estimates of immigrant´s contributions to Sweden's GDP. Until the beginning of the 1990s there was a positive contribution, which subsequently became negative. It is

about 1-2% of GDP, which amounts to the order of SEK 40-80 billion. This amount does not include the costs of asylum reception. Through the large asylum immigration in 2015, this cost has increased significantly.

The employment gap between refugees and natives is large. The refugees have lower employment than low educated natives. The gap decreases the first five years after the arrival and increases again the years after, which aggravates the employment issue. This means that activities must have a long term perspective. An initial contact and the current economic situation in the country are important conditions when it comes to get a work. It is also essential that the refugees acquire an education in the new country. Refugees get jobs mostly in the service sector and in small companies, which emphasizes the importance of this sector in the integration process.

Refugees have lower salaries and work more overtime compared to native citizens. Refugee children perform poor in school compared to native children and the results have fallen the last ten years. The average age when the children arrive is increasing, which make it more difficult for them to learn the new language.

However ambitious, the government refugee employment programs have not succeeded. Statistics show that it takes 7-8 years for asylum immigrants to get a job. However, in Åre and Krokom it only takes 2 years. It's about leadership, networking and commitment as well as seeing individuals.

The influx of people from outside the Nordic region over the past several decades has resulted in a rapid transition of the society and it is in this social context we shall create growth in Karlstad Region.

4.5 Business

Business is a function of technology and society. At the same time, society and technology are functions of business. The three areas interact and form an evolving change and movement.

Innovation and entrepreneurship are crucial for growth and a fundamental component of PGS. Wide and deep knowledge, together with innovative ability, brings new technologies in a positive social climate. Entrepreneurs transform the technologies into products and services, business processes, business models and companies, which in turn transform society. This transformation must be dealt with and then be sustainable socially and economically for the citizens in their everyday lives and for the environment in the future. The opposite is lagging behind or even decline.

A small number of world-wide companies such as Ericsson, ABB, Sandvik, SKF, IKEA, H&M, Volvo, Scania, the forest industries, and others have successfully been able to expand on the world market

However, the strong position of the big companies means that harsh international competition can have quick and direct effects. Should some of the most important of these companies lose weight, the Swedish economy may be severely affected. Ericsson's Chinese competitor Huawei is one of the companies in the world that has received the most patent in recent years.

India, China and other emerging countries account for an increasing proportion of cross-border investment and acquisitions. It will therefore be more difficult to get high returns in the form of high relative prices for advanced products in which Swedish companies have traditional market power over a long period. For a small country like Sweden, the task in this new world is to build globally competitive knowledge, based on education and research, but even more on knowledge collected from abroad.

Since 2007, 100,000 jobs in manufacturing industry have disappeared. The pharmaceutical industry, for example, has halved since 2001, but is now beginning to recover. Another sector is agriculture. Sweden has Europe's lowest domestic food supply and a substantial part of the food industry ownership has left the country.

Sweden's business sector has a large foreign ownership, which has impact on investments in research and development, which are managed by the headquarters. Further, Sweden has a small proportion of large and medium-sized family and cooperative companies compared to other countries, e.g. Germany.

New jobs are created at 80% in companies with up to 50 employees and companies younger than 5 years, account for 50%.

The base for the very advanced manufacturing production is thin and Sweden has a modest share of its manufacturing output in high and medium-high technology segments. Instead, the Swedish business sector is to a greater extent specialized in service production and a significant increase in advanced services is taking place. The service sector is now larger than the manufacturing industry. A large part of the activity performed in the service sector was previously conducted within manufacturing companies. A counterexample in manufacturing is Germany. Its manufacturing sector grows despite high wages and salaries. It shows that development is not determined by destiny but a result of systematic renewal and hard work.

Viewed across all service industries, productivity is on average lower than in the manufacturing sector. The service sector encompasses both private and public actors, the latter often with weak competition, sometimes in quasi-markets, which are defined by the fact that a public organization acts as client between customer and producer. Among the public actors are noted activities such as education and healthcare, which must be renewed and streamlined to meet future challenges. They are central to the nation's knowledge development and prosperity. At the same time, they spend considerable resources and suffer significant quality problems. The school's quality deficiencies are particularly serious, as they are likely to lead to a weaker development force in the future.

As the population ages, we become more care demanding. This means need for more resources and higher efficiency. These requirements grow considerably faster than the economy as a whole, partly because technical advances in medicine and medical technology create demand for higher quality and new treatment methods, and partly because it is generally more difficult to raise the productivity of care services than in the manufacturing sector, which drives the costs. It requires innovations, not least organizational, to increase quality and efficiency.

A better functioning service sector is necessary to reduce unemployment and alienation. The service sector accounts for almost three quarters of employment in Sweden. In all developed countries, it is in the service sector that employment is expected to increase in the future. If unemployment is to be reduced, especially among young people and asylum immigrants, jobs must be created in the service sector. Within the industry, most simple entry jobs have disappeared as entry wages increased, production processes have become increasingly mechanized and sophisticated, and many jobs have been moved to low-wage countries. Also in the service sector, many simple jobs, which previously served as integration jobs, have disappeared. Half of all jobs today have the potential to be automated

Innovation and Entrepreneurship

In order to cope with renewal and transformation for continued prosperity development, innovations are required, not only new goods and services but also new ways of organizing production, new technologies and new markets. Innovation is not just about new high-tech goods but covers all sectors and activities. It is equally important to renew the way in which society is organized, how welfare is produced and how taxpayer´s money is used. The way should be paved to support citizens to realize inventions, businesses and life projects. Knowledge increases and innovations explain a greater share of growth than increased investment and increased employment.

Three characteristics combine innovation-friendly countries; the economic driving forces are satisfactory and taxes are not too high. Furthermore, the public research institutions are effective and targeted, and it is easy for ordinary people to implement innovations and challenge existing companies

An invention will not be an innovation until it has reached a user and created a value. This starting point means that a number of factors contribute to the emergence of an innovation. It requires a level of innovation in terms of technology or business model, that is, a way of making money. There is also a need for knowledge in a product area and insight into what is demanded in the market. It is also important for the development work to be relatively autonomous

Of those who are considered to be the top 100 Swedish innovations, 47% have been created by inventors who have been employed by a company, while individual inventors and entrepreneurs have contributed 33%. University accounts for the remaining 20%. The role of free inventors has become more prominent in recent decades. Their share was 45% of the innovations 1981-2006.

Of the 696 companies that were named “gazelle” companies in 2010 by the paper Dagens Industri, most of them had achieved their success thanks to an innovative business idea, product or service. But only 4 of the companies built their success on an innovation developed in university research or at large company´s research department.

Universities are important sources of innovation in medicine and health. Within this area, they account for 56% of the innovations. In this sector, research is of crucial importance for innovations to occur. In sectors such as engineering, construction, telecom and information technology, private companies and individual inventors account for more than 90%. Especially larger companies spend more money on development work than other actors in society and often have the combination of technical skills, market knowledge and access to capital required to create groundbreaking innovations. Universities have a more marginal role here, which is explained by lack of market knowledge and, to a lesser extent, devoted to applied research. Students play a more important role in establishing new businesses than university researchers. Up to 80% of students' startups are located close to the university.

The public procurement amounts to approximately SEK 500 billion per year and about SEK 800 billion, including public companies. This market must increasingly be made available to the innovation system.

An international trend shows that both private institutions and governments increasingly use prices to stimulate innovation. Britain uses "pay-for-success bonds", which means that the public reserves a certain amount to address a social problem and only pays out money if that really happens.

NUTEK, the predecessor of Tillväxtverket, conducted an innovation competition, which was about heat pump technology. This competition resulted in the well-known companies NIBE and IVT in Småland now being successful in this market.

Entrepreneurs are important actors in the innovation process. They commercialize innovations in new or existing companies. New capacity and new structures are developed if commercialization is successful through a new company or expansion of existing company. Other effects are structural change and variation in the supply of products and services. An influx of new entrepreneurial companies is necessary for the development, renewal and transformation of the economy, and the conditions are about the economic and political environment defined by laws, regulations, norms and traditions.

Entrepreneurs who successfully run growing companies in knowledge-intensive sectors tend to be exceptionally competent. This includes long education, creativity, high risk tolerance, ability to lead others as well as industrial experience.

New companies account for about 45% of the creation of new employment in Sweden, which shows that innovation and entrepreneurship are crucial for Sweden's prosperity.

Of the companies that start, there are only a few who have the ambition to expand and create increased employment. At the same time, no other nation is equal to Sweden regarding the self-perceived ability to identify a business opportunity. However, this does not correspond to an equally extensive new venture. Although the positive attitudes can largely be due to over optimism, this probably also illustrates that the more general framework conditions for leaving an employment for a more risky entrepreneurship are not perceived as particularly attractive. Fear of failure and the consequences that follow from this are also significant factors that seem to inhibit Swedish entrepreneurship

New companies, however, are important also for reasons other than employment. They complement the larger companies´ product and service range, often subcontracting to large companies, and contribute to higher specialization in the market. They also create attractiveness for foreign companies to locate in Sweden

During the 1991-1993 real estate crisis, the number of companies decreased by 50,000, remained relatively constant during the IT crisis and increased by 30,000 during the 2008-2010 financial crisis. This indicates that the last two crises led to new opportunities exploited by entrepreneurs. The explanation can partly be that the negative effects were more prolonged during the 1990s crisis, and hence more difficult to resist for businesses, but also that it is about the change of economic policy with greater focus on business conditions and improved opportunities to start new businesses

The biggest decline during the real estate crisis affected simpler services and, in part, the manufacturing industry. Advanced services increased during all three crisis periods. One explanation may be that the new advanced service businesses are based on hopes of sustainably good profits and growth opportunities. Simpler services employ as many as the other two mentioned sectors together.

In international comparison, Swedish new entrepreneurship has remained relatively low until the mid-2000s, then risen markedly through 2013, and then sharply declined in 2014. This decline is dominated by the decline in women's entrepreneurship and domestic services, probably affected of the discussion about RUT and profit limitation in the welfare. It illustrates that predictability and long-term sustainability have a major impact on new business

Innovation and entrepreneurship become most intense in a mixed business environment, especially if they exist in clusters and information dense environments. Innovations often thrive in the kind of environments where companies can be both competitors, customers and subcontractors at the same time. There is more knowledge transfer in the exchange of experience, information and knowledge within and between companies when people interact and exchange jobs both within and between industries. Talented entrepreneurs tend to be attracted to metropolitan areas where there is a lot of specialized labor.

Pure competition among small businesses does not provide sufficient resources for expensive high-tech research, while oligopolistic and monopoly companies tend to become too rigid. The larger companies are relatively better at R &D, which aims to improve existing products, while the disruptive innovations are often made by smaller companies. These, in turn, are often bumps from larger companies

The opportunities for acquiring knowledge appear to be cumulative. Earlier knowledge levels affect the development of new knowledge, but can also lead to lock-in effects, which limit the spread of new knowledge. The more advanced new knowledge is, the harder it can be to apply commercially and the more the geographical distances limit the possibilities of acquiring such knowledge. Innovation has proven to be more geographically concentrated than both R&D and production

Within e.g. the food industry, it has been shown that it is more likely that companies are successful in export markets if they are located in a region where there is a high concentration of other food exporting companies. The results suggest that agglomeration effects, such as knowledge and information circulation between companies, cooperation around logistics and transport, good local supply of labor force with specific skills, lead to decreasing export costs. Food exporting companies are more productive and knowledge intensive than not exporting. This is a prerequisite to be competitive on international markets. Export experience also increases the likelihood of introducing new products.

An innovation policy must contain a strategy for developing clusters, constructing transport systems and create regional labor markets. It is also required that education and research at universities build knowledge that is spread throughout the society and benefits entrepreneurs, who want to develop and renew their activities and their organizations. Knowledge will lead to innovations, which are transformed into profitable products and services as well as organizational changes

Business Change

Business change is the result of innovation and entrepreneurship. It is about new products and services, new processes and above all new actors, that create disruptive changes in the way of doing business. Our task is to conduct a prosperity and growth strategy for Karlstad Region, which means the sectors that constitute the region. Consequently, it is our interest to discuss how business change may influence the sectors, as well as identify new business opportunities. The technological changes can be described in a single word, digital. In a world where more and more of the physical is transitioning into a digital realm, businesses live uncertain lives. It is a disruptive world and a new business logic, and no one is safe from the Silicon Valleys.

Technological development that seems unfeasible today might grow into something powerful over time. Often, technological or societal obstacles can be overcome on a timeframe of 5-10 years with the right investment and the right incentives

Across industries, it is clear, that technology-based startups dominate as the drivers of disruption, and especially so in finance, media and retail, where 50% or more of the executives see change coming primarily from new tech entrants. Only in the manufacturing industry do more executives expect a somewhat greater impact by companies coming from other manufacturing industries, than from high-tech start-ups. In the healthcare and welfare industry, drivers of change are roughly evenly split between the own industry, other industries, and technology based startups. Only in one industry, logistics, does a majority expect the established industry leaders to be the key drivers of change.

Changing value chains are likely to be one of the most dramatic impacts of the domains of opportunity, at least in the near future, and 82% of executives believe their value chain will change drastically over the coming years. The value chain will be redefined or merged with another industry. For many, change may come even faster. When calculating how long, on average, executives expected their business model to last in the various industries, nowhere was this average higher than 5 years.

Only 25% of Nordic executives believe they will see changes to their industry come from within the industry. The majority, instead, foresee changes coming from other actors, established companies in other industries in some cases, but primarily, new technology-based startups. The telecom industry did not invent Skype, nor did the hotel industry invent AirBnB. Changes do not come within the industry alone, they often come from other actors.

The share economy business model and the automation of business processes are two of the most profound effects of the digital technologies and the speed of innovation. The development makes strong influences on how we organize work, educate people, as well as on the society. We also discuss possible effects of AV´s on the train business.

Share economy
Digital platforms on the Internet repel large parts of the economy´s business models, which means that a large number of players are gathering in a digital platform. Scalability is huge. When the hotel chain Marriot announces that it will expand with 30,000 rooms, AirBnB claims that they will do it in 2 weeks. There are growing global marketplaces that connect millions of people

The sharing model can´t be dismissed as just a low cost option. Airbnb can offer from a dormitory in the suburb to a castle in France. What hotel chain would be able to offer the same degree of variation without collapsing in operational complexity and seeing its brand eroded?

Sharing models are established and challenge traditional companies in a number of new platforms in addition to the most well-known AirBnB and Uber in taxi. InCloudCounsel uses a variety of freelancers to process legal standard information into a fraction of what law firms take. Topcoder organizes very cheap programming by breaking up the work into smaller pieces and offering it to its 300,000 freelance programmers in 200 countries.

More industries will be next in line. Will home cleaning companies exist in ten years? Why can´t staffing companies be replaced by a platform? How is the restaurant industry going to make the living, if people start preparing lunches and dinners to each other?

Platforms create lower costs, more variety and make it possible to use unused resources. The presence of scale effects also means that a sharing model can range from being marginal to fully dominant over the course of just a few years. More buyers attract more sellers in a self-boosting system that can grow explosively.

The share economy entails a greater supply of an existing market, which usually leads to lower prices. If the price falls below the cost of the established actors, there will be a shake-out.

Independent work
A growing sharing economy creates political turbulence. The labor market's organization with its collective agreements is undermined when large parts of wage principles change. The tax base can be challenged, when fewer people have traditional jobs, but instead move into the gray zones of the barter economy, with platforms that do not know any national borders. This change in the labor market has already come a long way.

The concept of work as a traditional 9-to-5 job with a single employer bears little resemblance to the way a substantial share of the workforce makes a living. The self-employed, freelancers, and temporary workers, as well as individuals

renting out rooms on Airbnb, driving for Uber, or selling goods on eBay, are part of a significant trend that is called "independent work" or the "gig economy".

Independent workers amount 20-30% of the work force in Sweden, which means 1-2 million people. There are three categories of independent workers. Free agents derive their primary income from independent work and actively prefer it. Casual earners use independent work for supplemental income and do so by choice. Some have traditional jobs, while others are students, retirees, or caregivers. The financially strapped do independent work for supplemental income, but they would prefer not to have to do side jobs to make ends meet. In Sweden, free agents are about 30% of the independent workers, casual earners, 40%, financially strapped, 15%.

Independent earners perform short-term assignments, such as giving someone a ride, designing a website, treating a patient, or working on a legal case. Both the worker and the customer acknowledge the limited duration of the relationship. Some contracts may extend for months or even years, at which point the individuals become indistinguishable from traditional employees, therefore independent work is defined as assignments lasting less than 12 months.

Independent work is not dominated by millennials. While more than half of those under age 25 participate, they represent less than 25% of independent workers. About 60% in the age group 65- participate in independent work.

Nor is independent work solely about low-income workers doing one-off jobs to make ends meet. Although 40-55% of low-income households engage in independent work, they make up less than 25% of all independent earners. While independent work is prevalent in the construction trades, household and personal services, and transportation, it is also preferred by many professionals such as doctors, therapists, lawyers, accountants, interior designers, and writers.

The combination of share economy and independent work may be looked at as a special case of the global work-force mentioned above. The development has just started and it is highly probable that we will see creative manifestations of it in the future.

Automation

Robots and algorithms will invade our workplaces and homes in the coming years. They can read, listen and speak. They learn from their experiences and they can read our mindset and develop a kind of personality. They will drive a car, clean our homes, cook luxury food in our kitchen, handle many of our government affairs, and provide medical diagnoses. The fear of lack of labor in the welfare would be something of a fallacy. The hot picture is based entirely on the assumption that welfare systems and people's behavior remain unchanged.

Automation in the manufacturing industry has been going on for many years, but now it seems to take a leap and bring about disruptive changes in brand new industries. More than 50% of jobs are in the professions, which can be automated in the next 20 years if automation continues at the same rate as hitherto. In Sweden, there are about 4,700,000 employees, which means that almost 2,400,000 can be replaced by computers and robots. Human work will be about three kinds of tasks; solving new problems, working with new information, and performing non-routine manual work.

Digitalization differs from previous changes by virtually all areas are affected and the conversion pressure is higher. Automation that has long been an obvious part of the manufacturing industry will now also include services such as banking and insurance, with increasing strength. There are already financial robot advisors and fully automated injury chains as well as robot written text that are difficult to distinguish from the people written. Any form of administration or work that is repeated in a predictable way can be increasingly automated. When this happens, Sweden is far more exposed than many other developed countries because human work is so heavily taxed here. Robots do not take coffee brakes and do not pay any welfare or employer fees.

Many officials are affected by automation. Business economist's work attributes 50% probability of being replaced by computers. It is about the order of 50,000 jobs that can disappear. Even many of the duties of engineers and technicians may be replaced. For these groups at the same time, they can increase their productivity with new technology and become more sought after. How the conversion can be made easier for those who will get out of the disappearing jobs to those demanded, is a key issue for a society that wants to use the technology wave as a leverage.

Algorithms make their entry into more and more professions. Today, algorithms are used to assess the likelihood that a sentenced person will return to crime. In the future, algorithms will read the documentation without having to be fed into a database and be able to make proposals for court rulings that are of higher quality than human judges

In the recruitment context, there are algorithms that only use information available on Facebook and on average make more accurate personality assessments than people who also have access to fuller information.

In the financial world, robots and algorithms as asset managers of securities are about to revolutionize an entire industry. JP Morgan offers free robotic advice to its major customers. Merill Lynch launches a robot-driven investment unit, which will automatically tailor customers' portfolios based on their preferences. Young capital owners will prefer robots, which according to Deloitte will lead to capital transfer of SEK 250 trillion to young generations.

Virtual Reality, VR, is out of the hype-phase and now into the practical use. With virtual reality, we can create the virtual office, where colleagues can see each other and collaborate, even though they are in reality in different parts of the globe. The VR effect, combined with faster digital networks and even more powerful computers, can be a reduction in work trips, which in turn becomes a factor in the discussion of investment in transport infrastructure.

In the retail sector, one also discusses the use of virtual reality. In the beginning of the 2020th, 30 percent of the largest global retail chains feature virtual reality stores, allowing customers to view products in VR, make their decisions and then get the goods delivered at home.

The future's grocery outlet will be staffed by both people and robots. Simple and repetitive tasks such as entering goods and inventory stocks can be placed on the robots, and the staff thus focus on personal service. Digitalization creates opportunities for keeping a larger assortment in stores, which can increase the need for personalized service. Cashier staff decreases, but compensated by bakery and culinary counters.

It began with mail order, which was subsequently renamed e-commerce, which is steadily increasing its market share, especially in the case of specialized shopping. We are seeing a development with more and more pure online retailers, and also that retail chains complement with e-commerce. By 2015, e-commerce amounted to 7% of total retail sales and sales to SEK 50 billion. The estimates of how large the proportion will be in 10 years varies greatly, from just over 10% to slightly more than 30%. Probably closer to the higher proportion than the lower.

The effects primarily on the specialized shopping must be assessed on the basis of this trade´s cost structure. Premises and staff are costs that can´t be immediately adjusted with the sales volume, which means that even moderate sales reductions can lead to closures, which in turn affect the external shopping centers and city malls, as well as smaller property owners

In connection with retail and customer service, 50% of call center service is expected to be performed by software in the early 2020s

When IKEA creates new retail concepts, it is a guide to the direction of retail. In Copenhagen, IKEA starts its first shop in central location. Close to the shop, the company has set up 1,200 parking spaces for bicycles. Is it the beginning of the end for external shopping malls, with requirement of a car, we see and how will the city center trade evolve?

Through automation and digitalization, individual manufacturing companies can produce and handle a much larger range. All these new variants of products and services are to be sold, distributed and serviced. This increases the demand for staff. Small businesses can reach new markets easier and at lower cost, creating new jobs. For this development, 3D printing contributes to advanced products and large constructions. This, in turn, creates demand for architects and engineers who understand to exploit the engineering and artistic possibilities that the technology provides.

Automation makes it less attractive to move production to low-wage countries. In fact a stream of companies are moving back or planning to do so with parts of the outsourced activities. This movement will not generate many factory jobs, but may have a greater impact on future development of new products and services.

In the field of healthcare, robots make great progress. The robot STAR, the Smart Tissue Autonomous Robot, has 2017 for the first time sealed two intestines, which is considered to be very difficult. In the future, the doctor will

provide an AI system with the patient's disease signs, genetic characteristics and disease history, after which algorithms respond with a diagnosis in a few seconds. Already today, IBM's Watson conducts this type of diagnosis and does it with high accuracy

In terms of operations, robots will perform everything from intestinal surgery to cataract operations. The human surgeon's task changes to monitor the operation. Synthetic 3D-printed bone implants will act as "scaffolding" as the body's cells build new skeletons on. 3D-printers will create organ based on human cells.

Today, the use of network-based clinics increases, and in 5 years more than 50% of the age group 65- is expected to use health monitoring devices daily.

In psychiatry, cognitive behavioral therapy is developed, which is partly performed by a computer via the network.

Automation and digitalization create new jobs for those who develop digital technology as well as all the work tasks required around the digital platforms. The number of system developers has increased by 43% between 2005 and 2012, or about 2,000 people per year, and the increased business complexity has among other things brought about that the number of lawyers has increased by 18% over the past five years. Highly skilled peoples increased incomes lead to a rising demand for service occupations, as a result of these peoples increased earnings. Examples are, hair stylists, personal trainers and within tourism

In this context, it may be worth noting that the highly rated digital technology based companies Klarna, Izettle, Soundcloud, Truecaller, Spotify, Mojang and King have not created particularly many jobs. The seven companies had a total of about 5,000 employees in 2015. By comparison, the manufacturing company Sandvik, which is not often highlighted as a successful company, had 10 times as many employees.

The combined effect of automation, digitalization, increased consumption through revenue increases and new products and services is expected to give rise to an employment effect of approximately -15%. Reduced taxes and other reforms can compensate to avoid loss. The employment effects are likely to be significantly greater in the smaller municipalities.

Automation contributes to the polarization of the labor market. Middle-salary jobs are decreasing, which strengthen competition for lower-paid jobs. At the same time, the proportion of high wages increases. All this makes a move towards a community, where smaller groups in the labor market are spiders in the network for the robotized production and its development. At the same time, digitalization means great opportunities to reduce greenhouse gas emissions and give consumers more power, which in turn keeps inflation low next to what the Riksbank does. Already today, we are familiar with this.

In the wake of automation, some countries will redistribute financial resources to groups in the society, where these groups will see the pursuit of education and work as less interesting. Such development will lead to more and more polarized societies. Successful countries, on the other hand, will find systems that provide strong driving forces for education, creation and work, although strictly speaking, it would not be economically necessary

“Collapse is usually the result of a political culture that is unable to handle technological breakthroughs and world changes” (Jared Diamond, professor of the University of California, known for several popular science books on human evolution).

Digitalization demands a national and local political leadership of the same caliber that made Northern Europe's countries successful in the industrial revolution.

Education

The usability of different educations is reduced by the rapid technological development and increased specialization. The mismatch in the labor market is about the fact that educational choices, education systems, and skills development are not due to the rapid turnover of the required specialist skills. When the routine job is automated, human creativity, which the computers can´t match, becomes even more demanded.

One often discussed remedy to cure knowledge gaps is shorter courses with supplementary courses and programs linked to working life as well as more digital education. Digital online courses can be widened and, above all, renewed faster. Life-long learning is a buzzword for these thoughts

New jobs and professions are created in interaction between those who are looking to produce and hire in Sweden and those who choose education and occupation. In a country where many people find it interesting to educate to IT engineers, more IT companies will also find it worth investing.

Transport
One forecast says, that fleets of autonomous taxis will be cruising the streets picking up passengers in the Nordic countries in 2026 and traffic lights become obsolete in at least one of the Nordic capitals in 2040.

Automated vehicles, AV´s, will have large negative impact on employment, even if many new projects have a positive influence. The next few years of introduction of AV's will be the starting point for a very big change in how transport is carried out on our roads.

AV's is not just about private cars in our big cities. It is also largely a question of freight, bus and taxi, as well as work vehicles, from sweepers to our sidewalks and trucks in the mining industry to agricultural tractors. Passenger cars are just part of this market-driven development. With AV's, we can achieve a fossil-independent fleet of vehicles and new opportunities to streamline transports, thereby increasing capacity utilization and reducing energy use.

When AV´s become capable of safely driving in residential areas, AV adoption will likely disrupt rail significantly, probably making the biggest impact since the emergence of the automobile itself. That´s because AVs ready for both urban and residential use could speed the widespread adoption of both car sharing and ride sharing, which would dramatically improve the advantages of the car relative to public transportation.

Estimation indicates, that for three or more passengers willing to share rides, traveling by AV will become less expensive than traveling by regional train. For many passengers, taking an AV will be faster door-to-door than traveling by subway, commuter, or medium-distance rail because AV´s eliminate the trip to and from the railway station. Over time, it is possible that at least 40% of current train passengers will come to prefer taking an AV over the train.

AV´s are expected to constitute a tangible threat to passenger rail within the next one or two decades regardless of the rate of adoption. Trains will remain the least expensive mode of transportation during peak times in urban areas. But during off-peak hours and in rural environments, they will lose riders to AV´s. Rail companies may even end up in a downward spiral. With reduced overall ridership, rail companies' overall unit costs for all remaining passengers will escalate because of the inherently high proportion of fixed costs in operating a train network. This could trigger price increases or reduced schedules, which would result in a further reduction in ridership. The off-peak impacts of declining demand in rural areas could reverberate throughout the entire rail network, since it's difficult to operate fewer off-peak trains without affecting the costs of peak trains.

This isn't to say that passenger and retail revenues would vanish overnight. But because of rail companies' inherent fixed cost structure, even relatively modest reductions in passenger volume could turn respectable profits into massive losses. For example, a 20% reduction in passenger volume could turn a 5% margin into a -10% margin.

The impact on high-speed trains will be relatively limited because, for the foreseeable future, high-speed trains will continue to be a much faster means of transportation for both medium-distance and long-distance trips than AV´s. If there is a high-speed train. Rural trains will be most significantly affected.

Whether or when the AV becomes a mainstream form of transportation is unknown. But if it emerges successfully, it could truly disrupt the rail industry. Disruptive technologies not only arise increasingly rapidly, but they are also adopted increasingly quickly.

Terrorism is a major threat to the use of AV's. A terrorist can charge one or more cars with explosives and let them drive for days before they blow up at designated locations.

4.6 Conclusions

How Karlstad Region and Värmland will change in the above world is of course not predetermined, but is to large extent in the hands of the local political leadership. At the same time, we must note that the starting point is weaker in Karlstad Region and Värmland than in other regions, as shown by our evaluation in the next section.

In the next step of the project, when we will develop strategy proposals, we will deepen our conclusions for Karlstad and Värmland with regard to the review of the future, but here we summarize some preliminary conclusions

Värmland is more exposed to negative effects of automation on employment compared with other regions, especially in the retail and engineering industries. At the same time, Värmland can benefit from the sharing economy in tourism, programming, consulting, and many other service businesses.

The development of information technology means that it is equally technically possible to work remotely as physically adjacent to each other. Finally, if the technology overcomes the cultural barriers to teleworking, this can reduce Karlstad's disability in terms of passenger transport in relation to the geographical situation. More of distance work does not automatically mean an increased influence into a city. For this, it is also necessary that the city is attractive to young people

Karlstad is less exposed to areas of alienation, but at the same time has a weak labor market for employment of asylum immigrants.

Regarding the effects concerning one of our main issues, the need for transport infrastructure, we will address this topic in the next step of the project

“AI, energy, and biosciences are promising fields where you can make a huge impact. It's what I would do if starting out today” (Bill Gates, 15 May 2017).

5 Evaluation of Karlstad Region

"If we do not know our history, we lose our future. If we destroy our roots, we can´t grow" (Friedensreich Hundertwasser, Austrian artist and ecologist, 1928-2000)

Karlstad Regions history and roots as the starting point for PGS are structured and described as follows:

- Politics
- Population
- Industry sector
- Culture sector
- University sector
- Public sector
- Transport sector

Political leadership and politics are a fundamental cultural condition for prosperity and growth in a region and a country.

At the World Economic Forum in 2017, six prime ministers and seven mayors participated. Perhaps a writing on the wall, as cities are playing an increasing role for the world's development. As few as 600 cities account for 60 percent of the world's total GDP. Cities are leading the development, but who leads the cities? How city regions are organized and managed is determinant for competitiveness and results. To be minister has a higher status than being a mayor. Leading a big city, however, requires leadership comparable with leading a very large company and is in many aspects more demanding than being a member of parliament or belonging to the government. In view of the role of the major cities in the economy and growth of countries, their leadership issues must be central to the agenda.

When it comes to population, all the soft qualities are profound conditions for the possibilities to grow and especially the attitudes, which evolves during a very long time, and are not easy to change and which one need to presuppose if the goal is change.

The industry sector is of course a basic engine and condition for a regions possibility to grow. It is about the structure and size of the sector in the region, international and national markets, research and development, international and national ownership, profitability and how businesses have evolved during many decades. All of this has established business traditions including presence of cluster and the ability of innovation and entrepreneurship within the organizations.

The culture sector contributes to employment and economic activity, but, above all create attractivity for the population and the actors in all other sectors.

Presence of a university and other research and development institutions is another basic engine. Not least it is an organization with employees and students. However, most important is the specialization and quality of education and research, as well as the contribution to the industry sector. Regarding the later, universities with healthcare research are important when it comes to innovations. In different technology fields, companies are more innovative compared to universities.

Without efficient transport systems, it is almost impossible for a region to grow. The efficiency is about time, frequency and how the travel time can be used. The transport sector is here defined as infrastructure, vehicles, technologies, and operators.

We have built the evaluation of Karlstad and Karlstad Region on benchmarking against two other cities and regions, which we found relevant to get our starting point for PGS. The cities and regions are Växjö and Växjö Region in Kronberg county and Umeå and Umeå Region in Västerbotten county.

- Växjö Region – Växjö, Alvesta, Lessebo, Tingsryd, and Uppvidinge municipalities
- Karlstad Region – Karlstad, Forshaga, Hammarö, and Kil municipalities
- Umeå Region – Umeå, Bjurholm, Nordmaling, Vindeln, and Vännäs municipalities

The comparison is based on the "honeycomb" and the following capacities:

Structure capacities
- Structure

Soft capacities
- Attitudes
- Change abillity
- Skill development
- Collaboration
- Technology integration

The structure capacities describe in statistical terms the historical development and the situation today regarding politics, population and the different sectors. Structures capacities are measures of growth.

The structure capacities are described in a synoptic way to get a picture of the differences between the cities and regions. In the context of the project and the aim of the benchmarking, it is neither possible nor motivated to dig too deep in details.

The soft capacities are an attempt to explain the values of the structure capacities and thus the growth and conditions for PGS.

The structure capacities are presented in part 1 to 8, and the soft capacities are discussed in part 10.

This section also presents an overview of Oslo and Örebro regions, part 9, which are important potential labor market regions for Karlstad Region

5.1 Growth

Table 5.1 presents the regional GDP per capita in relation to the national Swedish GDP and the rank among 24 counties.

	Regional GDP					Rank	
	1860	1910	1940	1980	2010	1860	2010
Kronoberg	0,57	0,80	0,68	1,00	0,93	24	8
Värmland	0,86	0,81	0,83	0.96	0,81	13	22
Västerbotten	0,84	0,80	0,71	0,94	0,89	15	9

Table 5.1. Regional GDP (SNS, 2016)

All three counties peaked 1980. Värmland was year 2010 ranked 22 of 24 counties, while Kronoberg and Västerbotten had the position 8 and 9 respective.

Nordregio, the Nordic Council of Ministers research institute within the regional development and urban planning has constructed a regional potential index, RPI, for all 74 Nordic regions. The RPI is a measure of the future growth potential and consists of the following indicators, figure 5.1.

- Demographic potential – population density, net migration rate, demographic dependency rate, female rate
- Labor market potential – employment rate, share of the age group 25-64 with high education degree, youth unemployment rate
- Economic potential – regional GDP per capita, total R&D investments

Värmland is number 68 (68) of 74 regions, Kronoberg number 30 (41), and Västerbotten number 33 (46). Figures 2010 in brackets. During the period from 2010 to 2015, a strong development took place in Kronoberg and Västerbotten, while Värmland did not changed its position.

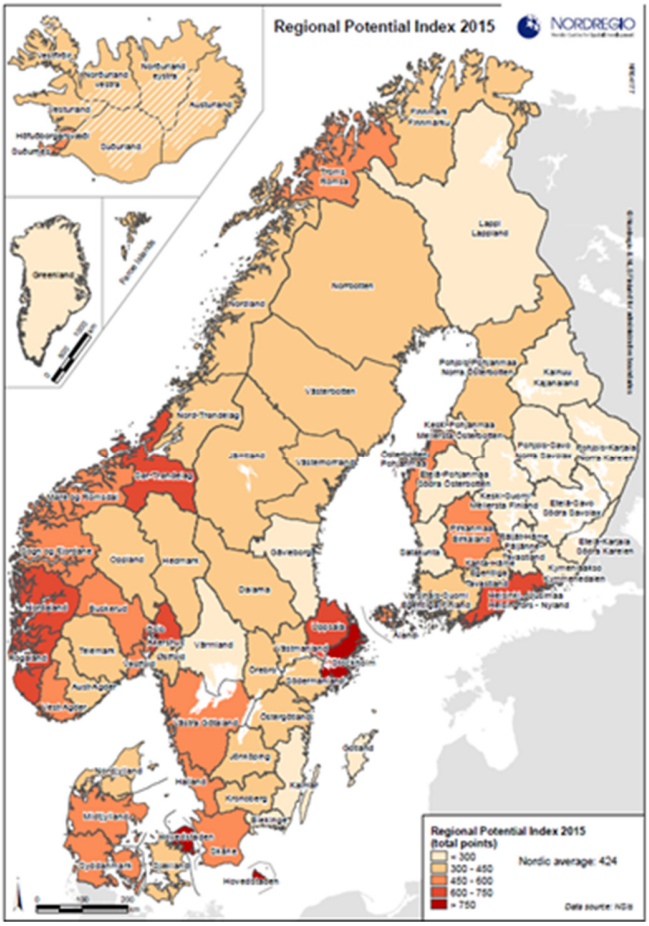


Figure 5.1: RPI (Nordregio, 2016)

Svenskt Näringsliv and Tillväxtverket have designed a vulnerability concept and based on this classified the vulnerability of Sweden's 290 municipalities.

The first part of the vulnerability is short-term consequences of a closure, which is a function of dependence on individual manufacturing companies and individual service companies, as well as the possibilities of commuting. The second part of the vulnerability are long-term opportunities to manage a closure, which is about the share of work people, private employers per 1,000 residents, new businesses per 1,000 inhabitants, an overall assessment of the business climate, and even here the possibilities of commuting.

The dependence on companies is how many companies are required to achieve 50% of the payroll in the private sector. The fewer companies, the greater the addiction. Sweden has established more companies in recent years and is also dependent on fewer.

The vulnerability measurement is a ranking concept of municipalities. The 100 municipalities that have the highest vulnerability in the survey is divided into three equal groups in form of genuinely vulnerable, medium vulnerability and moderate vulnerability.

Table 5.2 presents the number of vulnerable municipalities in the counties, the sum of the groups. Värmland is the most vulnerable county, at the same time, Karlstad Region has no vulnerable municipality. In Växjö Region, it is Lessebo and Umeå Region Vindeln, Nordmaling and Bjurholm

	Number of municipalities	Number of vulnerable	
		Total	In the city region
Kronoberg	8	2	1
Värmland	16	10	0
Västerbotten	15	6	3

Table 5.2. Vulnerability (Svenskt Näringsliv, Tillväxtverket, 2016)

5.2 Politics

With small exceptions, all municipalities are organized in the same principle structure, due to the legislation. The mayors are the top political and employed management in the communities. Växjö and Umeå have 3 mayors, while Karlstad has 9.

Table 5.3 presents the tax in SEK per 100 SEK taxable personal income 2017, the budget in billion SEK, and per citizen. Umeå has e significant higher tax compared to Växjö and Karlstad, and by that more public economic resources.

	Tax		Budget	
	Municipality	County	Billion SEK	Per Citizen, SEK
Växjö	20,19	11,60	4,6	51 397
Karlstad	21,75	11,20	4,6	50 999
Umeå	22,85	11,30	8,2	66 725

Table 5.3. Tax and budget (SCB, 2017)

Concerning public owned companies, foundations and other associations, there are significant differences between the municipalities. This reflects diverse political ambitions and strategies to be involved in sectors outside the strict public.

Companies within the areas of apartments, real estate, energy, water, waste water, fiber networks, parking, tourism and conferences are find in most communities, also in Växjö, Karlstad and Umeå.

Växjö is the owner of Videum science park and university buildings in co-operation with Linné University and partner in Växjö Citysamverkan, marketing and development of Växjö city center.

Karlstad is not involved in companies related to Karlstad University. However, in Karlstad there is the Innovation Park and four industry specific network organizations with focus on collaboration and development of their industries. It is Paper Province, IUC Stål&Verkstad, Visit Värmland and Compare within the information technology sector. Karlstad is partner in energy power plant businesses hydro, wind and nuclear (OKG). In the transport sector is Karlstad the owner of Karlstad Airport and principal owner of Vänerhamn (harbor)

Umeå is involved in education and development companies in co-operation with Umeå University, University of Agriculture and the industry sector. Examples are European CBRNE Traing center (security and vulnerability), Uminova Innovation (support to entrepreneurs), Uminova eXpression (incubator), Kompetensspridning (marketing and selling of the community´s skills and innovations, export support to SME, environment support)

Umeå is together with Vasa in Finland partner in Kvarkenhamnar (harbor, ferry service). In the culture sector is Umeå partner in Norrlandsoperan, Västerbotten museum and Väven, which is the new culture house.

5.3 Population

Table 5.4 presents the populations of the cities and regions, as well as the cities' share of the regions

	Population		
	City	Region	City %
Växjö	89 500	140 011	64
Karlstad	90 198	129 174	70
Umeå	122 892	146 586	84

Table 5.4. Population (SCB, 2017)

In 1976, Karlstad and Umeå had nearly equal populations. Forty years later, in 2016, Umeå is 36% larger than Karlstad. Växjö in 1976 had 14% fewer inhabitants than Karlstad. In 2015, the cities are of equal size. From 1976 to 2016, Umeå increased its population with 61%, Växjö 43% and Karlstad 24%. Figure 5.2.

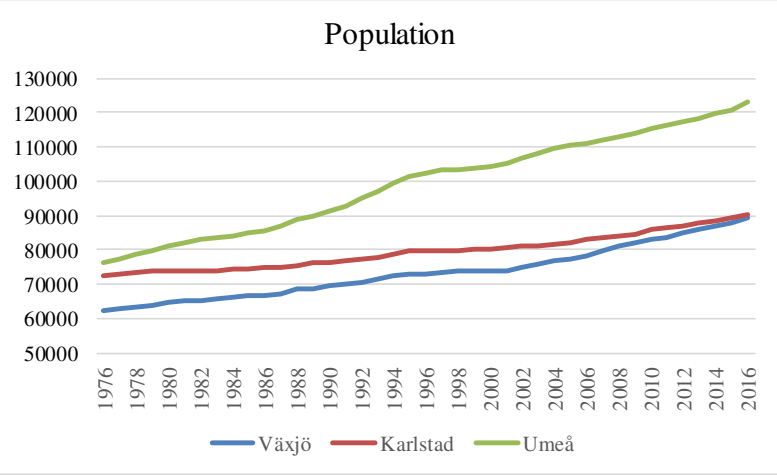


Figure 5.2. Population (SCB, 2017)

Figure 5.3 presents the areas where 80% of the total population increase took place in 2003-2013. Växjö and Umeå are parts in those areas, Karlstad is not.

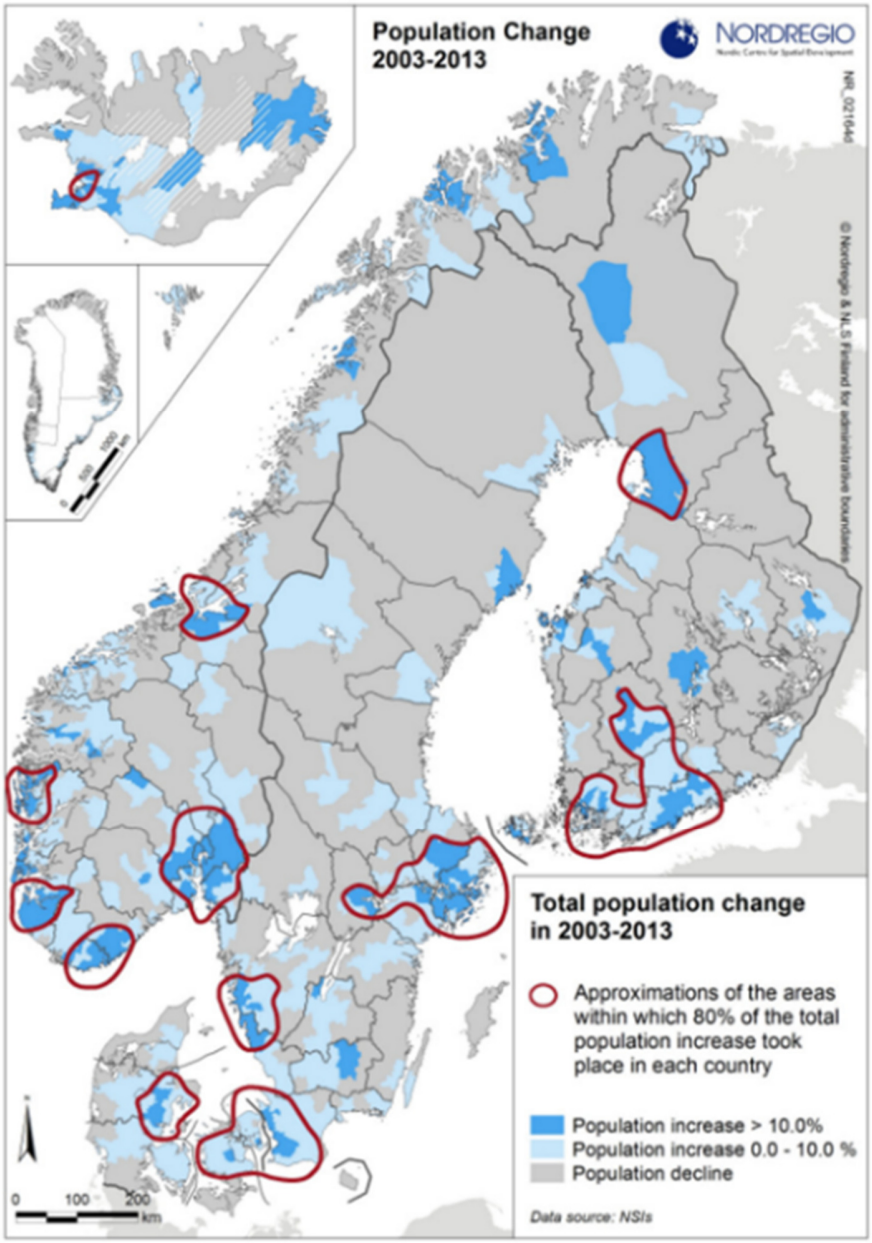


Figure 5.3: Areas where 80% of the population increase took place 2003 – 2013 (Nordregio, 2016)

Figure 5.4 presents larger and smaller urban areas. Umeå is an urban area, Växjö and Karlstad are not.

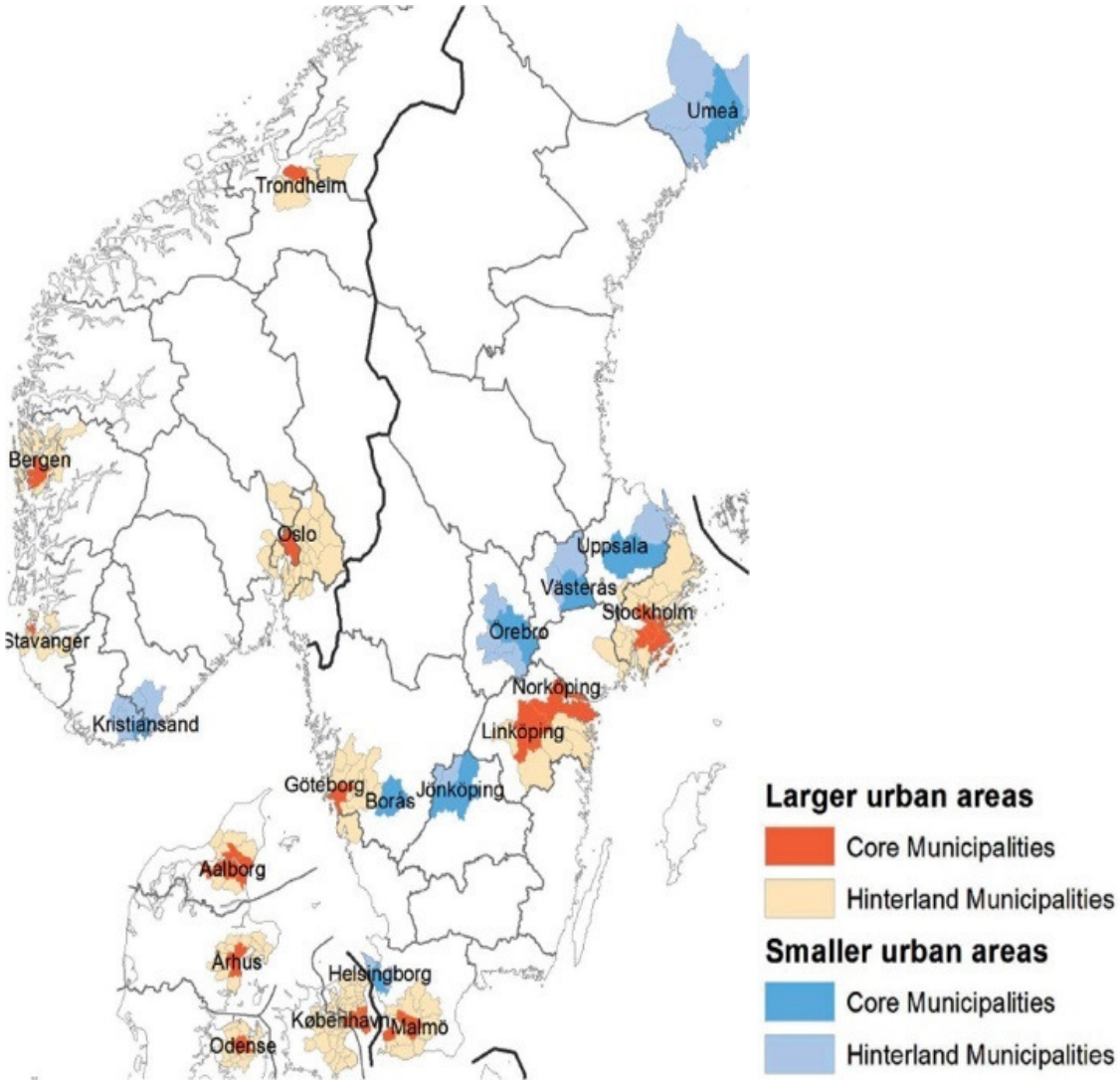


Figure 5.4. Urban areas (Nordregio, 2016)

Figure 5.5 presents forecast concerning the change in the number of inhabitants in the age group 18-64 from 2009 to 2025 based on trends from 1970 to 2009. Umeå and Växjö increases by 0,5 - 10%, while Karlstad is expected to decline by 0,5 - 10%.

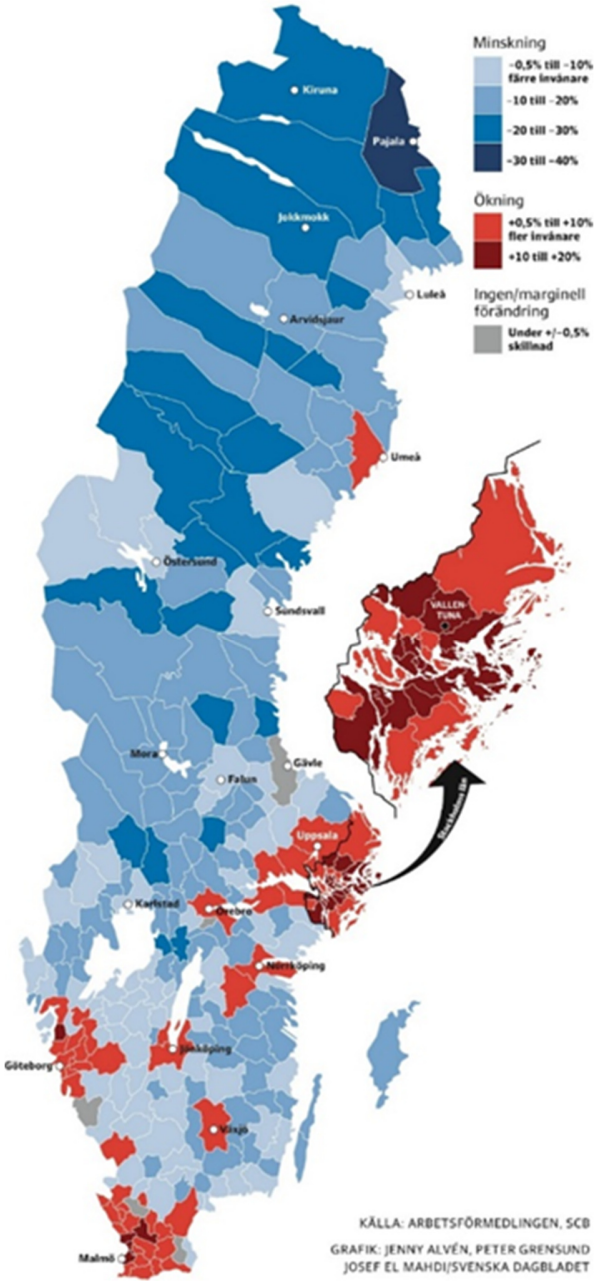


Figure 5.5. Population forecast (Nordregio, 2016)

Figure 5.6 presents the cities' share of the Swedish population. Umeå and Växjö has increased the share, while Karlstad´s is almost unchanged.

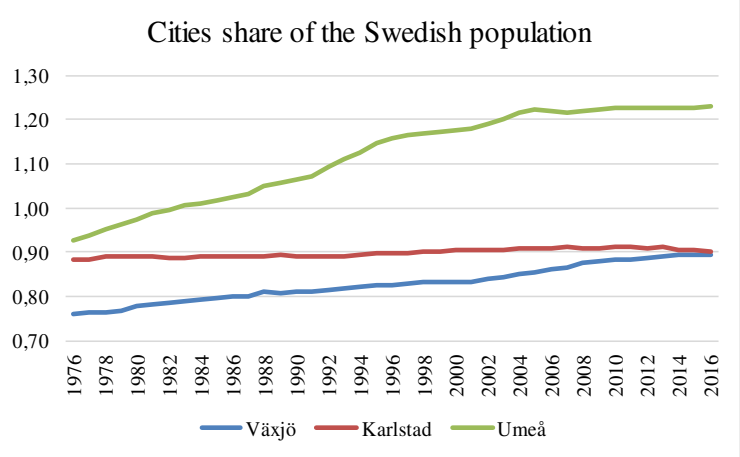


Figure 5.6. Cities share of the Swedish population (SCB, 2017)

Figure 5.7 presents the cities' share of their regions population. Växjö has grown most in relation to the surrounding part of the region, which still has a large share of the regions' population. Karlstad´s share has been unchanged, while Umeå has a parallel development with Växjö on a much higher level, and now accounts for most of the regions' population.

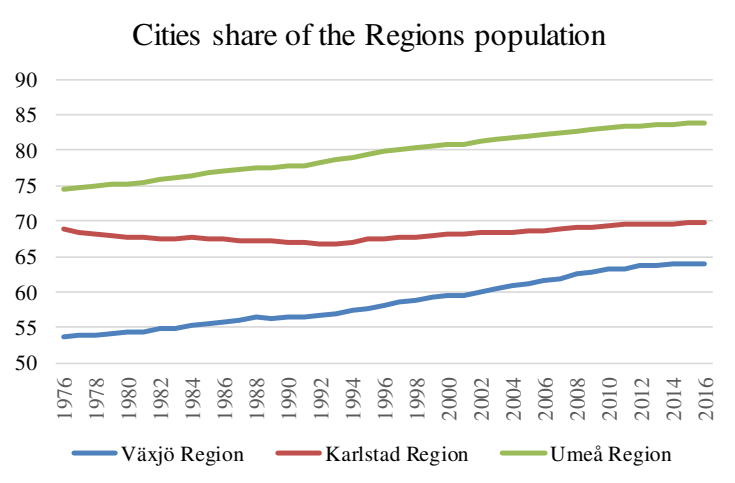


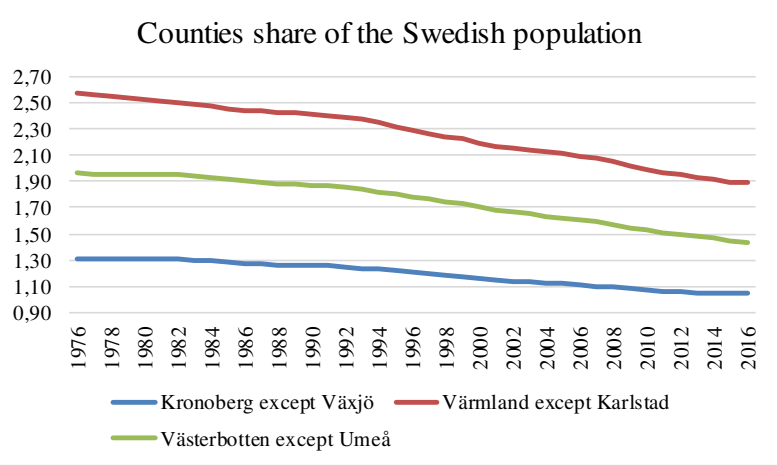
Figure 5.7. Cities share of their Regions population (SCB 2017)

The differences in the three cities' population growth is further highlighted by net in- and out-migration from the municipalities in their own county and the county's population development. Table 5.5 presents the share of the cities' population increase that moved in from their own county's municipalities. Karlstad stand out significantly compared with Växjö and Umeå.

Net migration to the cities from the other municipalities in the counties Share of population increase 2000-2016	
Växjö	33
Karlstad	55
Umeå	37

Tabell 5.5. Net migration to the cities from other parts of the county (SCB, 2017)

Figure 5.8 presents the change of the county's share of Sweden's population has evolved since 1976, excluding the cities. The largest decline occurred in Värmland followed by Västerbotten.



Figur 5.8. Counties share of the Swedish population (SCB, 2017)

In Västerbotten, Umeå is a magnet for young people in the rural areas, while young people in Värmland's small towns and villages do not move to Karlstad but to Stockholm and Gothenburg.

Figure 5.9 presents the share of age group 65-. Karlstad has the highest share and Umeå the lowest.

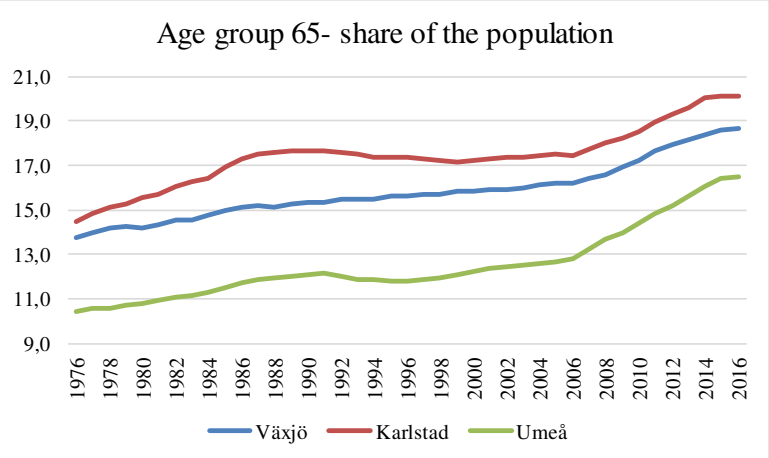


Figure 5.9. Age group 65- share of the population (SCB, 2017)

Table 5.6 presents the percentage of the population growth as the age group 65- accounted for the years 1976-2016. In Karlstad, retired people represents almost half of the population increase, while the other two cities show significantly lower shares.

	Age group 65-share of the population increase 1976 - 2016
Växjö	30
Karlstad	44
Umeå	26

Table 5.6. Age group 65- share of the population increase 1976-2016 (SCB, 2017)

Figure 5.10 presents the share of age group 25-64-. Umeå has the youngest population.

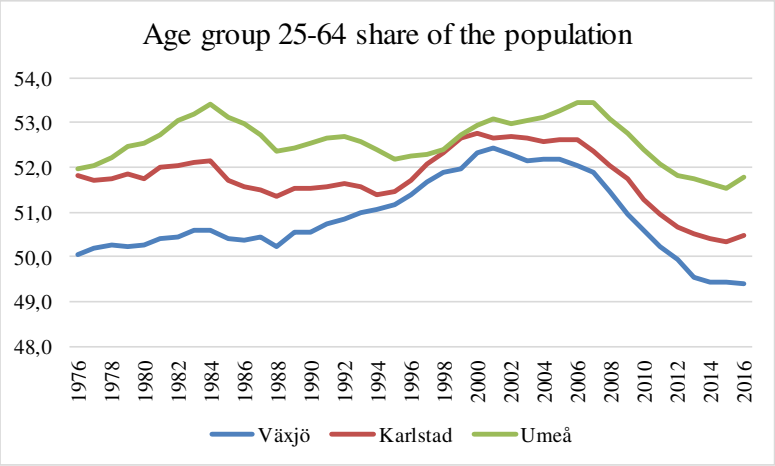


Figure 5.10. Age group 25-64 share of the population (SCB, 2017)

Figure 5.11 presents the employment in the age group 15-74. Värmland has the lowest employment share in age group 15-74

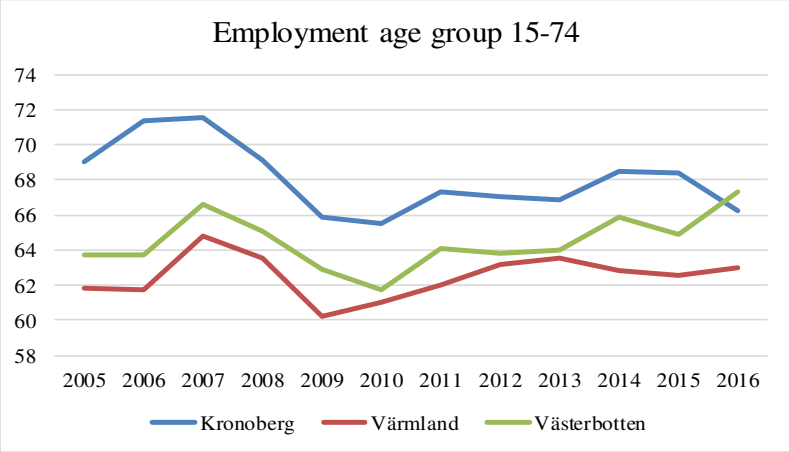


Figure 5.11. Employment (SCB, 2017)

Figure 5.12 presents the share in age group 25-64 who have at least three years university education. Although this shares show large increases, Umeå has clearly higher proportion while Karlstad and Växjö not differ. Year 2000, there was a change in the classification system.

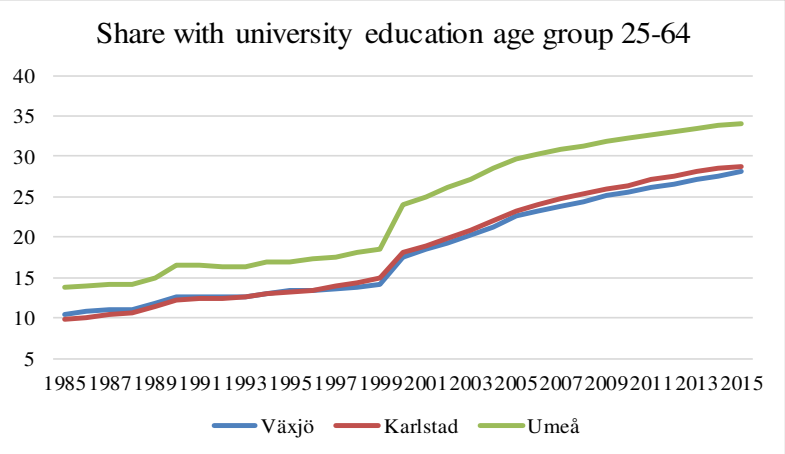


Figure 5.12. University education (SCB, 2017)

Table 5.7 presents the share of people in household with less than 60%, more than 200% and between 60% and 200% income relative the national median income 2011 and 2015. Karlstad and Värmland have a more negative income development compared to the other cities and counties.

	Income <60%		Income >200%		Income >60 - <200%	
	2011	2015	2011	2015	2011	2015
Växjö	12,8	13,8	6,2	6,7	81,0	78,4
Karlstad	14,5	14,5	5,3	6,2	80,2	79,3
Umeå	13,1	13,1	5,1	6,7	81,8	80,2
Kronoberg	13,2	15,0	5,0	5,5	81,8	79,5
Värmland	16,1	17,2	3,8	4,4	80,1	78,4
Västerbotten	13,0	13,9	4,0	5,3	83,0	80,8

Table 5.7. Income distribution (SCB, 2017)

Table 5.8 presents the tax income forecast per citizen 2017 and 2021. Umeå is expected to have the best economy also the coming years followed by Karlstad and Växjö.

	Tax income per citizen, SEK		
	2017	2021	Increase
Växjö	42 165	46 198	4 033
Karlstad	46 677	51 140	4 463
Umeå	49 500	54 234	4 734

Table 5.8. Tax income forecast (SKL, 2017)

5.4 Industry sector

The exploration of forests, ore and hydroelectric power has been the basis for industrial development in Värmland and Västerbotten. In Kronoberg, ironworks also laid the foundation for industrial development.

From the middle of the 17th century, there was a large amount of ironworks, especially in the eastern Värmland´s "Bergslag", based on ore mines and forests converted to charcoal. At the same time, large-scale ironworks with blast furnaces and German forges were constructed in southern Småland, subsequently referred to as the Kronoberg "Bergslag", and unique to Sweden through the absence of mines.

Already in the first half of the 1700s, the many ironworks in Småland experienced a final flowering period. The small iron mills were smashed out of Norrland's and Svealand´s large-scale mining and international competition, but in the small-scale ironworks without access to ore, an industrial know-how had been built. In addition, there was plenty of labor and forests. In eastern Kronoberg, they changed view to glass handicraft and the forests were well suited for the energy demanding ovens. In western Kronoberg, the ironworks were transformed into small manufacturing industries. The transformation developed a cooperative spirit, which still characterizes the business culture that is "Gnosjöandan".

In 1742, Kosta glass mill was founded by the two war veterans Anders Koskull and Georg Bogislaus Staël von Holstein. They had fought as generals for Karl XII, and as a thank-you been appointed to governors in Kronoberg and Kalmar counties. Now they invested their assets in a common glass mill, named after the first two syllables in the two partners surname.

During the 19th century, development accelerated. Over ninety new glass mills were established. At the same time, a lot of innovations were introduced. The technique of blowing solid glass was spread and in the 1830s, the machine-made press glass came to Sweden. Several glass mills experimented with glass pulp stained with metal oxides, and painted decorators. Glass tableware became the bourgeois status symbol. Kosta advanced to the country's second largest glass mill after Reijmyre in Kolmården. Kosta constructed a narrow-track railway to Lessebo, which boosted the business. The transport of glass products could change from bad roads to convenient railway

Orrefors glass mill was founded in 1898, since the old ironwork from 1726 was laid down. But it was only after the businessman Johan Ekman in 1913 became owner, as Orrefors began its journey to fame. Actually, he was most interested in the forests to his cellulose factory in northeastern Småland, but as the glass production went on with a slight profit, he decided to continue the operation. In order to create beautiful and functional products, artistic skills were required. The culture-inspired Johan Ekman saw the potential of an independent Swedish glass art. That would be the key to Orrefors´ success.

After the Second World War about 45 mills were active in the Glass Kingdom, but on the horizon the clouds gathered. In the early 1970s, the glass mills were exposed to its worst crisis so far. Mill after mill was bankrupt. The government urged amounts of money to save employment and support exports. About 4,000 people worked in the glass industry and 40% of production went on export, mainly to the United States.

At the beginning of the 1980s, the crisis once again resumed the glass mills in a tight grip. There were about 20 glass mills and they fusioned. Kosta had early acquired Boda. The two major players, Orrefors and Kosta Boda, had together almost half of the Swedish market. In 1989 Kosta Boda was bought by Orrefors. The last few decades have been further hard against the Swedish Glass Kingdom. Is an epoch of Swedish history about to go to the grave?

In Värmland, the ironworks business developed in a completely different direction. "Brukspatronernas" ironworks were consolidated step by step. Steel mills were set up in Hagfors, Munkfors, Degerfors and Nykroppa. The ore plants in Persberg and Nordmark were exploited industrially. Uddeholm emerged increasingly as the leader of the development. In 1830, the company bought Munkfors Bruk and in 1870 the Geijer family company was converted into a limited company. Railway was built from Filipstad via Hagfors to Karlstad. At the beginning of the 20th century, Uddeholm built the first power plants in Klarälven and the Storfors pipe factory was acquired. From the 1920s, Uddeholm became an international large company and dominated Värmland.

The forest industry's development in Värmland is essentially about Uddeholm, Billerud and Mölnbacka Trysil, in addition to a short period by Vänerskog, the private forest owners company, which went bankrupt in 1981 in the largest bankruptcy in Sweden up to then.

Billerud's first pulp mill was started in 1884 in Säffle. Many of the small ironworks in Värmland were in a financial crisis at the end of the 19th century and relocated production to pulp production. Billerud's strategy was to purchase these companies to access their own raw material base of forest while concentrating the production of pulp. Around

15 mills with forests and, in many cases, sawmills were acquired over the years, which eventually made Billerud a very big forest owner. In 1931 Billerud started the current large pulp and paper mill Gruvön. Of all the mills Billerud acquired, two are still in operation, one of which is the first in Säffle.

Uddeholm's footprint in the forest industry are mainly about the plant in Skoghall and the acquisition of Mölnbacka Trysil in 1967 with mills shut down today and very large forest holdings. Skoghall was opened in 1917 and is today a paperboard mill in combination with production of pulp and paper. Gruvön is also expanding its production with paperboard. In 1978, Billerud and Uddeholm's forest industries were merged and in 1984 the company was acquired by Finnish Stora Enso. Gruvön is today in Billerud-Korsnäs, with its headquarter in Stockholm.

Other forest industry comprises a significant number of independent sawmill companies and sawmills integrated with the mills in Gruvön and Skoghall. Further processing of the timber is relatively small.

The closure of ironworks in Kronoberg also paved the way for pulp- and paper mills, which could take over forest assets, hydropower, transport routes and personnel, who were used to industrial activities when ironworks ceased. A significant number of mills were built up, but the lack of large watercourses meant the mills could not expand. With the exception of Lessebo, all of them are closed.

About 50% of Sweden's forests are owned by private forest owners. In the southern part of the country the proportion is about 80%. The forest owners Södra Skogsägarna´s industrial commitment is also extensive here, especially in the pulp industry with large facilities in Mörrum and Mönsterås, just outside Kronoberg. Södra Skogsägarna with headquarter in Växjö is also a big producer of sawn timber and Kronoberg is a region with many sawmills and significant further processing of furniture and IKEA's home.

By the end of the 1970s, Uddeholm experienced a severe economic crisis and was saved by the government by SEK 600 million. The crisis was followed by turbulence and various ownership. Today Uddeholm, which consists of the tool steel mill in Hagfors, is owned by Austrian Voestalpine Stahl. Uddeholm's plant in Degerfors is included in Finnish Outokumpu. Uddeholm´s power plants are part of Finnish Fortum.

In Västerbotten, the industrialization process took momentum with the emergence of the forest industry, and continued in the power and mining industry. The early sawmill activities developed into a major industry in the mid-1800s, not least through the company Dickson & Co in, Gothenburg. The replacement of the water saws with the steam saw meant that the sawmills could be located at the river mouths in connection with shipment, which resulted in a smoother year-round operation. Through the Companies Act, 1848, the acquisition of capital could be distributed among several economically strong owners, thereby increasing investment capacity. The liberal business policy also meant the abolition of export duties on timber and import duties to England. Technical developments and political renewal were strong injections, which allowed the sawmill industry to expand sharply.

The expansionary sawmills were preceded by a strong population increase in the agricultural community, and Västerbotten had the fastest population development in Sweden from 1750 to 1900, from 16,000 to almost 150,000. Through new cultivation and the possibilities for seasonal work in the forests and at the sawmills of the coast, emigration was moderate, unlike Värmland and Kronoberg. Labor demand was met by recruiting from other parts of the country, among them Värmland.

After the turn of the 1900s a sawmill death occurred, caused by timber deficiency, operating concentration and industrial competition from the emerging pulp industry. Paper production was not as extensive in Västerbotten as in southern Norrland and Värmland. Hörnefors became 1948 Västerbotten's first paper mill.

When Boliden ore was found in 1924, Boliden AB was formed and the break started in 1926. The Boliden ore was exported untreated before the Rönnskär smelter was put into operation in 1930.

Hydroelectric power in Västerbotten began to develop in the late 1800s and expanded sharply during the 20th century.

Establishment of new engineering companies in Norrland was slightly larger than the national average in the period 1945-60, which was due to major investments in the steel and forest industry, hydroelectric power, transport infra-

structure and housing, as well as the mechanization of forestry. The engineering industry in Västerbotten has traditionally been small-scale with a local entrepreneurship as a basis. Often, the Västerbotten small business culture has values that traditionally characterize the peasant community in terms of high work ethic, independence and religiosity. In Västerbotten, the mining industry's development has meant a market for local engineering companies, which subsequently became national and international. Example is Gösta Nyströms Karosserifabrik, which is now Volvo Trucks.

Also in Värmland, the steel and forest industries and hydroelectric power have laid the foundation for major engineering companies focusing on these industries. Karlstads Mekaniska Werkstad, Kristinehamns Mekaniska Werkstad, Kamyr and Finnshyttans Bruk, are all well-known examples. Between 1936 and 1986, the companies included in Johnsonkoncernen. Today, the companies are divided into Finnish Valmet, Norwegian Kvaerner and English Rolls Royce

Värmland houses two well-known food companies, Wasabröd and Löfbergs. Wasabröd started in Skellefteå in 1919 and moved to Filipstad 1931. The company was a family company until 1982 and is today owned by Italian Barilla. Löfbergs was founded 1906 and began to roast coffee in 1911. Ever since its inception, Löfbergs is a family company. Another prominent family company in Värmland is the media group NWT with Nya Wermlands Tidningen in the lead. The company has its roots in the early 20th century

In Växjö, Karlstad and Umeå, of course, all branches of the service sector grow. In terms of tourism and the number of guest nights, Värmland is more than twice as large as Kronoberg and Västerbotten.

The retail trade in Värmland is very large in relation to the population. Large malls in Töcksfors and Charlottenberg, next to the Norwegian border, are primary aimed at customers in Norway. This also applies in part to shopping centers in Karlstad, which is a significant trading city.

Umeå is Norrland's largest trading city. Politicians have not allowed large external shopping centers, but invested in smaller city centers

The IT industry is very important to PGS and therefore we discuss this industry a little extra in our historical description.

In 1979, Uddeholm's IT department was transferred to a company, Värmlandsdata, jointly owned by Uddeholm and IT company Programator. Over a period of five years, Värmlandsdata grew from 50 employees to more than 500. When Uddeholm decided to sell its half to Programator, Värmlandsdata losts its energy with several dropouts and new companies as a result. It's about 30 companies in several stages. The remains of Värmlandsdata is today included in the French Sogeti´s local office in Karlstad.

Almost 70% of the IT companies in Karlstad, expressed in number of employees, are consulting companies with a small regional market in view of the fact that the major industries top management have left Värmland. These companies are therefore strongly dependent on efficient passenger transport to reach their markets. As this infrastructure is inadequate, the growth opportunities of consulting firms are limited, as can be seen from the number of recruitment ads. The lack of regional markets and transport restrictions, of course, also applies to all other consulting areas. According to SCB, Karlstad has 430 IT companies with a total of approximately 2,400 employees. In 2000, the Värmland IT companies established the Compare foundation, which is a network of collaboration. Compare has 96 members with a total of 2,300 employees. It's not just about IT companies.

Programator was also together with Ericsson owner of the IT company Ericsson Programatic. In conjunction with restructuring in Ericsson, the company was sold to Finnish Tieto, reducing the number of employees.

In Växjö in 1963, the tele maintenance company Telub was established. Telub became a major company in the region and developed a solid information technology know-how. The company, which had the Swedish state as majority shareholder, has been transformed and merged into other companies over the years as well as generating some 60 new companies. Examples include technology consultant Combitech, IT company Tieto and software company SPCS, now the Norwegian Visma SPCS. The company was started by two employees at Telub and one of them later created the software company Fortnox.

With Telub, the IT industry got a very good start in Växjö. IT is today the largest industry and Växjö one of the strongest IT cities in relation to the population. Växjö, according to the municipality, has 450 IT companies with a total of 5,000 employees and the recruitment requirement is high. The municipality's business office and the IT companies collaborate in campaigns aimed at recruiting 700 employees in spring 2017.

Almost 60% of IT companies in Växjö, expressed in number of employees, are software companies. These companies have mostly a small part of their market in the home region, but are not dependent on efficient transport communications in the same way as IT consultants. This would be one of the reasons why the IT industry is growing more in Växjö than Karlstad. The two cities have the same conditions for transport infrastructure.

In 1957, the Fläktfabriken opened in Växjö, and the business grew to about 1,000 employees. The factory has been shut down since the beginning of the 2000s, but this operation also caused several dropouts to engineering consulting companies. Given the strong manufacturing sector in Kronoberg, these companies have a good regional market.

Umeå was during a long time smaller than Skellefteå, and with a strong sense of office and school town. Since Umeå University started in the late 1960s, population development has gone fast as the service sector grow, and in particular IT companies. The latest survey, 2013, shows that between 2006 and 2012, 80 IT companies were started and the number of employees increased by more than 80% to around 1,700. In Umeå, there are an average of 2.4 employees per company, while in Växjö there are 5. 6 and in Karlstad 4.2. This strengthens the picture of the establishment rate in Umeå in recent years.

In Umeå, IT consultants and software companies are equally sized in the number of employees. Together they represent for almost 100% of the IT industry. Umeå has very good air connections to Stockholm, so the consultants do not have the limitations as in Karlstad and Växjö.

In the light of the above historical description of the industrial sectors in Kronoberg, Värmland and Västerbotten, a summary structure is presented below in figures.

Table 5.9 presents the distribution of industry sectors in Värmland, Kronoberg, and Västerbotten 1995, 2005 and 2015.

	Distribution of companies per industry								
	2015			**2005**			**1995**		
	Värmland	**Kronoberg**	**Västerbotten**	**Värmland**	**Kronoberg**	**Västerbotten**	**Värmland**	**Kronoberg**	**Västerbotten**
Mining	0,1	0,1	0,2	0,2	0,2	0,2	0,2	0,3	0,3
Manufacturing	6,5	8,3	6,7	9,1	12,3	9,1	8,7	13,4	9,7
Power and supply	1,2	0,9	1,0	0,9	0,5	0,5	1,1	1,0	0,9
Construction	10,6	10,3	10,0	8,7	9,0	9,3	8,7	9,9	9,4
Retail	16,8	16,2	13,9	20,3	20,0	17,7	24,3	23,5	20,4
Transport	3,6	3,3	3,7	5,4	5,3	6,2	7,7	6,8	9,7
Hotel and restaurant	3,8	3,1	3,5	3,8	3,2	3,7	3,9	2,9	3,4
Service	57,7	57,8	61,1	51,7	49,4	53,4	45,3	42,2	46,3
Sum	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0

Table 5.9. Distribution of companies per industry (SCB, 2017)

Kronoberg had a larger share of manufacturing companies 2015 compared to the other counties. The share has decreased in all three counties since 1995. In 2015 retail was larger in Värmland and Kronoberg compared to Västerbotten in terms of companies. All three counties have experienced a diminishing trend since 1995. The service sector shows the opposite development and is the largest in the counties.

Table 5.10 presents the number of companies per 1.000 inhabitants and company size in Värmland, Kronoberg, and Västerbotten 1995, 2005 and 2015.

Number of companies per 1000 inhabitants and company size										
	0	1-4	5-9	10-19	20-49	50-99	100-199	200-499	500-	Sum
2015										
Värmland	106,31	22,92	6,61	4,11	2,51	0,94	0,38	0,11	0,04	143,93
Kronoberg	107,77	21,32	6,39	4,09	2,97	1,07	0,41	0,17	0,04	144,21
Västerbotten	119,21	22,62	6,68	4,32	2,65	0,96	0,43	0,13	0,03	157,03
2005										
Värmland	86,48	18,46	5,73	3,74	2,47	0,87	0,38	0,12	0,05	118,31
Kronoberg	96,11	18,72	6,18	4,12	2,75	1,16	0,33	0,18	0,06	129,62
Västerbotten	97,49	19,26	5,97	3,79	2,32	0,93	0,37	0,14	0,03	130,31
1995										
Värmland	37,68	18,43	5,20	3,40	2,10	0,76	0,28	0,15	0,06	68,06
Kronoberg	44,15	18,05	5,94	3,63	2,64	0,84	0,35	0,18	0,03	75,81
Västerbotten	34,69	21,33	5,65	3,22	2,14	0,83	0,32	0,11	0,04	68,33

Table 5.10. Number of companies per 1000 inhabitants and company size (SCB, 2017)

The number of companies has more than doubled in all counties and most in Västerbotten. The number of large and midsize companies is almost unchanged in all three counties since 1995, while small companies have increased their numbers and most in Värmland. Micro companies have almost tripled and most in Västerbotten.

5.5 Culture sector

Umeå seems to be the most cultural of the three cities. However, Karlstad and Växjö are also cities, where cultural efforst are important instruments in the strategies. In 2014, Umeå, together with Riga, was the EU cultural capital.

Theater and music in Växjö has a more traditional and regional profile compared to Karlstad and Umeå. Wermland Opera with the Sinfonietta orchestra has a national profile and audience and Norrlandsoperan in Umeå with its symphony orchestra is also much more than local. Karlstad and Umeå have, above these capacities, several other theaters and performance resources. Väven is a large cultural center in Umeå.

Each city has traditional regional museums, as well as museums associated to the regional history. More national oriented are Lars Lerin art gallery and Fröding´s Alster in Karlstad and Kvinnohistoriskt museum (women history) in Umeå.

Outside the Karlstad Region, we have Västanå theater and Rackstad art museum, which both have a national reputation and are important also for Karlstad Region.

Karlstad CCC, Nolia and Väven in Umeå and Växjö konserthus are large conference and entertainment capacities in the three cities.

Table 5.11 presents the cities´ culture expenses 2015. The cultural capital activities are of course a vital part of the expenses in Umeå. However, Umeå spends a lot more than Växjö and Karlstad.

	Culture expenses 2015	
	Total, Million SEK	Per capita, SEK
Växjö	107	1 217
Karlstad	96	1 080
Umeå	324	2 685

Table 5.11. Cities´ culture expenses

Table 5.12 presents the counties´ culture expenses 2015. The figures show that a larger part of the culture in Värmland is a regional matter compared to the other counties.

	Culture expenses 2015	
	Total, Million SEK	Per capita, SEK
Kronoberg	61	317
Värmland	119	432
Västerbotten	110	419

Table 5.12. Counties culture expenses

5.6 University sector

Umeå became a university in 1965 and had at that time already dental and medical education since 1956 and 1958. Karlstad and Växjö were university branches 1967, which became colleges 1977 and universities 1999. In Umeå is also University of Agriculture, the Forest Science faculty, located. Umeå is a much more advanced university compared to Linné and Karlstad

Table 5.13 presents the number of students, employees and rank among 34 Swedish universities and colleges, due to uniRank university ranking

	University	Students	Employees	Rank
Växjö	Linné university	31 000	2 000	14
Karlstad	Karlstad university	16 000	1 200	21
Umeå	Umeå university	32 000	4 200	6
	University of agriculture	400	500	10

Table 5.13. Students, employees and rank (University Information Offices, 2017)

The description of the university structure is limited to faculties, schools and research centers.

Linné University

The university has 4 faculties, 2 schools and 1 research center.

Faculties:

- Health and Life Sciences
- Arts and Humanities
- Social Sciences
- Technology

Schools

- Business and Economics
- Teacher Education

Research center

- Regional Development (RUC)

Karlstad University

The university has 2 faculties, 3 schools and 3 research centers

Faculties:

- Arts and Social Sciences
- Health, Science and Technology

Schools:

- Business School

- Ingesund School of Music
- Teacher Education

Research centers:

- Service Research Center (CTF)
- Academy of Smart Specialization
- Regional Development (RUC)

Umeå University

The university has 4 faculties, 8 schools and institutes and 18 research centers

Faculties:

- Arts
- Medicine
- Social Sciences
- Science and Technology

Schools and Institutes:

- School of Architecture
- Institute of Design
- School of Business and Economics
- Academy of Fine Arts
- University School of Restaurant and Culinary Arts
- Institute of Technology
- School of Education
- School of Sport Sciences

Research centers:

- Arctic Research Centre
- Biomedical Engineering and Physics (CMTF)
- Demographic and Ageing Research (CEDAR)
- Environmental and Resource Economics (CERE)
- Regional Science (Cerum)
- Educational Development
- European CBRNE
- High Performance Computing (HPC2N)
- Northern Sweden Soil Remediation
- Functional Brain Imaging
- Gender Studies (UCGS)
- Microbial Research
- Molecular Medicine (UCMM)
- Marine Sciences
- Mathematics Education Research
- Plant Science Centre (UPSC)
- School of Sport Sciences
- Sami Research

5.7 Public sector

The public sector is the largest employer in all three regions. Of interest regarding growth is the presence of specific institutions such as government authorities and hospitals, theirs size, unique skills, as well as education and research.

Government authorities

Table 5.14 presents government authorities and the number of employees. For Karlstad, government authorities are important for the employment, which is not the case at all in Växjö and very little in Umeå.

	Authority	Employees
Växjö	No authority	
Karlstad	MSB	410
	Konsumentverket	170
	Totalförsvarets rekryteringsmyndighet	40
Umeå	Brottsoffermyndigheten	60

Table 5.14. Government authorities (Authority Information Offices, 2017)

Health care authorities

Table 5.15 presents the category of hospital and the number of employees. The hospital in Umeå is a large national education institution, while the two others are county level hospitals.

	Category	Employees
Växjö	County	2 800
Karlstad	County	3 200
Umeå	University	5 700

Table 5.15. Hospitals and employees (Hospital Information Offices, 2017)

Table 5.16 presents the counties' rank among 21 counties concerning health care quality. Kronoberg has a higher rank than Värmland and Västerbotten

	Rank
Kronoberg	6
Värmland	18
Västerbotten	14

Table 5.16. Health care quality rank (SKL, 2017)

5.8 Transport sector

Table 5.17 presents the distance from the benchmarking cities to larger cities and large cities in Scandinavia. The distance means the fastest road. Karlstad has the best location, followed by Växjö and then Umeå, when it comes to distance and cities.

		Distance to larger cities, km	Population	Distance to large cities, km			
				Stockholm	Göteborg	Malmö	Oslo
Växjö	Borås	210	110 000	460	230	240	
	Halmstad	130	98 000				
	Jönköping	130	135 000				
	Kalmar	110	67 000				
Karlstad	Eskilstuna	200	104 000	310	260		220
	Västerås	210	147 000				
	Örebro	110	147 000				
Umeå	Luleå	260	77 000	640			
	Örnsköldsvik	110	56000				
	Skellefteå	140	72 000				

Table 5.17. Distance to cities (Eniro, 2017)

Airline connections

Table 5.18 presents the number of connections to Stockholm, the owners of the airports, and the average profits 2011 – 2015. Karlstad Airport AB is a company with large financial worries. However, Linköping City Airport AB, owned by Linköping municipality, had a -48 MSEK loss in average 2014 and 2015.

Umeå has very good connections to Stockholm from a government owned airport. This is not the case in Växjö and Karlstad.

	Connections to Stockholm per week	Owner	Profit after financial items in average 2011-2015, MSEK
Växjö	22	Kronoberg county	2,4
Karlstad	19	Karlstad municipality	-19,0
Umeå	106	Swedavia	n.a.

Table 5.18. Airline connections (Timetables, 2017)

Train connections

Table 5.19 presents the number of work day connections to different cities. When it comes to train transportation, Karlstad and Växjö have better locations compared to Umeå

		Workday connections
Växjö	Borås	12
	Halmstad	20
	Jönköping	29
	Kalmar	18
	Stockholm	14
	Göteborg	19
	Malmö	38
Karlstad	Eskilstuna	19
	Västerås	23
	Örebro	36
	Stockholm	16
	Göteborg	15
	Oslo	5
Umeå	Luleå	11
	Örnsköldsvik	18
	Skellefteå	24
	Stockholm	6

Table 5.19. Train connections

Roads
Karlstad is located at the European highways E18 and E45 and Umeå at E4 and E12, while Växjö is 60 km from E4.

Harbors
Karlshamn harbor is an important export and import channel for Kronoberg and Växjö. Karlstad harbor is a part of Vänerhamn, including the different harbors around Vänern. Umeå harbor is a collaboration between Umeå and Vasa,Finland. In addition to freight traffic, Umeå has daily ferry connections with Vasa, Finland

5.9 Labor market regions
The Oslo and Örebro regions are the two most important regions when it comes to form an extended labor market for Karlstad Region. Below are descriptions of the regions potential and growth.

When it comes to the RPI, Oslo is number 1 (3) and Örebro number 30 (43). The figures within brackets are the figures from 2010.

Table 5.20 presents the number of travelers per year between Karlstad region and the two cities, as well as the travelling time.

	Travellers	Time	
		Train	Car
Oslo	50 000	02:30	02:35
Örebro	22 000	01:30	01:10

Table 5.20. Travelers and travelling time.

Oslo region
The metropolitan region Oslo is a self reinforcing urban growth economy, an agglomeration economy. The size of this large city´s surrounding labor market region is a function of the transport systems´ efficiency, what time the journey takes to and from major cities, how often it is possible to travel, how the travel time can be used and the price. Cities in metropolitan labor market regions is growing with the big cities.

Oslo together with Stockholm is the fastest growing region in western Europe. Year 2016, Oslo together with the Akershus county, the Oslo region, increased with 18,202 and the Stockholm region with 37,621 inhabitants.

Figure 5.13 presents the increase of Oslo and Stockholm regions population since 1976 and figure 5.14 how the cities shares of the countries' population have increased.

The Oslo region is expected to have 260,000 more inhabitants in 2030, and then have a population of 1.5 million. An already great business potential is growing. Simultaneously, the pressure in the housing market and the regional transport systems will increase. Investment in these systems will be given priority over interregional initiatives.

The Karlstad region lacks effective transport systems to Oslo, is therefore not included in this urban labor market region and by that can´t benefit the full potential from this important growth economy.

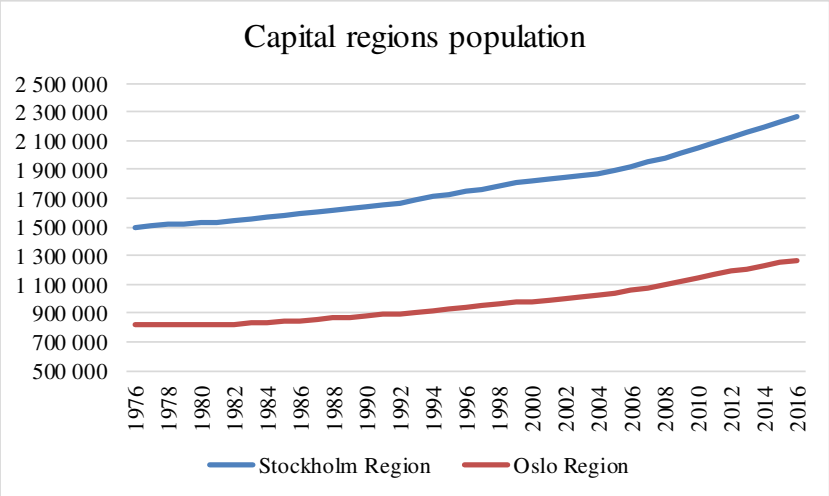


Figure 5.13. Capital regions population (SCB, SSB, 2017)

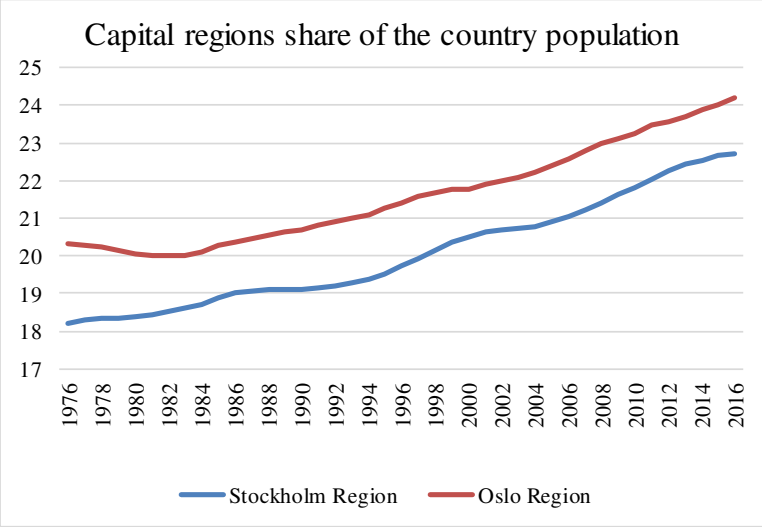


Figure 5.14. Capital regions share of the country population (SCB, SSB, 2017)

Örebro region

Figure 5.15 presents the increase of Örebros population since 1975 compared to Karlstad. In 1994 Lekeberg community left Örebro and formed its own municipality. Between 1976 and 1990 the population of Karlstad increased with 5,2% and Örebro 2,2%. From 1995 until 2016 the citizens of Örebro have been 22,6% more and Karlstad 13,5%.

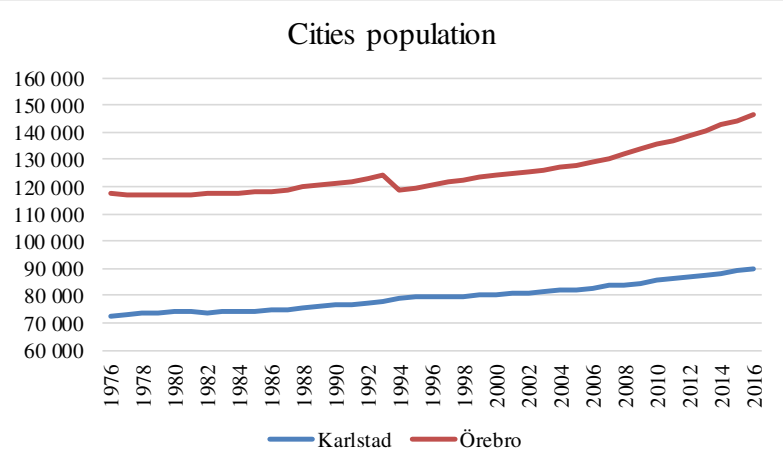


Figure 5.15. Cities population (SCB, 2017)

Figure 5.16 presents the development of the populations of Örebro and Värmland counties.

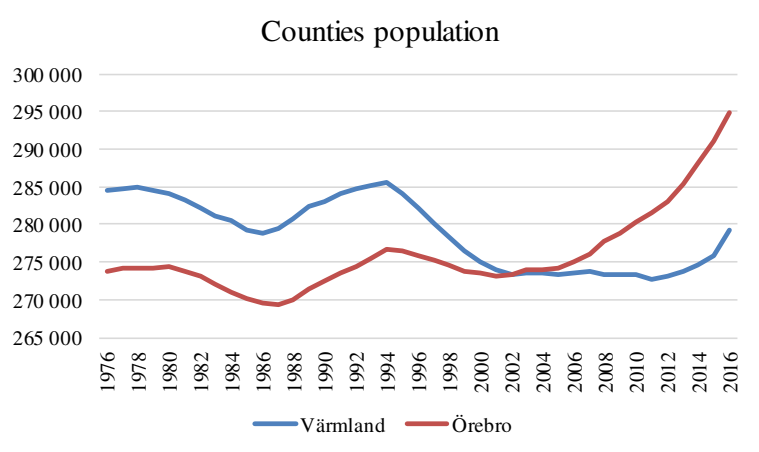


Figure 5.16. Counties population (SCB, 2017)

The development of Oslo and Örebro explains obvious the value for Karlstad Region to be an integrated part of the two regions.

5.10 Evaluation

Due to the structure capacities, part 5.1-5.8, Umeå and Växjö perform better than Karlstad. Umeå and Växjö are leverages for Västerbotten and Kronoberg counties, but Karlstad is not when it comes to Värmland county. The question is, why?

Our approach to discuss and analyze the question is the model in figure 3.1, as well as the soft capacities of the ”honeycomb”.

Figure 5.17 presents the counties share of the Swedish population since 1805. Värmland peaked in 1860 with 6,4% of the national population, and Kronoberg 1865 with 4,0%. Västerbotten continued to increase its share until 1940 and had that year 3,5% of the Swedish population. In 2016, the shares are, Kronoberg 1,9%, Värmland 2,8%, Västerbotten 2,7%.

Värmland's population development is terrible. Playing with the idea that the share had remained unchanged, the Värmland population had been 640,000 instead of 279,000, and Sweden's fourth largest county after the big city counties. Imagine how attractive Värmland would have been with a residential city with over 200,000 inhabitants.

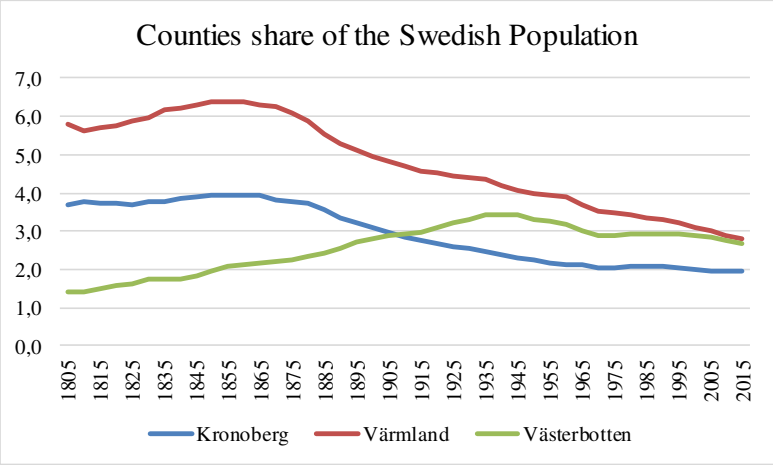


Figure 5.17. Counties share of the Swedish population

Explaining the development of the three cities is a complex matter. However, our aim is not to eliminate all residuals, but, as we have previously stated, to identify essential capacities as a starting point for PGS together with the assessment of the future

Politics and religion is the models "big bang". Martin Luther's transformation of the Christian church 500 years ago has since then been a positive component of the development of northern Europe. This church has been rooted differently in regions in recent times with a Lutheran perspective and has, together with politics, a strong bearing on regional tradition and culture as impacts on prosperity and growth.

Excellent political leadership plays over the "honeycombs" all soft capacities in the development of their society. These leadership has a positive view of collaboration, learning, change and new technologies, and how these capacities are transformed to strategies. In that respect, our interest is prosperity and growth

Regions and cities that focus on human capital in their development strategies are performing better than those who continue to capitalize primarily on natural resources. Human capital refers to the population's level of knowledge including language skills, work experience, education and education quality. It is about investments in universities, culture and healthcare as well as building advanced and highly paid manufacturing and service sectors, which then generates a broad service sector with shops, restaurants, cafes, hairdressers, gyms, etc.

The resource curse is the negative statistical correlation that has been observed between economic development and richness of natural resources. Norway, and other developed countries, are examples that the correlation has its weaknesses. However, Norwegian governments are aware of the after oil time and invest billions of NOK in research Centres of Excellence all over the country.

The attractiveness of larger cities increases with its size. Large cities are more diversified and therefore become more attractive for companies looking for establishments. They generate their own growth, become less vulnerable, and begin to be agglomeration economies. In addition, successful universities contribute to this. In order for cities to grow, they must also be especially attractive for women to live in and for their children to grow up in. Where the women

are, the men come. The real estate market also plays a major role for growth of cities. Increased value on real estate strengthens equity, which creates opportunities for borrowing and investing.

Above tradition and culture, formed by politics and religion during a very long time, and the last decades politics as main drivers of growth, there can be an element of coincidences and circumstances. However, what seems to be such elements in the first glance can be results of the soft capacities.

To sum up, our evaluation comprises the following areas:

- Tradition and culture
- Political leadership
- Coincidences and circumstances

Västerbotten is based on a liberal and free-spirited tradition and culture with open mind for new ideas and early interest in human capital. This culture has developed an industrial tradition characterized by entrepreneurship and small businesses. Over the past 20 years, more small companies have been started in Västerbotten than in Värmland in relation to the population.

Kronoberg has the same heritage as Västerbotten. It is about the free-church and liberal elements and an industry tradition that started with small businesses. There is a strong entrepreneurship, a Gnosjöanda. You are talking about the "growth banana", the arch from Jönköping via western Småland to Växjö.

Tradition and culture in Värmland are completely different from Västerbotten and Kronoberg. The river Klarälven divides Värmland geographically and culturally into two halves. To the east of the river, the culture is strongly characterized by "brukstraditioner" and large scale forestry. Even the western hemisphere has its heritage from its mills, but there are more of small businesses, tourism, private forest owners and thus entrepreneurship. The free-church influence has been small in Värmland, except in a few towns and these are also islands of entrepreneurship. "Brukstraditioner", that has so much been told by Selma Lagerlöf, and has been so paralyzing has still not been passed out there.

Old "bruksorter" have difficulty reorienting and lag behind. When they are on the verge, occur reinforcing mechanisms that lead to an evil spiral of all worse economic development, increased relocation and worse social development. The tax equalization system is an enhancing mechanism. It has the biggest negative effects on growth in the weak municipalities that receive major contributions. Municipalities who neglect work on their business environment are almost entirely compensated for the consequences.

Tradition and culture in Umeå and Växjö on the one hand and Karlstad on the other are different worlds. There are different conditions that remind about children, who start school and come from different study traditions. However, this is the basic condition that PGS has to accept and assume.

When it comes to the political leadership, we have chosen to focus on a limited number of politicians and other leadership to show what leadership means for growth.

For many years, Umeå has a political leadership with great commitment to development, change and growth, focusing on human capital instead of capitalizing on natural resources. It is about education, culture and healthcare. This leadership had and has roles far beyond the local community. There have been strong relationships with decision makers in Stockholm, seeking cooperation and not counter-work. There are few cities that have benefited greatly from regional policy like Umeå. Stockholm is Umeå's largest commuter destination thanks to the good aviation connections with three competing companies.

Regarding the collaboration capacity, in Umeå there is a strong interaction between the municipality, business and universities. BioFuel Region is a regional cooperation arena in the four northernmost counties. The focus is on a conversion to renewable energy, with emphasis on transport and sustainable products based on forest raw materials. BioTech Umeå creates activities and opportunities for researchers and biotechnology companies in the region and markets Umeå-based research and companies in biotechnology and life science. InfoTech Umeå is a strategic venture to market and develop the IT innovation environment in the region. Close contact is a collaborative project initiated by the Institute of Technology to develop cooperation between the university and the region's companies. Uminova

Innovation is working for the development of business ideas to businesses. Uminova Innovation is aimed at researchers, employees and students at universities, hospitals and other research institutes in Umeå. They also work with innovative business ideas from existing companies throughout the region.

Gösta Skoglund was a leading politician in Västerbotten during the 1940s and a few years into the 1970s. During this period, he served as minister for communications 1957-1965, member of the parliament 1940-1970, and chairman of the county council 1954-1963 and 1971-1973. He attributed to the decision that Umeå hospital in 1949 became a regional hospital, which later became a university hospital. Gösta Skoglund had a strong conviction of the importance of higher education for regional development and realized the importance of education of dentists and doctors could have for Norrland and worked hard for this in his political network. He made financial commitments from the county council, which is considered to have been crucial for the advent of the education of dentists and then doctors in Umeå. Gösta Skoglund played a decisive role in the advent of Umeå University and the positive development of Umeå.

Gösta Skoglund is a talking example of the crucial importance of strong leadership, and how far in the future such one has effect if it is managed well, and at the same time that the search for explanations for successful regions must start well back in time. Likewise, the opposite, that less successful regions have causes that are found many years back.

Another politician of great importance to the university sector in Umeå is Torsten W Persson, who was member of the city executive board 1970 - 1988. The years 1980-1985 he was the mayor. Torsten W Persson is a doer with close relationships with Tage Erlander, the former Swedish prime minister. He has a lot of interest in architecture and attributes the merit of the launch of the Architectural School in Umeå 2009. He has predicted how to build a city during traveling with his political party, Socialdemokraterna, in different countries. In 1992, he became a PhD honorary doctorate at Umeå University

Politics in Umeå also managed to locate the Forestry faculty with the master of forestry program at the University of Agricultural Sciences to Umeå. Additionally, this was not the best location. Both Karlstad and Växjö had been significantly better.

Torsten W Persson was succeeded by Margot Wikström. She was the mayor 1986 - 1991 and 1995 and is an excellent example of how important it is for the development of the city that municipality politicians also have national roles and that they are using these networks. Margot Wikström belonged to Socialdemokraternas party board 1990 - 2001 and was chairman of Svenska Kommunförbundet, later Sveriges Kommuner och Landsting, 1995 - 1999.

For a decade, 1995 - 2014, Lennart Holmlund was the mayor. He came from the construction sector. With his background, he brought with him a great interest in urban planning and construction. In his role, Lennart Holmlund was very visible and cultivated his business network, when it was trot at Umåker and Björklöven played hockey.

For a period, politicians talked more about “vård, skola och omsorg” instead of urban planning and construction. With Lennart Holmlund, it became the focus on the latter and he speeded up the planning process. More would move to Umeå than was possible, so it required a more efficient process that generated increased construction. The focus was changed to a denser city and to build on several areas simultaneously, which was a requirement from construction companies to spread the risks.

In order to strengthen the property market, Umeå is discussing selling out parts of the public sector, which has already been carried out in Luleå.

Despite the population growth that Umeå is experiencing, the perception that after 2010, it is too small and that Umeå stagnates. Since 1976, Umeå's population has increased by 61.1% and the 7 cities, which today are larger than Umeå with 32.5% on average. From 2010, Umeå's increase is 6.4% and the other's 7.6% on average.

It is often difficult to talk with local politicians that their cities stagnate, but in Umeå, Lennart Holmlund realized that Umeå grows too little, so today the target is 200,000 inhabitants. This requires people to move in from around the world.

The cultural sector is strategic to make Umeå attractive and is the city that invests the most money on culture per capita. Renewal of the culture to attract younger people is an important part of the strategy.

Marie-Louise Rönnmark is the city council chairman and member of the Swedish parliament. She was member of the city executive board until 2014. Marie-Louise Rönnmark's focus is culture and she was very important for the arrival of the Väven Cultural Center and that Umeå became the EU capital of culture. Marie-Louise Rönnmark has had and has several international assignments.

The above means, due to the “honeycomb”, that Umeå has strong capacities when it comes to collaboration, attitudes, change ability, skill development, as well as technology integration.

In the university sector, it has come to light that faster transport infrastructure may have effects that may not have been expected. With the railway Bottniabanan, the journey time from Örnsköldsvik to Umeå has sharply been reduced, which means that students can equally commute to Umeå instead of studying in Örnsköldsvik. The result is a decreasing campus in Örnsköldsvik. If Bottniabanan is extended to Skellefteå, it is possible that people move to Umeå and commute to Skellefteå. The cheap flight from Umeå to Stockholm means shopping in the capital, which is noted by the shops in Umeå. Better train connections have led pensioners in Lycksele to go to Umeå and shop.

When iron industry in Kronoberg was in difficulty and forced to shut down, one could think that owners and others would give up, but they did not. On the contrary, new ways were sought with the knowledge, forest raw materials and labor available. Glass manufacturing, pulp mills and, in particular, small manufacturing factories grew over the years. Pulp production disappeared and now glass use may be overtaking, but new activities are emerging. There was a tendency for change in Kronoberg, which still characterizes the region

Over the past 5 years, 3,000 jobs have been created in Växjö. During the same period, the population increase was 4,700. In the spring of 2017, the business office operates 25 business establishments. The city also helps surrounding municipalities to land establishments. The city is engaged in the city's growth companies and helps them grow more. The work is carried out in project form and spring 2017 there is about 60 companies involved in the collaboration

Two important explanations for the growth are the establishment of two major companies in Växjö, the Fläktfabriken 1957 and Telub 1963. Telub laid the foundation for Växjö's IT companies and Fläktfabriken for technology consultants. These establishments could be seen as coincidences. If so, they have been well managed. Additionally, Växjö began to build fiber networks already in the mid-1990s, which became a driving force for developing services.

The other municipalities in Kronoberg have strong manufacturing sectors, which represents a good market for consulting companies in Växjö. The focus of software within IT also means that the industry has no significant handicap of the geographical location. In view of the expansion of the IT industry, the Linné University spring 2017, is applying for civil engineering education in the digital field. The Linné University aims is to be connected with the region's businesses

IKEA is of great importance to Växjö. About 300 employees at the company live in Växjö and commute to Älmhult. To this end will be added the Kamprad Foundation, which has its headquarter in Växjö, and is funding research at many universities including Linné University. It is of course a coincidence that Ingvar Kamprad was born in Kronoberg, but the environment might stimulate the entrepreneur in him.

The fact that Södra Skogsägarna's head office is located in Växjö is important as such, but also for research and development, as well as for service companies. Rune Brandinger is the data manager who became Södra Skogsägarnas CEO 1986 - 1982 and a famous profile in Sweden's business community. During a period earlier, he was deputy CEO in Uddeholm. Rune Brandinger had great interest in the timbers further processing and use in buildings, as well as for other purposes. This interest was expressed in, among other things, research at Linné University.

IKEA and Södra Skogsägarna are excellent examples of the importance of ownership and top management location.

Some years ago, IKEA and Coop closed their logistics centers in Växjö and large premises became empty, a circumstance beyond the control of politics, and something the Småland spirit would not accept. The politicians decided to make Växjö a logistics center and this has become a success, which grows by 40% per year.

Integration of asylum immigrants is emphasized as a political parade event. Companies are constantly creating new jobs, which makes it easier to arrange employment. To this also contributes the close cooperation between politics and business.

Östers´s first Swedish championship in football in 1968 and the construction of Arenastaden is also highlighted as a contributing growth factor.

The population target is that Växjö will have 100,000 inhabitants by 2025. In the last 5 years, the increase has been 1.3% per year on average. If this rate continues, Växjö will reach the target 2024 and continue to increase its share of the Swedish population, which is expected to increase by 0.9% per year on average.

The political parties Moderaterna and Socialdemokraterna run Växjö as a radar pair with consensus on strategic issues and the future agenda, and not least when it comes to the business sector, with the aim of creating the best business environment. In 2000, Expansiva Växjö was established, an informal network of politicians, entrepreneurs and researchers. They meet at breakfast meetings 6 times a year and then there will be about 400 of the network's 1,800 members. At the meetings, workgroups are created spontaneously and when the work is completed, the groups cease. Participants will not receive any compensation. One wants to avoid formal organizations with boards that often have to take care of everything.

Georg Lücklig was the glass worker who retrained himself as a teacher and advanced to the director of school in 1958. He was was a member of the city council of Växjö for 35 years. Georg Lücklig was strongly actuated in Växjö's acquisition of Teleborg's castle and land ownership and engaged intensively in the university issue. When this became relevant, there were 8 cities that were alternatives to getting a branch to Lund University. Växjö was not one of them, which was explained by the fact that Växjö was too close to Lund and that the region was too sparsely populated. Georg Lücklig did not give up his vision that Växjö would become a university city. He initiated a working group and used his political contact network. Georg Lücklig offered Teleborg as an area for a modern campus. In 1965, it was decided that Växjö would become a university branch.

In addition to the university, Södra Skogsägarna placed its headquarter in Teleborg. Where these for Växjö's development so important activities had ended if Teleborg had not been offered, one might ask.

Gerth Christiansson was not a politician, but worked as planning manager in Växjö city 1984 - 1996. He was strongly committed to increasing cooperation between the university, industry and the municipality. He was one of the fathers of the science park Vidéum, which today has 110 companies. Hans Wieslander was another founder of Vidéum and during many years the principal of Växjö college. He was a leading light regarding the development of the university branch to the Linné University.

Vidéum is a good example of the spirit in Småland. It began with Växjö municipality, Skanska and NCC, starting a joint venture and established Vidéum science park. The university found that Akademiska Hus, which usually owns university buildings, had too high rents. It ended that Vidéum took over the buildings and the university got lower rents. Today Vidéum is wholly owned by Växjö municipality.

Former Mayors, which, in recent times with our perspective, have been of great importance to Växjö's growth are Carl-Olof Bengtsson and Bo Frank.

Växjö has, in conformity with Umeå, strong capacities when it comes to the “honeycomb”, and especially collaboration, attitudes and change ability.

In Värmland establishes about as many small businesses as in Kronoberg. The traditionally working age population in Karlstad has a larger share than in Växjö, and so it has always been the last 40 years. Karlstad and Växjö have been following each other since 1976 regarding the proportion of the population with university education. Växjö and Karlstad have equivalent communications to the big cities and other major cities. If we weigh together all structural features, one can´t assert that Växjö has better conditions than Karlstad. However, Växjö grows considerably better than Karlstad. The explanations may be in the soft qualities in the “honeycomb”

"Värmland grows and perceives no limits" was the title of the regional development program for 2009-2013. Leadership, innovative environments, skills supply, accessibility and quality of life are 5 key areas of the region's development program. An overall theme and overall goal is to achieve growth

Leadership and innovative environments are highlighted in the following quote from the program. "The regional leadership is when the political organizations, the industry sector and the university collaborate and act together. The leadership makes common and strategic decisions for Värmland's future. The leadership's ability to act is a crucial puzzle to realize the priorities in "Värmland grows". Innovative environments are where research, companies and a variety of people meet. It is in these environments that Värmland business community strengthens its competitiveness and is renewed. When entrepreneurs and capital meet new ideas, innovations are born. Here, knowledge is transformed into new products and services that reach the growing world market ".

The network organizations, or clusters that they are named in the program; Paper Province, IUC Stål&Verkstad, Visit Värmland and Compare are key tools in the development program in the field of innovative environments.

In a survey, the citizens of Värmland were asked what activities they considered important for Värmland's development. Tourism came in place number one of 21 activities. Information technology ended in place 15. The residents in Karlstad felt that transport was at least important, that is location 21. The survey was conducted in 2011.

Since Värmland does not grow, the overall goal of the development program has not been met.

Karlstad's population target is 100,000. In the last 5 years, the rate of increase has been 0.9% per year on average. With this increase, Karlstad will reach the goal 2027 and the city's share of Sweden's population will remain unchanged. Growth is too low if Karlstad is to become an attractive city, which creates its own growth through a diversified economy.

The fact that Karlstad is not attractive enough shows that one of the government authorities, and even manufacturing companies, has considerable difficulties recruiting highly qualified employees to the core business. This leads to government services ending in Stockholm. However, the difficulties in recruiting do not apply when authorities and manufacturing companies are looking for IT staff. Then they get a large number of applications, which is not explained by the fact that the services are remarkably attractive, but are due to the weak regional market for IT consultants. After several years of week- and day commuting to Stockholm, Örebro, Jönköping and many other cities, you want a different life.

When the owners and executive management in most of the large manufacturing companies migrated from Värmland during the 1980s and in most cases to other countries, much of the research and the market for advanced services followed. This is a well-known and documented fact. The structural transformation was a circumstance beyond the control of politics, but difficult circumstances occur. It is true to like the situation and act as one did in Växjö regarding logistics and Västerås after the merger between ASEA and Brown Boveri.

In 1988, the large electric power ASEA merged with the Swiss company Brown Boveri and they formed ABB. Research and development units were moved to Zurich as well as manufacturing facilities. The number of employees at ASEA in Västerås decreased 11,000 to 4,000. A lot of measures were considered. Stakeholders on the route from Västerås to Stockholm banded together to fund the expansion of the railway Mälarbanan, together with the government. Travel time between Västerås and Stockholm decreased from 90 minutes to 50 minutes. Commuting between Stockholm and Västerås increased sharply. The education at the city college expanded and was profiled against the technology company's needs. New companies were established and compensated for the loss of jobs in manufacturing. From 1991, the population has grown by 20,000 to 140,000. The average income has risen sharply.

The changes in the large companies in Värmland prompted industry organizations to take initiatives and look for new businesses in the fast-growing IT sector. Handelskammaren and Utvecklingsfonden (Almi) started in 1983 the EDV Foundation, Elektronik och Data in Värmland, with the purpose of creating training centers, technology facilities and companies. A large number of companies and organizations joined as stakeholders. Lennart Christoffersson, retired deputy CEO of Uddeholm, was appointed chairman of the board. In subsequent years, the EDV Foundation delivered significant results, which however were insufficient in relation to the industrial transformation. The foundation is now closed.

A few years later, 1987, Stora (Stora Enso) and Sparbanken Alfa (Swedbank) started the cooperation KomVäst, with the goal of marketing Värmland and creating business startups. In addition to spectacular market activities, the concrete outcome became thin and the cooperation ceased.

Political initiatives were also taken. Parliament members Magnus Persson, Erik Jansson, Kristina Svensson, Jarl Lander and Hans Rosengren, sended a proposal to the parliament in 1986. The latter participated actively in KomVäst. The translated proposal goes as follows.

"Despite the improved economic climate, Värmland´s situation has been severely weakened. In 1985, the population decreased by approximately 1,300 people. This decline is even greater than the major decline in the 1960s. To date, the county has reduced by about 5,000 people in the 1980s. Particularly serious is the net migration of young people. Only in the period 1980-1985 it amounted to about 2,200 people. Länsstyrelsen´s forecasts point to a continued decline in the county's population by 1990 with about 4,000 people. In the county, it is mainly Bergslagen municipalities and Säffle, as well as Grums who suffered. "

"In order for Värmland to reach the national average employment rate, the county has to be provided about 4,300 new jobs. Länsstyrelsen´s forecasts, however, estimate that employment will generally come to decline until 1990. Industrial employment is thus estimated to decrease by about 5,500 jobs in the 1980s."

"The structural changes of industry have also led to that decisive decisions about the future of the companies today is taken outside the county. This remote control means reduced potential for impact."

"It is also severe that Karlstad Region no longer by growth serves as a buffer against the decline in the county. A study conducted at Karlstad University shows that the development in Karlstad in a number of areas been significantly lower than for comparable centers in central Sweden. Värmland's special situation, which is a consequence of the combination of rural problems in the northern hinterland, the structural change problems in Bergslagen and the lack of a rapidly expanding county capital need to receive increased attention from parliament and government, and strong regional policy efforts need to be put in place."

In the proposal, the parliament members provide for increased regional support and support also to the Karlstad Region as well. There was no lack of political insight and political initiative, but we can conclude that Karlstad did not and still is not the growth engine they demanded.

The above shows that Karlstad is another example concerning the impact of the politcal leadership during long time as explanation of a regions success or the opposite. The Karlstad situation is not the result of only the last years political leadership.

Concerning the advent of Karlstad University, Lennart Andersson had a key role. He worked at Gothenburg University and was tied to the Karlstad branch when it was formed. He developed the branch to college and was the principal from the formation until 1994. In that position, Lennart Andersson was the strong force behind the vision of going from college to university. With great endurance, he reached the goal.

In 2016, Karlstad University and the public organization Region Värmland initiated the research collaboration Smart Specialization. The strategic intention of the Academy of Smart Specialization is that it will be a tool for the transformation and renewal of businesses and public sector, and not least for research at Karlstad University. The program is ongoing until 2020 and has a budget of 150 million SEK, of which Region Värmland is funding one third. Karlstad municipality is not an active part of the research program in the same way that Umeå and Växjö are involved in their universities.

Strong focus on specialization and what a city or region has been good at in the past, rarely leads to success. In the 1940s, Silicon Valley was much like Österlen with orchards and food industry. We also have no idea what will get big tomorrow, so specialization can be completely wrong. There is also an overriding belief in what planning can achieve. However, a strength factor in Värmland is the prerequisite for forest-related innovations, which can provide new jobs in forestry and processing industries

In the project, we meet the perception that there is a lot of "silos" in Värmland, and that there is a tension between Karlstad and the other 15 municipalities, who do not want Karlstad to take too much space, and that this would be the reason that Karlstad is not involved in research in the same way as Umeå and Växjö. Tensions are also in Västerbotten between Umeå and Skellefteå, as well as to the municipalities adjacent to Umeå. On the other hand, Lycksele and the municipalities along the mountain range have come to the knowledge that they are benefiting if Umeå grows. Even in Kronoberg there are tensions between Växjö and surrounding municipalities, but they do not get such expressions as they seem to do in Värmland.

In our interviews, we have noted the perception that there is a self-righteous attitude in Karlstad, that the city is "sleepy", and that it is lacking in the dialogue with the business community. We are also confronted with the opinion that political leadership in Karlstad and Värmland have difficulties to become united.

Growth is about the business climate in the municipality and the tax climate in the state. A good business climate involves a great interest in entrepreneurship in a committed dialogue between the business owners and the representatives of the municipality. It's about attitude and you must understand society's economic cycle. Arguments such as nature and the fact that you are in the middle of the Nordic region are of no importance. Municipalities should be business and service oriented to achieve success. When an entrepreneur in Markaryd applies to the municipality, an official calls within one day and arranges a visit. In Ängelholm, the city manager decided how long a matter was to take, which put pressure on the organization.

In our assessment based on the "honeycomb", we find that Karlstad in comparison with Umeå and Växjö is weak in terms of collaboration, attitudes, and change ability

Regarding Karlstad University's orientation in relation to Karlstad´s and Värmland's manufacturing sector, one can consider the priorities. When Linné University is applying for a master of science degree in digitalization to launch a fast-growing industry in Växjö, Karlstad University chooses lawyer education. It is doubtful whether this will promote Karlstad and Värmland's growth. It may not be strange that the university is struggling to involve companies in research projects. Karlstad University operates 13 EU Horizon 2020 projects and only 2 companies in Värmland are included. It is a fact that when the big corporate decision makers went out of Värmland, the focus was on not so technologically oriented SMEs and apparently not so interested in the research collaboration the university offers. The changing reality of business is the university's role to adapt to.

In connection with Karlstad University, Innovation Park has 50 companies, public organizations and the network organizations Paper Province, IUC Stål&Verkstad and Compare.

Retail is a major industry in Värmland and Karlstad. In Töcksfors and Charlottenberg there are large shopping malls next to the border with Norway aimed at the Norwegian market. Just outside Karlstad there are two major trading venues and centrally a large mall.

The emergence of the malls in Töcksfors and Charlottenberg, Kjell Eriksson had a key role, when it comes to politics. He was member of parliament 1988 - 1998 and after that mayor in the border municipality Årjäng until 2008. Kjell Eriksson established a dialogue with the Norwegian businessman and entrepreneur Olav Thon, who owns a large number of properties, malls and hotels. Kjell Eriksson is himself a true entrepreneur and the two found each other and the result was initially the two trading venues at the border. Later, Olav Thon acquired the mall in Karlstad and projects further trade in the city.

Retail is an important service industry for Värmland's employment and economy. At the same time, it is a sector that does not get a region to lift with the same power as advanced manufacturing and service sectors. Tourism is another service industry, which goes hand in hand with retail. Tourism is an important complement to the region, and Värmland has a strong position compared to many other counties including Kronoberg and Västerbotten.

Anders Knape is an example of a municipality politician during recent time, who also had a national role. The years 2006 – 2014, he was chairman of Sveriges Kommuner och Landsting. Between 1988 and 2007, Anders Knape had the position of member of the city executive board in Karlstad, and he was mayor 1991 – 1994, as well as 2001 – 2002. From 2014, he is the city council chairman.

Our summary of Karlstad, related to the two other benchmarking cities, as the starting point for PGS is; unfavorable sociocultural legacy, insufficient political leadership as measured by the soft capacities in the "honeycomb". In addition, the historical wings from the flight of the biggest companies´ headquarters. The political leadership could not influence the major corporate ownership change and relocation of the leadership, which still throw their shadows over Värmland. The time has come to improve the situation.

References

Litterature and Articles

In addition to the following literature and articles in newspapers and newsletters, we have reviewed a significant number of further reports, which we will refer to in the next step.

Alexander Mankowsky, Framtidens bilar är redan här, 2016
Aktiva ägare skapar fler jobb, SVCA, 2015
Akademin för smart specialisering, Region Värmland, Karlstads universitet, 2016
Avsiktsförklaring Akademin för Smart specialisering, Region Värmland, Karlstads universitet, 2016
Alexander Ståhle, Alla behöver närhet – så blir framtidens städer, Dokument Press, 2016
Automation, Kairos Future, 2015
Better growth, better climate, The Global Commission on the Economy and Climate, 2014
Birgitta Södergren, Flaggskeppsfabriken, IPF Uppsala universitet, 2016
Bo Enquist, Transcendence for business logics in value networks for sustainable service business, CTF, 2015
Bo Malmberg, Thomas Wimark, Jani Turunen, Linn Axelsson, Invandringens effecter på Sveriges ekonomiska utveckling, Delmi, 2016
Christian Sandström, Var skapades Sveriges 100 främsta innovationer, Reforminstitutet, 2016
Christopher Lagerqvist, Reformer och revolutioner, Studentlitteratur, 2013
Christofer Laurell, Christian Sandström, Nya tekniken utmanar svenska modellen, 2017
Dag Detter, Stefan Fölster, The Public Wealth of Nations, Palgrave MacMillan, 2015
Den skandinaviska 8 miljonersstaden, 8 Million City, 2014
Den svårförutsägbara framtiden, Sveriges kommuner och landsting, 2015
Där guld glimmar blått, Veteskapsrådet 2007
Edward E. Gordon, Future Jobs, Praeger, 2013
Erik Söderberg, Sagan om Ostlänken, Linköpings universitet, 2015
ESPON, Sverige kommuner och landsting, 2014
European Commission, Demographic report, Analytical web note 3, 2015
Framtidens slut - och andra trender under 2014, 2013
Floire Nathanael Daub, 8 Million City, Partner SPACEGROUP, 2015
Foster Dusseau, Oslo- Stockholm High Speed Railway: An up in the air project, KTH, 2012
Fredrik N.G. Andersson, Andreas Bergh, Anders Olshov, Sverige in i dimman, Intelligence Watch, 2016
Godmorgon världen, Sveriges Radio 2017-05-21, om återflyttande företag
Hanna Skoog, Sverigestudien 2016, Preera, 2016
Hans Abrahamsson, Vår tids stora samhällsomdaning, Sveriges Kommuner och Landsting, 2016
Hurtige tog får arbejdsmarkedet til at vokse, 8 Million City, 2104
Här skakar kirurgen inte på handen, Illustrerad Vetenskap, 2017
Independent Work: Choice, Necessity, and the Gig Economy, McKinsey, 2016
Infrastruktur i utveckling, Infrastrukturkommissionen, 2015
Infrastrukturens roll för omvandling och tillväxt – behovet av uthållig strategi, Svenskt Näringsliv, 2011
Infrastrukturskulden, Svenskt Näringsliv, 2013
James W. Higgins, World Future Review, 2013
Jan-Evert Nilsson, Dagens Samhälle, 2016
Jan Wallander, Flykten från Skogsbygden, 1948
Jared Diamond, Collapse - how societies choose to fail or survive, 2005
Joel Hazan et al, Will Autonomus Vehicles Derail Trains, Boston Consulting Group, 2016
Johan Norberg, En värld i rörelse 1990 - 2015, Entreprenörskapsforum, 2016
Jonas Bjelfvenstam, Hög tid att anpassa för de självkörande bilarna, 2016
Josefina Syssner, Politik för kommuner som krymper, Linköpings universitet, 2014
Julien Grunfelder, Linus Rispling, Gustaf Norlén, State of the Nordic Region 2016, Nordregio, 2016
Jörgen Einarsson, Svenska synpunkter på höghastighetståg, Trafikverket, 2015
Kerstin Enflo, Regional ojämlikhet, SNS, 2016
Klaus Kunzman, Creative Governance in City Regions, 2015
Klusterprogrammet, Tillväxtverket, 2011
Kristina Persson, Arbetet i framtiden, Regeringen, 2016

Karl-Fredrik Gustafsson, Papper och massa i Småland, Skogsindustrierna, 2002
Lage Johansson, Västerbottens industrihistoriska arv, Länsstyrelsen Västerbottens län
Lars Aronsson, Lotta Braunerhielm, Värmlands framtida utveckling, 2011
Lars Westin, Martin Eriksson, The Role of Cities in Nordic Regional Development Policy, Cerum Umeå universitet, 2015
Lina Aldén, Mats Hammarstedt, Flyktinginvandring, Linnéuniversitetet, 2016
Livsmedelsföretagen och exportmarknaden, Jordbruksverket, 2008
Länsplan för regional transportinfrastruktur i Värmland 2014 - 2025, region Värmland 2014
Magnus Persson, Erik Jansson, Hans Rosengren, Kristina Svensson, Jarl Lander, Motion till riksdagen, 1986
Maria Börjesson, Jonas Eliasson, Mattias Lundberg, Is CBA Ranking of Transport Investments Robust? KTH, 2014
Maria Rankka, För elitspel krävs de bästa borgmästarna, Svenska Dagbladet, 2017
Marit Örn Langslet, Regional plan for land use and transport in Oslo and Akershus, Regional Planning Secretariat, 2015
Mark A. Safford, Thoughts on the future of transportation, "Hopes end visions for the 21st century" World Future Society, 2007
Mark P. Mills, Julio M. Otinno, Wall Street Journal, 2012
Martin Rosenström, Tar e-handeln över? Handels, 2016
Mats Johansson, Urbanisering, storstäder och tillväxt, 2006
Moa Tunström, The urban as norm in planning discourse and practice, 2015
Mårten Blix, Özge Öner, Digitaliseringen är en ödesfråga för landsbygden, 2017
Mätning av indirekta klustereffekter, Tillväxtverket, 2011
Nima Sanandaji, Stefan Fölster, Framtidens Jobb, Volante, 2016
Nordregio news on migration and integration, Nordregio, 2016
Carina Jönhill Nord, Ostlänkens betydelse för Sörmlands utveckling, Regionförbundet Sörmland, 2014
Ostlänken – möjligheter för Nyköping, Nyköpings kommun, 2014
Orter med befolkningsökning, Myndigheten för tillväxtpolitiska utvärderingar och analyser, 2011
Patrick Tucker, Mapping future with big data, The Futurist, July-August 2013
Per Florén, Attraktiva kommuner, 2015
Planning Nordic City Regions, Nordregio, 2015
Pontus Braunerhjelm, Klas Eklund, Magnus Henrekson, Ett ramverk för innovationspolitiken, Entreprenörskapsforum, 2012
Preparing for the Future of AI, Office of the President of the United States, 2016
Protectionism in the 21st Century, Kommerskollegium, 2016
Prototyp av Hyperloop svävar för första gången, Illustrerad Vetenskap, 2016
Resultatöversikt för 16 hälso- och sjukvårdsområden, Sveriges kommuner och landsting, 2017
Robotar som aktiva förvaltare håller på att revolutionera hela branschen, Veckans affärer, 2016
Robert Putnam, Bowling Alone, 2000
Roland Andersson, Svante Mandell, Mats Wilhelmsson Så skapas attraktiva städer, Reforminstitutet, 2015
Sara Johansson, Hållbar samhällsutveckling – vad innebär det? Jordbruksverket, 2012
Scientific American 2007 - 2017
Shon Ferguson, Rikard Forslid, Flyget och företagen, SNS, 2016
Sjur Helseth, Norske synspunkter på høyhastighetstog Oslo-Gøteborg-København, Jernbaneverket, 2015
Smart industri, Näringsdepartementet, 2015
Sophie Nachemson, Hållbar ägararkitektur för Sverige, Global Utmaning, 2016
Stefan Fölster, De nya jobben i automatiseringens tidevarv, Reforminstitutet, 2014
Stefan Fölster, Reformmanifest för pragmatiker, Reforminstitutet, 2013
Stefan Fölster, Robotrevolutionen, Volante, 2016
Stockholm attraherar arbetskraften, Stockholms Handelskammare, 2013
Sårbara kommuner, Tillväxtverket, Svenskt Näringsliv, 2016
The future of jobs, Employment, skills and workforce strategy for the fourth industrial revolution, World Economic Forum, 2016
Tillväxtens guldägg, Tillväxtverket, 2011
Tillväxt- och sysselsättningseffekter av infrastrukturinvesteringar, FoU och utbildning, KI, 2013
Tim Besley, Tosten Persson, Utvecklingskluster, SNS, 2015
Tino Sanandaji, Utanförskapets karta, Stiftelsen Den Nya Välfärden, 2014
The End of the Beginning, Kairos Future, 2016

The Stockholm-Helsinki Hyperloop project just took a decisive step forward, Business Insider, 2017
Towards Sustainable Nordic City-Regions, Nordregio, 2016
Tvi Bisk, No limits to growth, World Future Review Spring 2012
Urbanisering, SKL, 2015
World Values Survey, Worldsocialscience.org, 2015
Wolf Richter, Self-Driving Vehicle Revolution to Wipe Out 4 Million Jobs, 2016
Örjan Sölvell, Evaluation of Cluster Initiatives, Region Värmland, 2014

Interviews and Contacts

We have conducted the below interviews, and in addition with several people related to Karlstad and Värmland, who we do not publish for privacy reasons.

Per Florén, 2016-06-20, forskare, framtidsstudier
Paul Lindvall, 2016-10-05, kommunalråd, Linköpings kommun
Kristina Persson, 2017-03-02, fd minister framtidsstudier, Sveriges regering
Åsa Fällman, 2017-03-07, näringslivsutvecklare, Umeå kommun
Magnus Henrekson, 2017-03-09, verkställande direktör, Institutet för Näringslivsforskning, IFN
Torborg Chetkovich, 2017-03-17, fd verkställande direktör, Swedavia
Stefan Fölster, 2017-03-20, chef, Reforminstitutet
Lars Westin, 2017-04-04, professor, CERUM Umeå universitet
Thomas Karlsson, 2017-04-18, näringslivsdirektör, Växjö kommun
Carl-Olof Bengtsson, 2017-04-19, fd kommunalråd, Växjö kommun
Peter Norrman, 2017-04-20, politiker, Växjö kommun och fd chef, Södra Skogsägarna

Seminars

Arena för infrastruktur, 2016-05-31
Business Leader Conference Årjäng, 2016-07-15
Arena för infrastruktur, 2016-08-18
Flaggskeppsfabriken, 2016-09-28
Trafikverkets åtgärdsvalsstudie Oslo – Stockholm, 2016-10-13
Labour Market Integration, 2016-11-10
100 grader Karlstad, 2017-03-31

Databases

Statistiska Centralbyrån, Sweden
Statistisk Sentralbyrå, Norway
Nordregio