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Intellectual Property, Jobs & Prosperity in the Nordic Region

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Summary

Nearly all businesses in the Nordic region to some extent depend on trademarks, patents, copyright and design rights. Some businesses are heavily dependent on intellectual property rights in their operations. This study examines how many jobs and what economic value those businesses create, in each Nordic country and the regions within those countries. An analysis of detailed structural business statistics, coupled with short-term business statistics, shows that a large share of employment and an even larger share of value creation occurs in Nordic businesses with intense reliance on intellectual property rights. Intellectual property rights are of key importance to firms that engage in immaterial value creation (such as program code, movies and music) as well as firms that engage in a combination of material and immaterial value creation (such as manufacturers that rely on new technologies).

One form of immaterial rights is copyright. Copyright is based on the idea that a person or business that has created an original work has the exclusive right to determine how it may be copied and used by others. Sectors with large dependency on copyright include telecommunications, video and television program production, sound recording and music publishing activities as well as advertising and market research. In the Nordic region as a whole, 80.1 billion Euros in value was created in 2019 in businesses with large dependency on copyright. In specific, 17.1 billion of this value was produced in Denmark, 14.2 billion in Finland, 1.2 billion in Iceland, 16.2 billion in Norway and 31.4 billion in Sweden. Intensely copyright dependent businesses employ 819 600 individuals in the Nordic region.¹

One of the main reasons for why consumers choose one product over another is appealing design. Design rights protect the appearance of a

¹ Analysis is based on structural business data, a highly detailed reporting of firm activity across Nordic economies, coupled with quarterly business statistics in order to attain data for latest years. Short-term business statistics relies on comparison of Q2 data.

product, which in turn result from attributes such as shape, materials and colour. This form of immaterial rights is important for many manufacturing industries. In the Nordic region as a whole, 87.8 billion Euros in value is created annually in businesses with intense dependency on design – out of which 28 billion worth of the value was created in Denmark, 13.9 billion in Finland, 0.6 billion in Iceland, 10.7 billion in Norway and 34.7 billion in Sweden. Intensely design dependent businesses employ 940 100 individuals in the Nordic region.

A third form of immaterial rights are patents. Before the evolution of patents, technological achievements were kept secret, to prevent plagiarizers from benefitting from them. This halted the pace of technological development, since technologies did not spread, and also significantly reduced the incentives to invest in technological innovation. Patents incentivize invention by giving the owner the exclusive right to an invention for a limited amount of time, after which the invention can be copied by others. Scientific research and development, telecommunications and many manufacturing sectors are intensely dependent on patents. In the Nordics 182.3 billion Euros in value is created annually in businesses with intense dependency on patents – out of which 53.8 billion in Denmark, 26.3 billion in Finland, 2.4 billion in Iceland, 30.3 billion in Norway and 69.5 billion in Sweden. Intensely patent dependent businesses employ 1.86 million individuals in the Nordic region.

Trademarks are intellectual property consisting of a recognizable sign, expression or design which identifies products and or services coming from one particular source. Trademarks play an integral role in modern society. If this form of intellectual property did not exist, businesses that produces low quality products or services could deceive customers into thinking that their products was actually produced by a reputable firm. Since trademarks protect the identification of businesses, incentives are created for investing in quality and innovation. Trademarks further incentivize firms to act responsibly when it comes to social and environmental issues, since such actions strengthen their trademarks towards the cus-

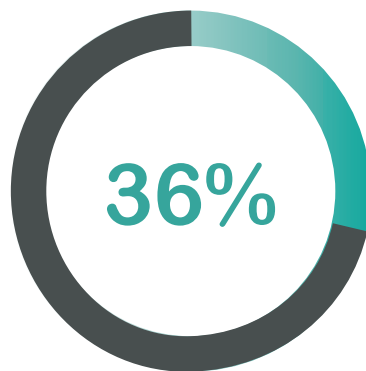
tomers. All business sectors with an intense dependency on patents, design rights and copyright are also intensely dependent on trademarks. In the Nordic region as a whole, 280.7 billion Euros in value are annually created in businesses with intense dependency on trademarks, which is also the total sum of businesses with intense dependency on various immaterial rights. Out of this sum, 75.8 billion is created in Denmark, 41.2 billion in Finland, 4.6 billion in Iceland, 54.8 billion in Norway and 104.2 billion in Sweden. Intensely trademark dependent businesses employ 3.05 million individuals in the Nordic region.

Immaterial intensive sectors tend to have considerably higher output per employee than other parts of the business sector. In Iceland, the average employee in immaterial rights intensive occupation creates 13 percent higher economic value compared to the average employee in the rest of the business sector. In Denmark, the average employee in immaterial rights intensive occupation creates 20 percent higher economic value. The same relation in Sweden is 32 percent higher economic value and in Finland 33 percent. Only in Norway, where much of national wealth is created in the oil and natural gas sectors, the inverse relationship exists, as employees in immaterial intensive occupations create 4 percent less value. A shift towards higher share of the economy with intense immaterial rights dependency is likely to boost GDP per capita in the Nordic region.

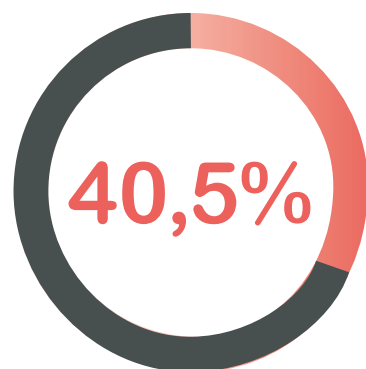
In twelve out of the 25 Nordic regions, the majority of private sector wages are found in businesses with strong dependency on immaterial rights. At the same time, only five of the regions have a majority of private sector jobs in the same businesses. This again shows that businesses with intense reliance on immaterial rights tend to be more productive, reflected in higher wages, than the rest of the private sector economy. Another observation is that in all Nordic regions, including rural regions, at least a third of private sector jobs and wages are found in businesses with intense reliance on immaterial property rights. Improving the con-

ditions for businesses with intense dependency on trademarks, patents, copyright and design rights is thus not only important for a small part of the economy or the capital region economies, but also for economic prosperity throughout the Nordics.

Social benefits of immaterial value creation



36% of the private sector jobs of the five Nordic economies exists in businesses with intense dependency on intellectual property rights.



The same businesses create 40.5% of the value added in the private sector economy.

A map of Norway showing its 19 administrative regions. Each region is labeled with its population in 2018. The regions and their populations are: Finnmark (74,000), Troms (137,000), Hedmark (290,000), Oppland (235,000), Akershus (450,000), Oslo (685,000), Vestfold (198,500), Telemark (156,000), Sørlandet (335,500), Vest-Agder (112,000), Aust-Agder (82,500), Rogaland (163,500), Hordaland (266,000), Nordland (137,000), Sør-Trøndelag (251,000), Møre og Romsdal (182,000), Nord-Trøndelag (112,000), Trøndelag (390,000), and Nordfynland (34,000). The map also shows the coastline and major islands.

Region	Population (2018)
Finnmark	74,000
Troms	137,000
Hedmark	290,000
Oppland	235,000
Akershus	450,000
Oslo	685,000
Vestfold	198,500
Telemark	156,000
Sørlandet	335,500
Vest-Agder	112,000
Aust-Agder	82,500
Rogaland	163,500
Hordaland	266,000
Nordland	137,000
Sør-Trøndelag	251,000
Møre og Romsdal	182,000
Nord-Trøndelag	112,000
Trøndelag	390,000
Nordfynland	34,000

Employees in immaterial-intensive industries per region

Stockholm	335,500
Copenhagen	266,000
Västsverige	251,000
Helsinki	198,500
Oslo og Akershus	172,000
Sydsverige	163,500
Midtjylland	156,000
Östra Mellansverige	137,000
Syddanmark	128,500
Länsi-Suomi	112,000
Småland med öarna	98,000
Etelä-Suomi	82,500
Sør-Østlandet	82,000
Vestlandet	81,000
Agder og Rogaland	67,500
Pohjois- ja Itä-Suomi	63,500
Nordjylland	58,000
Norra Mellansverige	57,500
Iceland	51,000
Sjælland	50,000
Övre Norrland	39,000
Trøndelag	38,500
Nord-Norge	34,000
Mellersta Norrland	29,000
Hedmark og Oppland	23,500
Åland	4,500

Foreword: Nordic nations need to cooperate in fostering intellectual property legislation

The Nordic region is uniquely creative and innovative. Sweden, Finland and Denmark are the EU member states that have the strongest performance in their innovative systems.² This study, published by the network A modern intellectual property law, examines the importance of intellectual property laws in Nordic economies. These laws are of vital importance for creative firms, since much of the value created by such businesses is immaterial rather than physical in form.

As the study shows, firms that are intensely dependent on intellectual property laws (trademarks, patents, copyright and design rights) produce significant economic values in the Nordic nations. In all the Nordic nations, and in all regions within the Nordic countries, a large share of employment is found in firms with intense dependency on intellectual property laws. Additionally, firms with intense dependency on intellectual property laws offer jobs with significantly higher wages than average. These firms are important drivers for economic success.

At the same time, the threat of immaterial rights crime is growing in strength. Actors that infringe on immaterial rights, for example by selling counterfeit products or streaming the digital content of others, are aggressively entering the marketplace. A study published by The Swedish Patent and Registration Office and the OECD finds that the total trade value in fake goods that infringe on Swedish intellectual property amounts to 28.3 billion SEK (3.4 billion USD, 2.6 billion Euro).³ The study describes the situation in Sweden as alarming. An apparent risk is that immaterial rights infringements also spreads to other Nordic countries.

2 European Commission (2019)

3 OECD and PRV (2019)

Criminals have little concern for borders and target the countries with the weakest protection of immaterial rights.

The positive news is that legislators can influence the development. The 2018 Nobel Memorial Prize in Economic Sciences was awarded to Paul M. Romer, whose research shows that a well-designed and balanced regulation for intellectual property law is necessary for long-term growth. There are many examples from Nordic countries on how to foster well-designed regulation for intellectual property. This report is hopefully the first step in a process where the Nordic countries can commonly recognize the importance of intellectual property protection, learn from each other, and strive towards introducing good practice policies from their neighbours.

A common strong Nordic intellectual property law would make the region, which is already well known as a leading international knowledge region, more appealing to creative firms and less open to criminal networks.

/Henrik Pontén

- Representing the network "A modern intellectual property law"

Introduction

This study is based on an in-depth analysis of the latest available structural business information for the Nordic countries of Denmark, Finland, Iceland, Norway and Sweden. The purpose of the report is to measure how much of the jobs, and economic value created, in the Nordic nations are linked to businesses with intensely dependent on immaterial rights—in the form of trademarks, patents, copyright and design rights. This analysis is also carried out at a regional basis. The study finds that firms with intense dependency on immaterial rights play a key role in offering employment and are even more important when it comes to value creation, in all Nordic nations and their respective regions.

The Nordic region as a whole constitutes the 12th largest economy in the world.⁴ While the strength of Nordic economies historically has been an abundance of natural resources, today it is knowledge-intensity. The average Nordic nation has a higher concentration of Brain Business jobs amongst the working age population than countries in Western, Southern and Eastern and Central Europe. This means that an unusually large share of the Nordic population are engaged in knowledge-intensive occupations.⁵ The European Commission's 2019 European Innovation Scoreboard, which compares innovative output as well as the conditions for innovation to occur, finds that Sweden is the EU innovation leader, followed by Finland and Denmark on second and third place respectively.⁶ This study measures the importance of intellectual property for jobs and wealth creation in Nordic economies. Firms that rely on brain power tend to also be strongly dependent on immaterial rights, since these rights protect formalized investments in knowledge and digital creation. Therefore, it comes as no surprise that a significant share of

4 Nordic Council of Ministers (2018)

5 ECEPR (2019). Brain Business Jobs are knowledge-intensive occupations in the traditional tech-sector, ICT, advanced services and creative professions.

6 European Commission (2019). The three Nordic nations that are EU-member states are thus the leading member states in terms of innovative capacity.

value creation in Nordic economies occurs in firms with an intense dependency on different forms of intellectual property.

As late as the end of the 19th century, the Nordic region was a relatively undeveloped outskirts of Europe. As business freedom was introduced in the region about this time, the nation's grew prosperous by relying on their wealth of natural resources, opening up to free international trade and fostering knowledge-based businesses.⁷ Firms such as Atlas Copco, Novo Nordisk, Nokia, Aker Solutions, Electrolux and Vestas developed into internationally recognized knowledge-firms by relying on engineering skills combined with pragmatic Nordic problem solving. Like many Nordic firms, they began to continuously invest in innovation processes, protecting their innovations with patents. Over time, Nordic firms gained an international reputation for their attention to detail, quality and safety. The firms invested in building up brands trusted around the world. This investment in brands was protected by trademarks.

Soon the Nordics came to be known around the world for the works of designers such as Finn Juhl, Poul Kjærholm, Kaare Klint, Josef Frank, Hans Brattrud, Sven Ivar Dysthe, Alvar Aalto and Aino Aalto. Many Nordic businesses have thrived by promoting functionalistic design to an international audience. For firms in industrial design, furniture and fashion design rights are an integral part of the business model. ABBA, A-ha, Roxette, Ace of Base, Whigfield, Aqua, Björk and Sigur Rós are some examples of the Nordic Music Wonder, made possible by the protection of the intellectual property created by creative individuals. The music wonder has been followed by Nordic success in film and television as well as a thriving programming and digital games industry, again with strong reliance on immaterial rights protection.

⁷ Adoption of business freedom and integration into the global marketplace happened earlier in Denmark, followed by Sweden, and later in Finland

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If industrial innovations, designs, songs and brands had not been protected by immaterial rights, incentives would have been undermined for technological innovations, song-writing, furniture design, computer game programming and many other aspects of the Nordic knowledge economy.

Much of the Nordic success story, through which previously poor agrarian nations grew into prosperous welfare societies, has been fuelled by formalized knowledge and digital content. Nordic manufacturing firms would not have grown into international technology firms had they relied on simple manufacturing, rather than continuously working towards product and procedure innovations that gave them an international edge. These massive investments in turn were made since their fruits were protected by patents. Similarly, the Nordic success in design, music, film, computer games and other creative professions has relied on intellectual property and the protection of it. If industrial innovations, designs, songs and brands had not been protected, incentives would have been undermined for technological innovations, song-writing, furniture design, computer game programming and many other aspects of the Nordic knowledge economy.

The importance of immaterial rights has increased over time, due to two long term trends. The first is that firms specialized on creation are increasing in size and dominance, while the other is that firms in general are more dependent on immaterial rights than before. An example of the first trend is the fact that software firms, whose value creation is ba-

sically in digital form, are making up an increasing share of the business sector. The other trend is exemplified by the fact that the evolution of software no longer is limited to specialized software firms, as many businesses today are investing in different apps and other forms of software to use in their business applications, or for their customers to utilize. The same reasoning also applies to other forms of intellectual property, such as arts, graphics, music, film and design. An ever increasing number of firms rely on webpages, brand logos and tailor-made graphical styles. Much of the movie industry is about producing digital content for businesses, who use movies for internal and external purposes – such as educating the staff or outreach to customers and business partners.

Immaterial values differ from **physical values** simply since they lack physical form. Earlier in history the great part of economic value was created in physical form – for example agriculture, manufacture of tools to work farms with and construction of buildings. Today the economy relies on a mixture of material and immaterial value creation. Example of immaterial values include innovation, business ideas, design, program code and digital content in the form of film and music.

Intellectual Property Rights (IPR) have been established to ensure that creative and inventive efforts are rewarded and that investments in new and more efficient products are encouraged. They greatly stimulate the creation of jobs in today's knowledge-based economy.

Infringements of intellectual property rights are a widespread and worrying phenomenon. Reasons for its expansion are various, including the attractiveness of a 'look-alike product' at a cheap price, the ease of production of copies at minimal costs, the development of new forms of marketing such as e-commerce and the growth of international trade.

IPR infringements are harmful as they reduce business and government revenues, stifle investment and innovation and hinder economic growth.

European Commission on the importance of immaterial rights.

Value creation in modern society

How is value created in society? For a long time, the answer provided by economists were simple: capital, labour and natural resources are the three cornerstones of economic activity. The wealth of society will grow when the productivity of labour increases, either as a consequence of investments in innovations or a better utilization of the natural resources available. The management consultant and author Peter Drucker, whose ideas have influenced the understanding of modern business operations, challenged this simple view of economics during the late 1960s. Drucker observed that many leading firms relied on the knowledge that existed amongst their employees and within the organization. Knowledge was the forgotten cornerstone of economic success.⁸

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The knowledge-based society has emerged in a state in which an ever increasing part of the economy is dependent on immaterial, rather than material, value creation.

The theory of the knowledge-based economy, which is based on the observations that Drucker and others made, has with time become widely accepted. One example is the conclusions drawn in a study published in the end of the 1990s, in which Peter Klenow and Andrés Rodríguez-Clare examined why prosperity growth occurred faster in some economies than others.

⁸ Drucker (2011). Originally published in 1969

They found that the traditional model based on physical capital, labour and natural resources only to a limited degree could explain the development. Rather, the two economists claimed that 90 percent of the variation in growth could be explained by how efficiently investments were utilized, rather than how large the investment volumes were.⁹ Later studies have confirmed the link between innovation and growth. A combination of technological innovations, new ways of organizing work processes, organizational changes and service innovations drive long-term progress.¹⁰

The knowledge-based society has emerged in a time in which an increasing part of the economy is dependent on immaterial, rather than material, value creation. An important share of the value created in the manufacturing sector as well as the service sector is of an immaterial nature. Immaterial value creation in the form of business ideas, technological innovation and digital content is a key part of many modern businesses. Immaterial values typically result from investments in organized knowledge, made over a long time period. In some businesses, such as film, music, programming and computer game design, nearly all value created is in immaterial form, since the output is digital content.

As this report emphasizes, immaterial value creation that depends on intellectual property rights is not limited to a few specialized parts of the modern economy. Rather, in the knowledge-based economies—such as the Nordic nations—intellectual property is important for the business sector as a whole. For example, businesses in a number of different sectors find that it is valuable to invest in strengthening the firm's reputation through trademarks and well-designed homepages. Such investments are of course particularly important for firms that provide their customers with superior products or services. The reason is that it is firms with

9 Klenow & Rodríguez-Clare (1997)

10 See for example Grossman and Helpman (1993), Hasan & Tucci (2010), Soete (2011) and Tamura et al. (2019)

a good base reputation that have most to win by enforcing their trademarks. For the same reason, firms that take social and environmental responsibility take a larger interest in protecting their trademarks, as this strengthens the trademark of the firms. Nearly all firms rely to a certain extent on intellectual property, while a significant share have an intense reliance on them.

Firms that rely on new technologies, advanced design, digital content, service innovation and other forms of intellectual property can often gain a competitive advantage from these assets. This is in particular important for European businesses that compete in global markets, since intellectual property advantage can make it possible for the firms to compete with businesses from lower wage countries.

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The transition towards an immaterial-oriented economy has been taking place since the early European industrial revolution—and can in fact be traced to the Middle Eastern industrial revolution that occurred a thousand years ago.

The fact that modern economies are increasingly oriented towards immaterial value creation has several societal benefits. Given the very nature of ideas, they travel fast and can be scaled up. There are environmental benefits from an economic model in which growth is not necessarily the result of manufacturing ever-increasing volumes of products, but instead is caused by a higher quality of goods produced and a greater importance of immaterial content. The transition towards an

immaterial-oriented economy has been taking place since the early European industrial revolution—and can in fact be traced to the Middle Eastern industrial revolution that occurred a thousand years ago.¹¹ Digitalization is currently rapidly increasing the importance of immaterial value creation, and thus the transition is accelerating.

11 See Sanandaji (2018) for further discussion

How would society progress without immaterial value protection?

There are two basic viewpoints on immaterial rights protection within the research literature. The first is that immaterial rights protect important values and that without such protection innovation would be considerably less rewarding and thus much rarer. The other perspective is that excessive utilization of, for example, patents can hinder growth, not least in cases where firms utilize patents to protect processes that competitors could readily discovered on their own. A study by Richard Gold, Jean-Frédéric Morin and Erica Shadeed actualizes the issue by studying the level of immaterial rights protection in 124 economies during the period between 1995 and 2011. The study finds that higher level of immaterial rights protection is indeed linked to higher rates of economic growth. The results are consistent with two casual pathways explored in other literature, namely that intellectual property leads to greater degree of technology transfer and increased domestic innovation activity. The study also finds that growth leads to a higher level of intellectual property protection, which does complicate the issue of causality.¹² The latter effect may be because policymakers in economies with economic progress put greater emphasis on immaterial rights protection, seeing that this protection is favourable to growth.

A similar study but on Chinese data has been conducted by Lily Fang, Josh Lerner and Chaopeng Wu. Their study focuses on the development of previously state-owned enterprises that were privatized. They find that the rate of innovation increased in the businesses following privatization and that this effect was stronger in those cities in China where immaterial rights protection was stronger.

12 Gold, Morin & Shadeed (2019)

Advanced methodology was used in the study to find companies with very similar circumstances, in order to better capture the effect of immaterial protection. A positive relation was found between immaterial rights protection and the rate of innovation once firms are coupled to similar firms in cities with varying degrees of immaterial rights protection. Thus, the effect is likely to be casual.¹³

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These two studies and other similar work use precise methods to better separate cause from correlation. They are in line with the idea that immaterial rights strengthen economic growth and in particular innovation.

These two studies and other similar work use precise methods to better separate cause from correlation. They support the idea that immaterial rights strengthen economic growth and, in particular, innovation. It should also be noted that immaterial rights of course must be balanced, rewarding investments in ideas and digital content are protected, as well as allowing new firms to enter the market.

13 Fang, Lerner & Wu (2017)

A historic context of the importance of intellectual property rights

A glance at history is equally interesting. A common modern misconception states that enterprise and market economy are relatively new historic innovations, which evolved around the renaissance in Europe. In fact enterprise and market economy evolved already 4 000 years ago in ancient Babylonia and Assyria. The Middle Eastern market tradition lived for a millennium, but it lacked intellectual property rights. The first intellectual property rights, in the forms of patents, evolved in the renaissance cities of Italy. Historically, it was not before the market economy was combined with intellectual property rights that a knowledge economy could emerge.

In the early Middle Ages, a Middle Eastern market renaissance coincided with the development of ground-breaking innovations. The Damascus swords forged in Syria, wielded by Middle Eastern armies during the crusades, were made of such advanced material that Europeans never managed to reproduce them. Only recently have scientists been able to understand the secrets of the swords: somehow, the Middle Eastern steelmakers managed to incorporate carbon nanotubes in the steel structure.¹⁴ This is an amazing feat of engineering, as carbon nanotubes are considered an advanced 20th century invention.

It remains somewhat of a mystery how the metalsmiths incorporated carbon nanotubes. Modern nanotechnology did not exist at the time. A likely explanation is that the metalsmiths serendipitously developed an advanced manufacturing method that gave rise to carbon nanotubes, without understanding precisely what they were doing. Organic fibres

14 Reibold et.al (2006)

were likely inserted in the metal through a sophisticated process, leading to the creation of nanotubes. The details of the technique which was used are lost in time, but the resulting metal is nevertheless an impressive achievement. What is interesting is that while the Middle East at the time had a very advanced market economic model, with strong physical property rights, intellectual property rights did not exist. New advances in technology therefore did not spread and were instead kept secret.

The Middle Eastern market renaissance of the early Middle Ages also took place at a time when advanced manufacturing plants were set up to build and construct, amongst other things, astronomical instruments, ceramics, chemicals, distillation technologies, clocks, mechanical hydro- and wind-powered machinery, matting, mosaics, glass, pulp and paper, perfumery, petroleum, pharmaceuticals, ropes, silk, sugar, textiles, and weapons. Knowledge of these production processes, carried out in early factory complexes (tiraz) did to some extent survive and inspired the later European industrial revolution. Yet, much of the knowledge has been lost since then. Perhaps the most important example of a thing forgotten is the Baghdad Battery or Parthian Battery, which was a ceramic pot, a tube of copper, and a rod of iron found together. The artefacts found are believed to be up to a thousand years old and seem to be an early battery. It has been hypothesized that the object functioned as a galvanic cell, possibly used for the electroplating of metals.¹⁵

The discovery of carbon nanotubes and an early battery shows that ground-breaking advances, in the form of nanotechnology and electricity, occurred in the early Middle Ages. Instead of inspiring future growth, these advances were lost only to be discovered much later in history. One key reason is that while the Middle Eastern market model had an advanced protection of physical property rights, intellectual property rights did not exist. Therefore, new technologies and ideas didn't spread, as their authors elected to not speak of their ex-

15 Keyser (1993)

istence. The lack of intellectual property rights also explains why the medical advances of the Middle East, China and India in part have been lost to history. If intellectual property had existed in these civilizations, it stands to reason that the technological advancement had been greater through history.¹⁶

Already during ancient times, some early attempts to introduce intellectual property rights were made in different parts of the world. A systematic form of this incentive seems, however, to first have been in place in the Italian city-states at the end of the 15th century. The first known patent was awarded in 1421 by the Republic of Florence. The receiver was the architect Filippo Brunelleschi, who had invented a barge with hoisting gear, which made it possible to carry marble along the Arno River. Brunelleschi was granted exclusive rights to the fruits of his invention for a three-year period.¹⁷ Another important advancement was when, in 1665, the British and French simultaneously launched the first scientific journals of the world, the French *Journal des sçavans* and the British *Philosophical Transactions of the Royal Society*.¹⁸ Before the invention of scientific journals, researchers often took credit for the ideas produced by others. Since it was difficult for an individual to prove that he or she was the first to formulate a new idea, researchers were reluctant to share their findings with each other, which impeded scientific progress. With the scientific journals, it became clear who was the originator of an idea or insight, thus creating incentives for sharing ideas and research findings.

The scientific journal and the patent right were crucial to the scientific and industrial revolution of the Western world. In essence, they both granted property rights to ideas, and can thus be seen as an extension of market institutions from the area of material values to the area of immaterial values. Copyright, design rights and trademarks are other immaterial rights inno

16 Sanandaji (2018)

17 MacLeod (2002)

18 Kronick (1976)

ventions that paved way for the modern knowledge economy. The historical evidence points to the conclusion that innovation and prosperity flourished when enterprise and physical property rights were combined with intellectual property rights. The early industrial revolution of the Middle East was a time of advanced technological breakthrough, but in the absence of patents the innovations did not spread. When the European industrial revolution occurred, patents were in place and those who had invented new technologies encouraged them to be spread since they benefited as patent holders. Investments in new technologies flourished since patents created a market for innovation.

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The historical evidence points to the conclusion that innovation and prosperity flourished when enterprise and physical property rights were combined with intellectual property rights.

It is also evident that much of the advances made before the invention of intellectual property rights were lost in history, since innovators due to the lack of intellectual property rights were incentivised to hide, rather than spread, their innovations. How the legislation concerning intellectual property rights should be structured and upheld is a complex matter, but that these rights play a key role in fostering technological and economic growth is strongly suggested by historical experience. This is also supported by modern research about intellectual property rights, as discussed briefly in the previous passage.

The modern economy is neither driven by solely physical or solely immaterial value creation. Rather, these two forms of values go hand in hand. One example is that smart phones are physicals product that needs to be manufactured. The manufacturing of smart phones would not be possible without the extensive immaterial investments that occur in the technology for smartphone production. Once the phone is produced, much of its utility comes from being connected via telephone and Internet services, which are immaterial in nature, as well as various applications that are also immaterial software. Thus immaterial values make it possible to manufacture and utilize smartphones, which in turn are very much material products.

Immaterial-intensive businesses in the Nordics

How important is the role of intellectual property rights in the Nordic nations? Our study measures this by examining detailed structural business statistics, which assess the share of employment and value created related to the sector with intense reliance on intellectual property. A study published by the Office for Harmonization in the Internal Market (OAMI) has concluded that essentially all sectors of business utilize intellectual property to a certain extent and that some can be categorized as intensely dependent on intellectual property. The OAMI study, that was originally published in 2011 and later updated in 2016, offers a division of the business sector in two groups, those sectors that are intensely dependent on intellectual property and those that are not.¹⁹

This study utilizes the OAMI classification of business sectors, together with the latest available structural business information coupled with short-term business statistics for recent years, in order to examine the size of the share of the business sector in the Nordic countries and their regions that are intensely dependent on intellectual property.²⁰ Table 1 shows the division of the private sector in businesses that are intensely dependent on various forms of immaterial rights and those that are not. Structural business information has been gathered from the European Union's statistical agency Eurostat. Analysis of what share of economic activity occurs in firms with intense dependency on immaterial rights has been carried out for the business sector of each Nordic country excluding agriculture, forestry, fishing and welfare services. On regional basis the same analysis has been carried out, but with a focus on number of jobs and wage costs rather than number of jobs and value added as in the national analysis. The

19 Office for harmonization in the internal market (2013, 2016). See also European Patent Office samt European Union Intellectual Property Office (2019).

20 The analysis has been limited to four forms of immaterial rights: trademarks, patents, design rights and copy right. The other two immaterial rights in the OAMI studies, geographical indicators and plant rights, are specific cases whose importance mainly concerns parts of the food industry and are not included in this study. Short-term business statistics relies on comparison of Q2 data.

reason is that firms' value added is difficult to pinpoint to regions, in the currently available statistics, and wage costs is therefore the best available proxy for value added on regional level.

The result of this analysis is discussed in the coming chapters, first divided into the four different forms of immaterial rights and then on a regional basis. As can be seen in table 1, business sectors that are intensely dependent on immaterial rights tend to have dependency on several forms of immaterial rights. Trademarks are important for all firms with intense dependency on various forms of immaterial rights.

Tabell 1. Intense dependency on various forms of immaterial rights

	Trademark	Design	Patents	Copyright	No intense immaterial rights dependency
Manufacture of textiles	X	X	X		
Manufacture of basic pharmaceutical products & preparations	X	X	X		
Manufacture of rubber & plastic products	X	X	X		
Manufacture of other non-metallic mineral products	X	X	X		
Manufacture of computer, electronic & optical products	X	X	X	X	
Manufacture of motor vehicles	X	X	X		

	Trademark	Design	Patents	Copyright	No intense immaterial rights dependency
Manufacture of other transport equipment	X	X	X		
Manufacture of electrical equipment	X	X	X		
Manufacture of machinery & equipment	X	X	X		
Manufacture of furniture	X	X	X		
Other manufacturing	X	X	X		
Scientific research and development	X	X	X		
Manufacture of wearing apparel	X	X			

	Trademark	Design	Patents	Copyright	No intense immaterial rights dependency
Manufacture of leather & related products	X	X			
Advertising and market research	X	X		X	
Other professional, scientific and technical activities	X	X	X		
Telecommunications	X		X	X	
Wholesale trade, except of motor vehicles and motorcycles	X		X		
Manufacture of chemicals & chemical products	X		X		
Manufacture of food products	X		X		

	Trademark	Design	Patents	Copyright	No intense immaterial rights dependency
Motion picture, video and television programme production, sound recording and music publishing activities	X			X	
Computer programming & consultancy	X			X	
Renting and leasing	X			X	
Information services	X			X	
Programming & broadcasting	X			X	
Printing and reproduction of recorded media	X			X	
Publishing	X			X	

	Trademark	Design	Patents	Copyright	No intense immaterial rights dependency
Manufacture of beverages	X				
Office administrative, office support and other business support activities	X				
Air transport	X				
Wholesale and retail trade and repair of motor vehicles and motorcycles	X				
Travel agency, tour operator reservation service & related activity	X				
Water transport	X				
Remediation activities & other waste management services					X

	Trademark	Design	Patents	Copyright	No intense immaterial rights dependency
Employment activities					X
Architectural and engineering activities; technical testing and analysis					X
Waste collection, treatment & recycling					X
Sewerage					X
Civil engineering					X
Retail trade, except of motor vehicles and motorcycles					X
Electricity, gas, steam & air conditioning supply					X

	Trademark	Design	Patents	Copyright	No intense immaterial rights dependency
Real Estate					X
Mining					X
Accommodation					X
Legal and accountin activities					X
Construction of residential & non-residential buildings					X
Land transport and transport via pipelines					X
Food and beverage service activities					X

	Trademark	Design	Patents	Copyright	No intense immaterial rights dependency
Postal and courier activities					X
Repair of computers and personal and household goods					X
Security & investigation activities					X
Specialised construction					X
Manufacture of fabricated metal products, except machinery & equipment					X
Manufacture of metals					X
Manufacture of paper & paper products					X

	Trademark	Design	Patents	Copyright	No intense immaterial rights dependency
Manufacture of wood products except furniture					X
Services to buildings & landscape activities					X
Warehousing and support activities for transportation					X
Water supply; sewerage, waste management and remediation activities					X
Activities of head offices; management consultancy activities					X
Veterinary activities					X

Copyright



Copyright is based on the idea that a person or a business that has created an original work has the exclusive right to determine how it may be copied and used by others. For example, authors who write a book or musicians who compose a song have copyright on their creation. The concept of copyright developed in Britain following the appearance of the printing press. The subsequent rise in literacy and book publishing lead to a situation where book plagiarism became commonplace. In 1709, the British Statute of Anne gave writers and publishers exclusive rights to their work, ensuring that creative work rather than plagiarism was incentivized. The same principle is used in film, TV and other forms of creative production. Copyright is granted for expression of ideas but not the ideas themselves. Currently, work is ongoing to create a harmonized regulations for copyright in the European Union, which could stimulate creative sectors.

Those sectors that are intensely dependent on copyright are Printing and reproduction of recorded media, Programming & broadcasting, Information services, Renting and leasing, Computer programming & consultancy, Manufacture of computer, electronic & optical products, Advertising and market research, Telecommunications, Publishing and Motion picture, video and television program production, sound recording and music publishing activities.

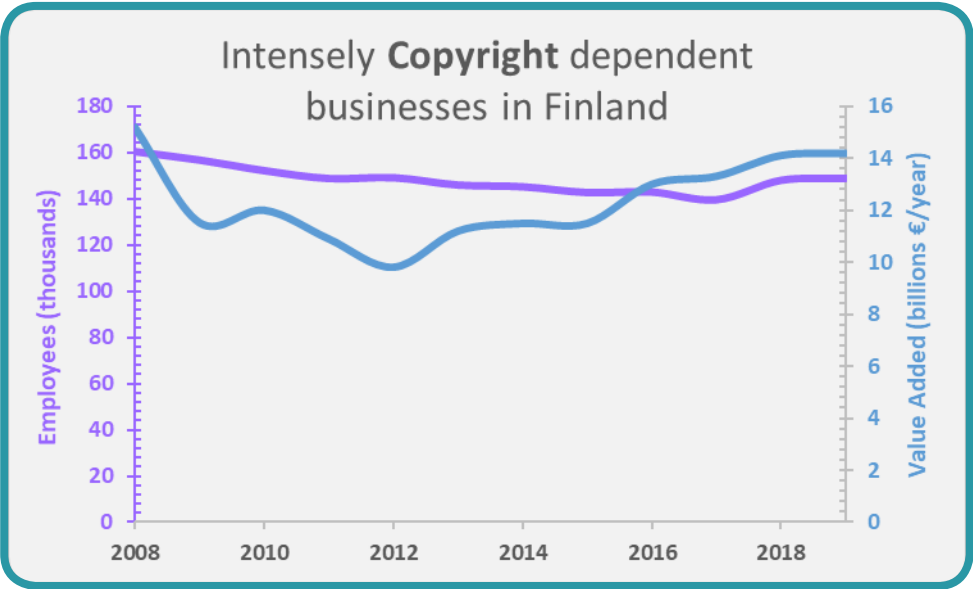
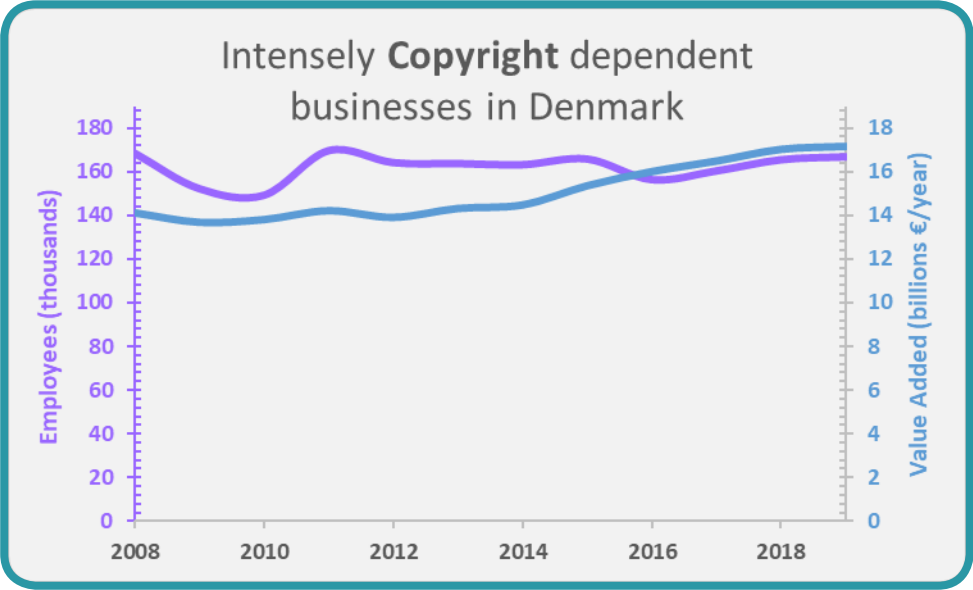
In the Nordic region as a whole, 80.1 billion Euros in value was created in 2019 in businesses with intense dependency on copyright—out of which 17.1 billion was created in Denmark, 14.2 billion in Finland, 1.2 billion in Iceland, 16.2 billion in Norway and 31.4 billion in Sweden. The

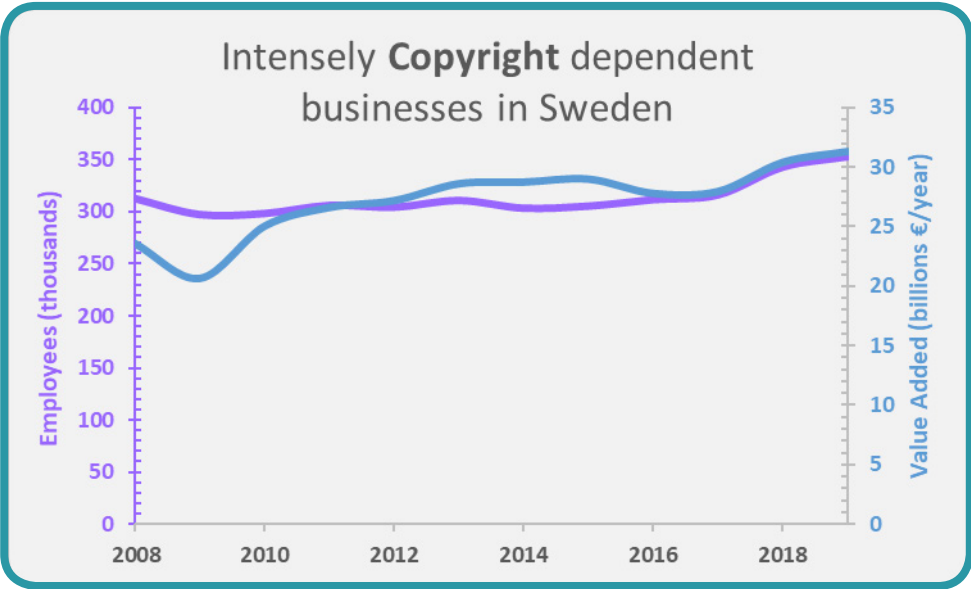
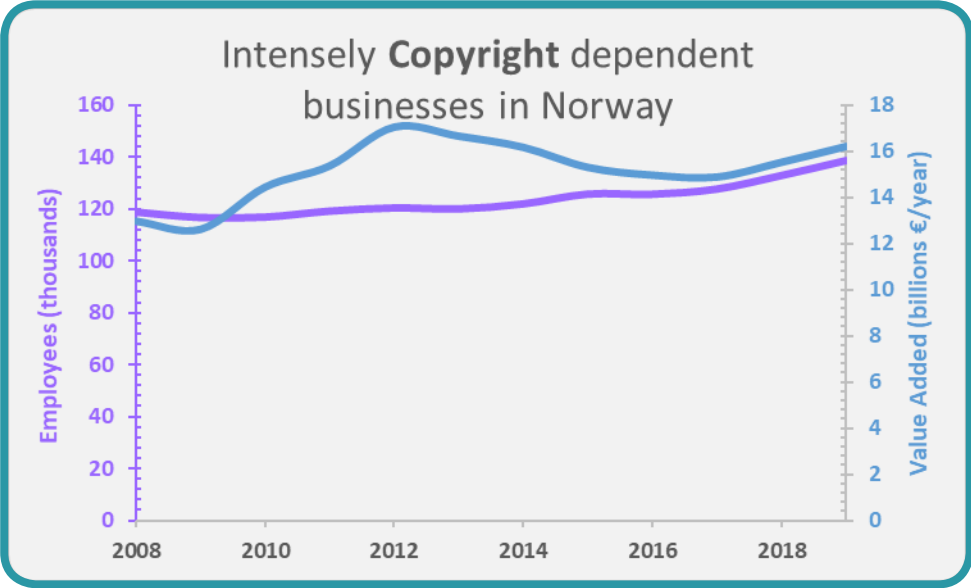
same businesses employ 819 600 individuals—with Denmark accounting for 167 000 of the employed, Finland for 148 800, Norway for 138 500, Iceland for 12 300 and Sweden for 353 000.

For the four larger Nordic nations, but not Iceland, historic data exists for the evolution of businesses with intense dependency on copyright. The trend for the large Nordic economies is that value creation in businesses with strong reliance on copyright has risen over time, while employment has been relatively stable. This is in line with a growth of the value added per employee.

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In the Nordic region as a whole, 80.1 billion Euros in value was created in 2019 in businesses with intense dependency on copyright ... The same businesses employ 819 600 individuals.





Design



One of the main reasons for why consumers choose one product over another is often appealing design. Design rights protect the appearance of a product, which in turn result from attributes such as shape, materials and colour. Modern design rights can, like copyright, be traced to Britain. In 1787 the UK passed the Designing and Printing of Linen Act, to protect design created by textile manufacturers. Much like patents, design rights exist to encourage innovation and hinder plagiarism.

While design continues to be important in textile manufacture and the clothing industry, it is also of great importance to manufacturing firms, not least manufacturers of consumer goods. Today it is not enough that a manufacturer creates a products that works well, products also need appealing design to be chosen by customers. The European Union has harmonized industrial design protection, in order to foster creation and competition on a level playing field.

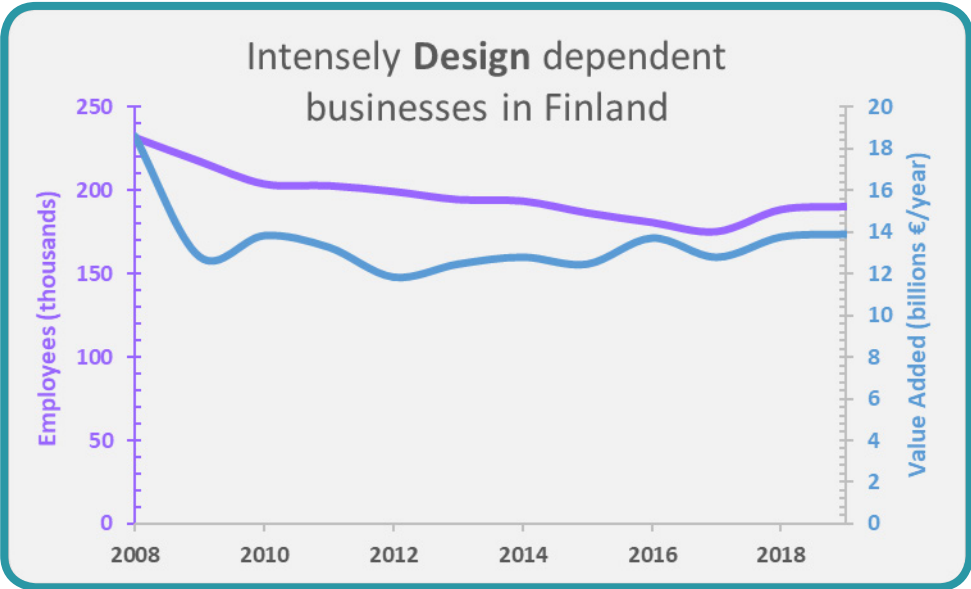
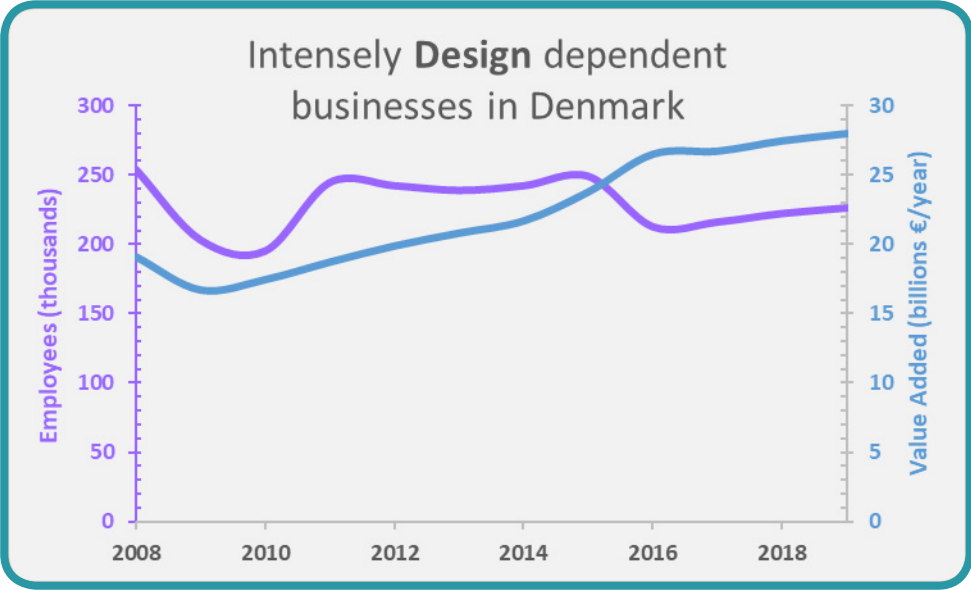
Sectors intensely dependent on design protection are Manufacture of textiles, Manufacture of basic pharmaceutical products & preparations, Manufacture of rubber & plastic products, Manufacture of other non-metallic mineral products, Manufacture of computer, electronic & optical products, Manufacture of motor vehicles, Manufacture of other transport equipment, Manufacture of electrical equipment, Manufacture of machinery & equipment, Manufacture of furniture, Other manufacturing, Scientific research and development, Manufacture of wearing apparel, Manufacture of leather & related products, Advertising and market research and Other professional, scientific and technical activities.

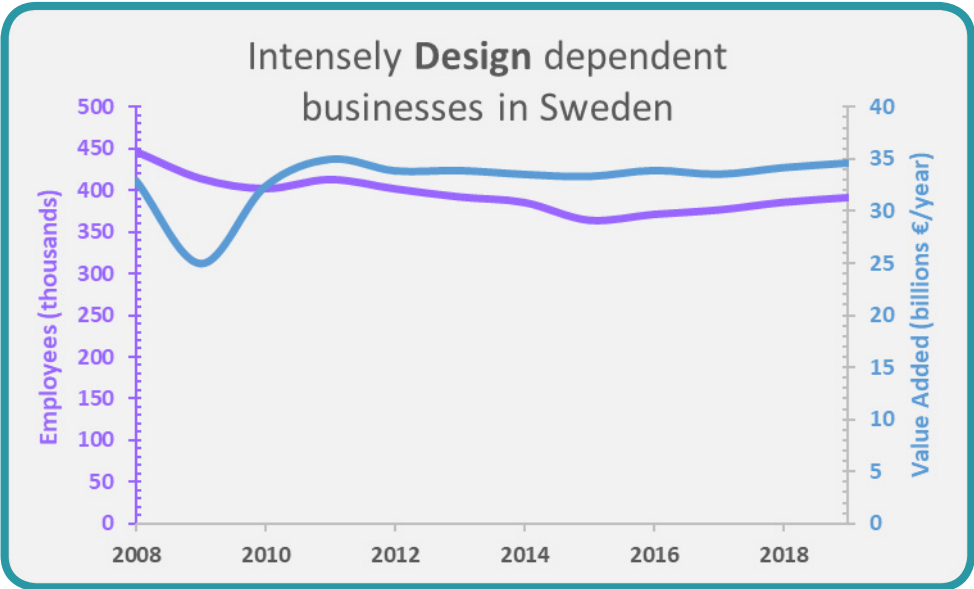
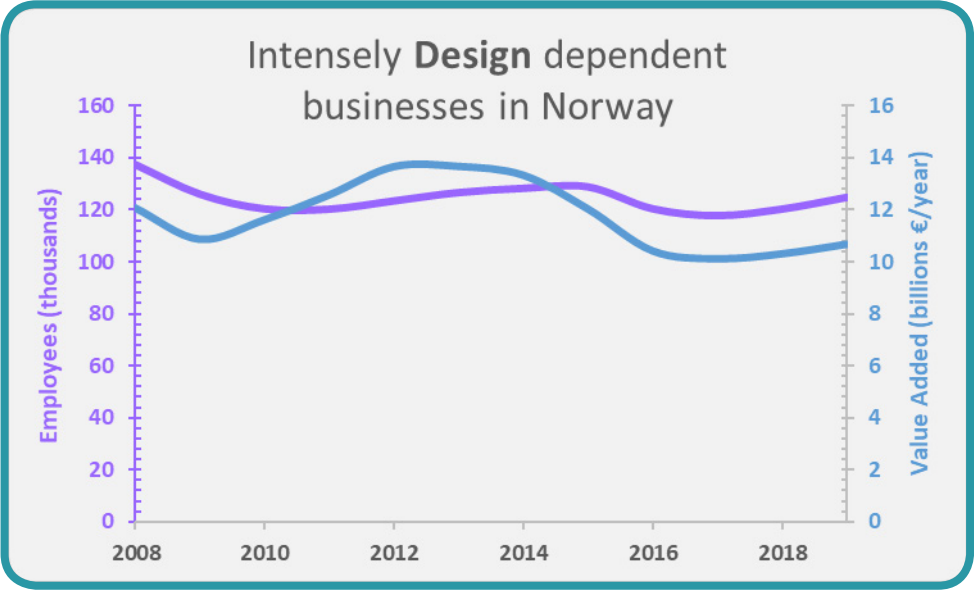
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**In the Nordic region as a whole, 87.8 billion Euros
in value was created in 2019 in businesses with
intense dependency on design...
Intensely design dependent businesses employ
940 100 individuals.**

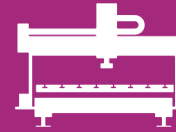
In the Nordic region as a whole, 87.8 billion Euros in value was created in 2019 in businesses with intense dependency on design—out of which 28.0 billion of the value had its origin in Denmark, 13.9 billion in Finland, 0.6 billion in Iceland, 10.7 billion in Norway and 34.7 billion in Sweden. Intensely design dependent businesses employ 940 100 individuals in the Nordic region—with Denmark accounting for 226 000 of the employed, Finland for 190 100, Norway for 124 900, Iceland for 7 900 and Sweden for 391 100.

Value added in the design sector is growing strongly in Denmark, in Finland and Norway it is currently stabilizing after a fall, while it in Sweden has remained at the same level. As with many immaterial rights dependent sectors, productivity per workers is rising over time. This for example explains how the number of jobs can be relatively stable in Danish firms with intense reliance on design, while value added in the same firms is increasing significantly.





Patent



Patents are a form of intellectual property that play a key role in technological advancement. They give the owner the exclusive right to an invention for a limited amount of time, after which the invention can be copied by others. Before the evolution of patents technological achievements were kept secret, to prevent plagiarizers from taking advantage of them. This halted the pace of technological development, since technologies did not spread, and significantly reduced the incentives for investing in technological innovation. The European Union is working towards introducing efficient and cost-saving uniform patent protection across the union.

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In the Nordics 182.3 billion Euros in value is created annually in businesses with intense dependency on patents...

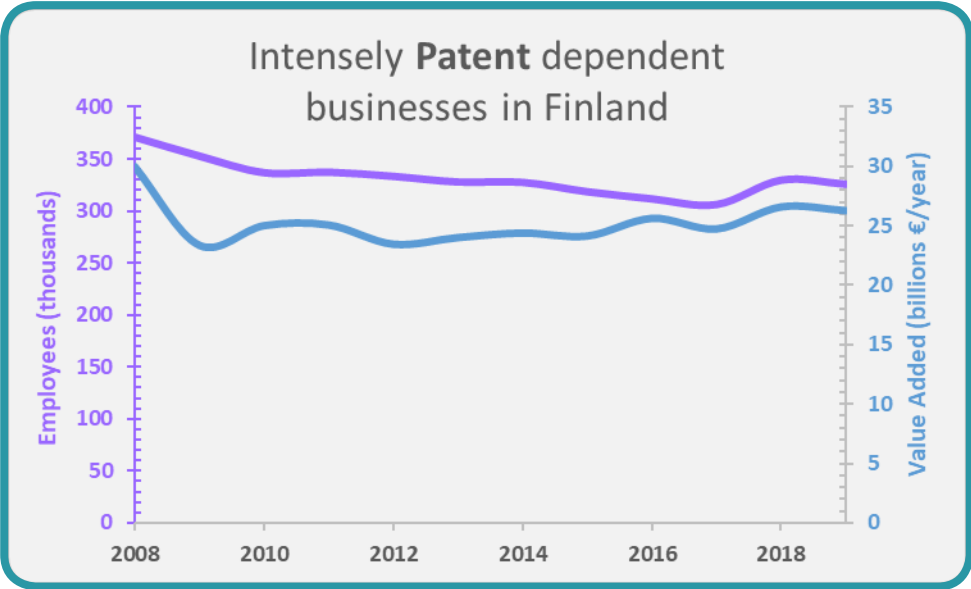
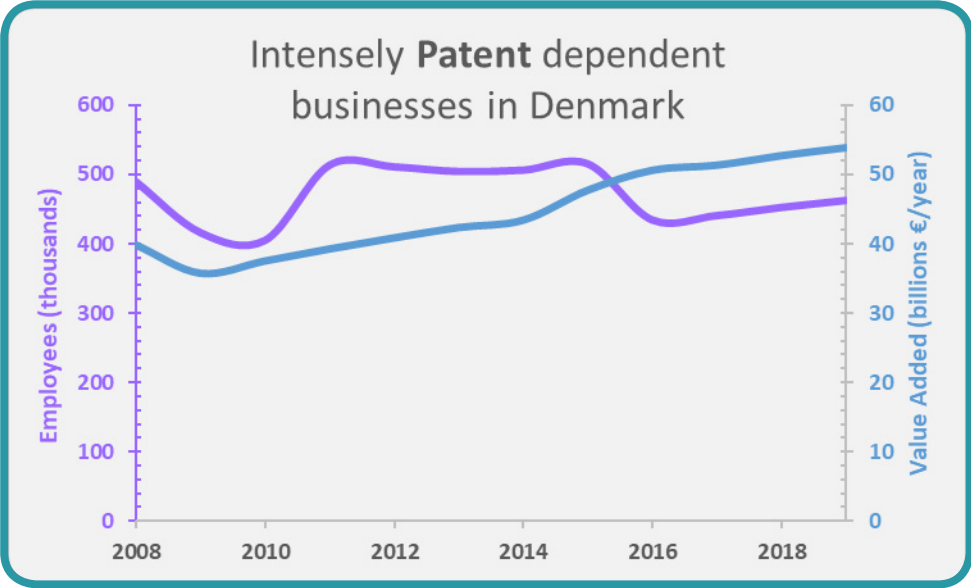
These enterprises have in total 1.86 million employees

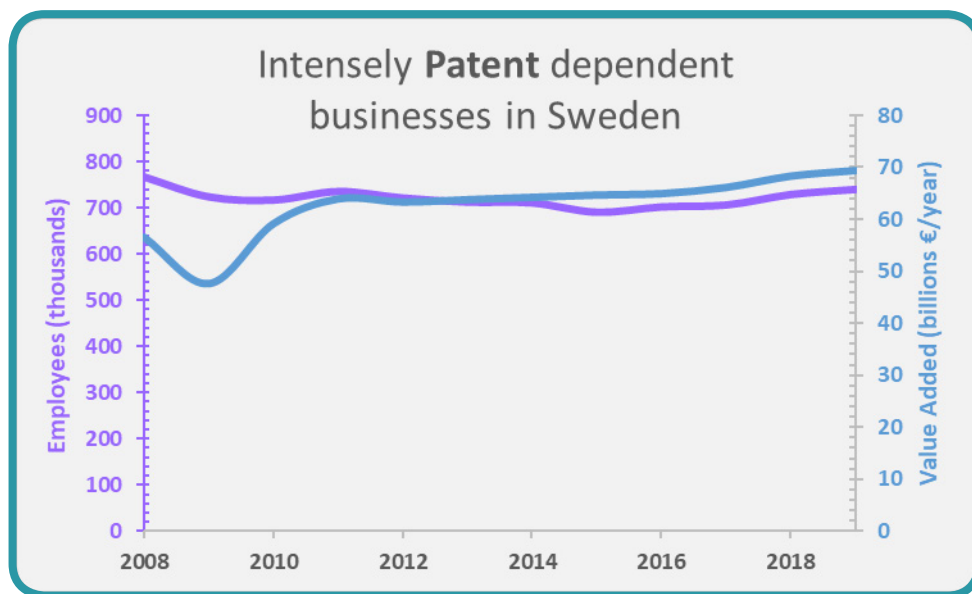
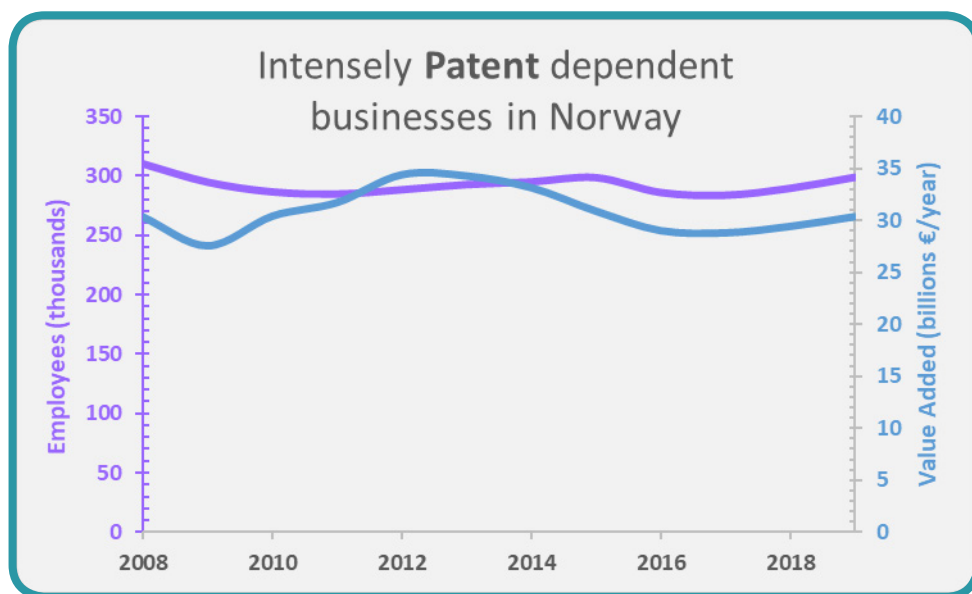
Sectors intensely dependent on patent protection are: Manufacture of textiles, Manufacture of basic pharmaceutical products & preparations, Manufacture of rubber & plastic products, Manufacture of other non-metallic mineral products, Manufacture of computer, electron-

ic & optical products, Manufacture of motor vehicles, Manufacture of other transport equipment Manufacture of electrical equipment, Manufacture of machinery & equipment, Manufacture of furniture, Manufacture of chemicals & chemical products, Manufacture of food products, Other manufacturing, Wholesale trade, except of motor vehicles and motorcycles, Scientific research and development, Other professional, scientific and technical activities and Telecommunications.

In the Nordics 182.3 billion Euros in value is created annually in businesses with intense dependency on patents—out of which 53.8 billion of value is created in Denmark, 26.3 billion in Finland, 2.4 billion in Iceland, 30.3 billion in Norway and 69.5 billion in Sweden. These enterprises have in total 1.86 million employees—with Denmark accounting for 463 200, Finland for 326 000, Iceland for 29 000, Norway for 298 800 and Sweden for 739 000.

The value created in businesses with strong dependency on patents is increasing in Denmark and to a lesser extent in Sweden, while being stable in the two other large Nordic economies. Employment is stable, except in Finland where it is falling. Rationalization processes are occurring in businesses with patent dependency. Many of these businesses are industrial manufacturers, that are outsourcing services previously part of the main business operation to external service firms and increasing productivity of each employee by introducing new automation techniques.





Trademark



Trademarks are intellectual property consisting of a recognizable sign, expression or design which distinguishes products and or services from one source from others. Trademarks play an integral role in modern society. If this form of intellectual property did not exist, businesses that have low quality products or services could fool customers that their offer was actually coming from a reputable firm. Since trademarks protect the identification of businesses, incentives are created for investing in quality and innovation. Trademarks further incentivize firms to act responsibly when it comes to social and environmental issues, since such actions strengthen their trademarks towards the customers. The EU trade mark system creates a unified trade mark registration system in Europe, in which one registration provides protection in all member states of the EU.

All business sectors with an intense dependency on patents, design rights and copyright are also intensely dependent on trademarks. And thus, sectors with intense dependency on trademarks are Manufacture of textiles, Manufacture of basic pharmaceutical products & preparations, Manufacture of rubber & plastic products, Manufacture of other non-metallic mineral products, Manufacture of computer, electronic & optical products, Manufacture of motor vehicles, Manufacture of other transport equipment, Manufacture of electrical equipment, Manufacture of machinery & equipment, Manufacture of furniture, Other manufacturing, Scientific research and development, Manufacture of wearing apparel, Manufacture of leather & related products, Advertising and market research, Other professional, scientific and technical activities, Telecommunications, Wholesale trade, except of motor vehicles and motor-cycles , manufacture of chemicals & chemical products, Manufacture of

food products, Motion picture, video and television program production, sound recording and music publishing activities, Computer programming & consultancy, Renting and leasing, Information services, Programming & broadcasting, Printing and reproduction of recorded media, Publishing, Manufacture of beverages, Office administrative, office support and other business support activities, Air transport, Wholesale and retail trade and repair of motor vehicles and motorcycles, Travel agency, tour operator reservation service & related activity and Water transport.

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In the Nordic region as a whole, 280.7 billion Euros in value is annually created in businesses with intense dependency on trademarks, which is also the total sum of businesses with intense dependency on various immaterial rights... The same businesses employ 3.05 million individuals.

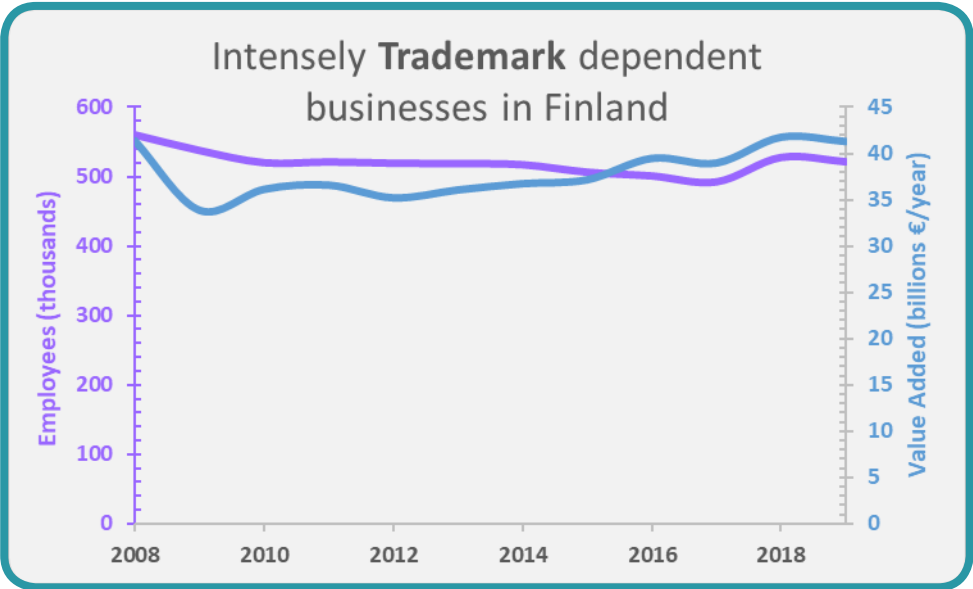
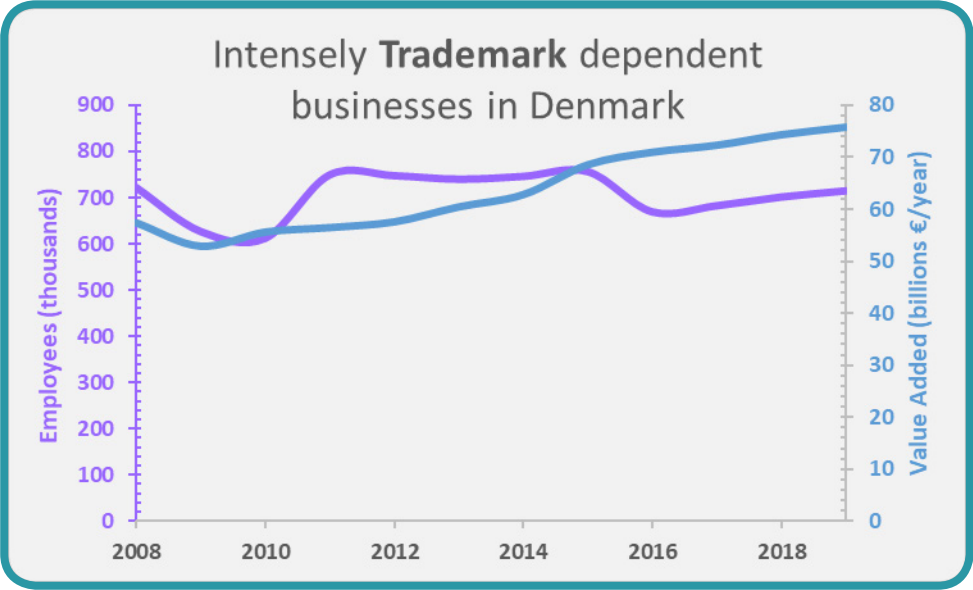
In the Nordic region as a whole, 280.7 billion Euros in value is annually created in businesses with intense dependency on trademarks, which is also the total sum of businesses with intense dependency on various immaterial rights. Out of this 75.8 billion of the value is created in Denmark, 41.2 billion in Finland, 4.6 billion in Iceland, 54.8 billion in Norway and 104.2 billion in Sweden. The same businesses employ 3.05 million individuals—with Denmark accounting for 714 700, Finland for 521 500, Iceland for 53 400, Norway for 529 300 and Sweden for 1 234

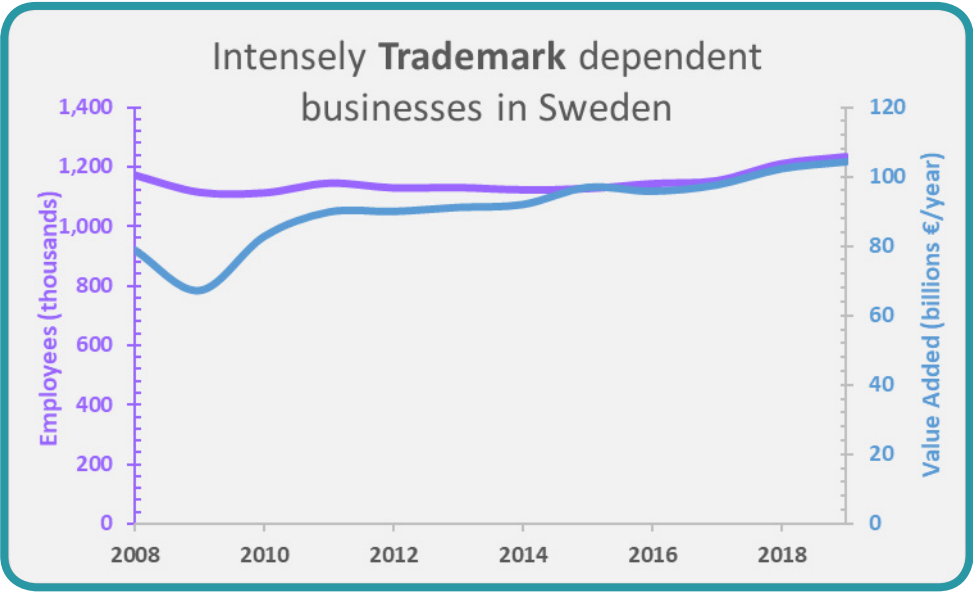
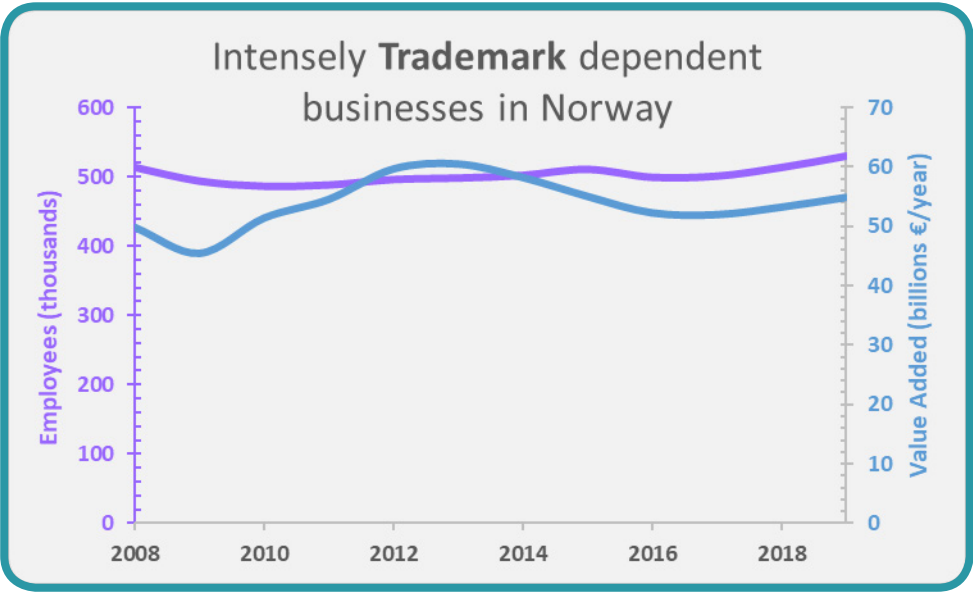
700. Again, these figures are also the total values for employment in all intellectual property dependent firms in the Nordic region.

Denmark and Sweden have growing value added in intensely trademark dependent businesses, coupled with stable employment. In Finland, employment is falling slightly while value added is rising. In Norway value added and jobs have risen slightly over the last years. Overall, immaterial dependent businesses are adding increasing value to the Nordic economies.

Immaterial intensive sectors tend to have considerably higher output per employee than other parts of the business sector. In Iceland, the average employee in immaterial rights intensive occupation creates 13 percent higher economic value compared to the average employee in the rest of the business sector. In Denmark the average employee in immaterial rights intensive occupation creates 20 percent higher economic value. The same relation in Sweden is 32 percent higher economic value and in Finland 33 percent. Only in Norway, where much of national wealth is created in the oil and natural gas sectors, this relationship is the inverse.²¹ A shift towards higher share of the economy with intense immaterial rights dependency is likely to boost GDP per capita in the Nordic region.

21 The average job in immaterial rights-intensive firms in Norway creates 4 percent lower value compared to other parts of the business sector





Regional analysis

In the Stockholm region, 335 500 individuals are employed by businesses with intense reliance on immaterial rights. This is the highest number in the Nordic region. Copenhagen with 266 000 jobs comes in second place, followed by Västsverige, the region in which Sweden's second largest city Gothenburg is located in. In Västsverige 251 000 jobs are found in businesses which are strongly dependent on trademarks, patents, copyright and design rights. The Helsinki region has 198 500 jobs in firms with intense reliance on immaterial rights, while Oslo has 172 000 such jobs. In terms of total numbers, the capital regions and other regions with large cities tend to have the top placement. This is not surprising, as the capital regions have large populations and also strong concentration of advanced professions.

As shown in table 2, it is not however necessarily capital regions that are ranked the highest in terms of knowledge-intensive jobs concentration. The small Finnish region of Åland, whose water transportation sector makes up a key part of the local economy and is intensely dependent on trademark, scores on top with 60 percent of employment in immaterial intensive industries. This is considerably higher than the 49 percent rate of the Finnish capital region of Helsinki. On second place in a ranking of Nordic regions comes Midtjylland, the central Danish region which is an innovation leader—with a wide range of industries dependent on immaterial rights. Here 53 percent of employment is in immaterial rights businesses.

The Danish Copenhagen region follows closely, with 51 percent of employment, while the southern and northern regions of Denmark. (Syddanmark and Nordjylland) have 50 percent of private sector jobs in immaterial intense businesses. The Swedish regions of Sydsverige and Västsverige, where Sweden's second and third largest cities reside, have 49 percent of employment in immaterial rights intensive businesses.

This is somewhat higher than 46 percent in the capital region of Stockholm. Thus, in Finland, Denmark as well as Sweden, the capital regions are not those with highest share of immaterial rights dependent jobs. In Norway however, the capital region of Oslo is the leader share of private sector occupation (48 percent) in businesses with intense dependency on immaterial rights. Other strong parts of Norway are the south-eastern region of Sør-Østlandet, a strong innovation region, the western Norwegian region Vestlandet and the more rural Trøndelag region, which is strong in food industries as well as scientific research and development.

A comparison of the share of wages in immaterial rights intensive industries, as shown in table 3, follows largely the same pattern. Åland is again at top, this time followed by Copenhagen. In twelve out of the 25 Nordic regions, the majority of private sector wages are found in businesses with strong dependency on immaterial rights. At the same time, only five of the regions have a majority of private sector jobs in the same businesses. This again shows that businesses with intense reliance on immaterial rights tend to be more productive, reflected in higher wages, than the rest of the private sector economy.

Table 2. Share of private sector employment in immaterial intensive industries

Åland	60%
Midtjylland	53%
Copenhagen	51%
Syddanmark	50%
Nordjylland	50%
Sydsverige	49%
Helsinki	49%
Västsverige	49%
Oslo	48%
Småland med öarna	47%
Sjælland	46%
Stockholm	46%
Länsi-Suomi	44%
Sør-Østlandet	44%
Östra Mellansverige	43%
Etelä-Suomi	42%
Trøndelag	42%
Vestlandet	42%
Mellersta Norrland	40%
Nord-Norge	40%
Hedmark og Oppland	39%
Agder og Rogaland	38%
Övre Norrland	37%
Norra Mellansverige	37%
Pohjois- ja Itä-Suomi	37%

Share of private sector employment in immaterial intensive industries

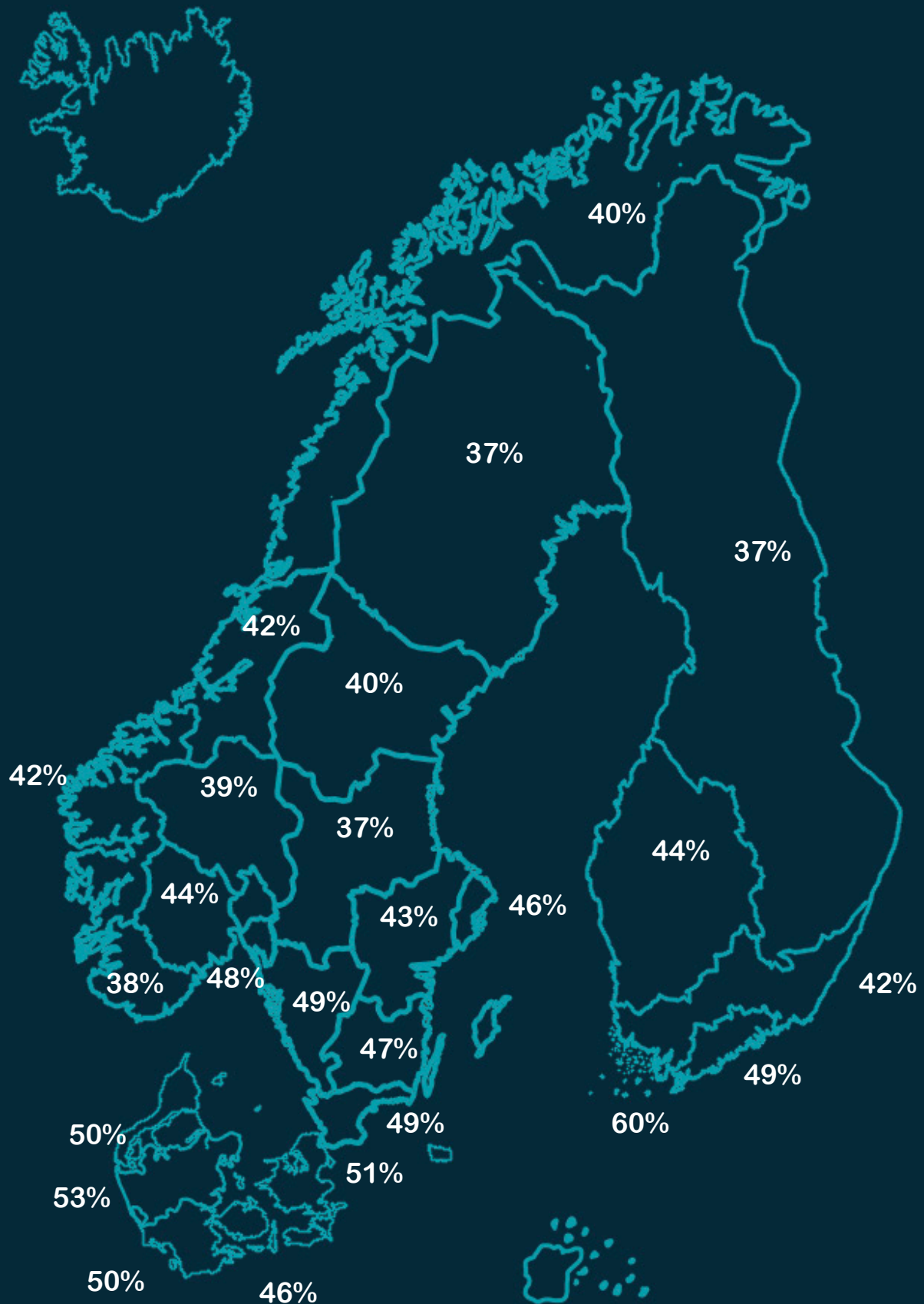


Table 3. Share of wages in immaterial-intensive industries

Åland	67%
Copenhagen	60%
Midtjylland	59%
Nordjylland	56%
Helsinki	56%
Syddanmark	56%
Sydsverige	55%
Stockholm	54%
Västsverige	54%
Oslo	54%
Småland med öarna	51%
Sjælland	51%
Sør-Østlandet	48%
Länsi-Suomi	48%
Östra Mellansverige	47%
Etelä-Suomi	46%
Trøndelag	45%
Vestlandet	44%
Mellersta Norrland	42%
Hedmark og Oppland	40%
Nord-Norge	40%
Pohjois- ja Itä-Suomi	38%
Norra Mellansverige	37%
Övre Norrland	37%
Agder og Rogaland	34%

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In twelve out of the 25 Nordic regions, the majority of private sector wages are found in businesses with strong dependency on immaterial rights. At the same time, only five of the regions have a majority of private sector jobs in the same businesses. This again shows that businesses with intense reliance on immaterial rights tend to be more productive, reflected in higher wages, than the rest of the private sector economy.

Rural regions tend to have the lowest share of private sector occupation and wages in immaterial intensive sectors. One example is Pohjois-ja Itä-Suomi, which makes up most of Finland's geography including all of the north and much of the east of the country. Övre Norrland and Norra Mellansverige in Sweden, which also have low population density, are other examples. A fourth is mountainous Norwegian region of Agder og Rogaland. Even in these regions however immaterial rights intensive industries play a key role for the local economy. The lowest share of private sector employment regionally is 37 percent, in Pohjois-ja Itä-Suomi as well as Norra Mellansverige region, while the lowest share

of private sector wages is 34 percent in Agder og Rogaland. The data clearly shows that immaterial intensive industries play an important role for jobs and wages in all of the Nordic regions. Improving the conditions for businesses with intense dependency on trademarks, patents, copyright and design rights is thus not only important for a small part of the economy or the capital region economies, but rather for economic prosperity throughout Nordic regions.

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This report has been written by Dr. Nima Sanandaji, president of the think tank European Centre for Entrepreneurship and Policy Reform (ECEPR), with support from the following actors through the network
A modern intellectual property law

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