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Nordic Council of Ministers

# Nordic Information Society Statistics 2005







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### Nordic co-operation

Nordic co-operation, one of the oldest and most wide-ranging regional partnerships in the world, involves Denmark, Finland, Iceland, Norway, Sweden, the Faroe Islands, Greenland and Åland. Co-operation reinforces the sense of Nordic community while respecting national differences and similarities, makes it possible to uphold Nordic interests in the world at large and promotes positive relations between neighbouring peoples.

Co-operation was formalised in 1952 when *the Nordic Council* was set up as a forum for parliamentarians and governments. The Helsinki Treaty of 1962 has formed the framework for Nordic partnership ever since.

The *Nordic Council of Ministers* was set up in 1971 as the formal forum for co-operation between the governments of the Nordic countries and the political leadership of the autonomous areas, i.e. the Faroe Islands, Greenland and Åland.

## Preface

- Nordic collaboration on the Information Society* In recent years, the Nordic countries have in the field of ICT statistics produced a series of projects aimed at describing the influence and development of the Information Society. This work has partly been carried out in collaboration with the Nordic Council of Ministers. Methodological guidelines and publications centred on the development of ICT statistics in the Nordic countries are important results of the Nordic ICT network between Nordic statistical institutes, which was established in 1999 with the purpose to profile and develop statistics in this important area.
- Nordic approach to future directions* This publication is the latest result of this co-operation building on its predecessor from 2002 and capturing the development of the Nordic Information societies since then, by including detailed and recently updated official data. Moreover, special analyses in key areas have been included in the publication, which seeks to contribute to future directions in the measurement of the Information Society.
- Co-financed by the Nordic Council of Ministers* This publication was co-financed by the Nordic Council of Ministers and has been co-ordinated by Statistics Denmark. The editorial team consisted of Martin Lundø (chapters 3, 4 and 5), Troels Burchall Henningsen (chapters 6 and 7) and Henrik Lynge Hansen (chapters 1, 2 and 8).

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## Introduction

- Comprehensive picture of the Nordic Information Societies* "Nordic Information Society Statistics 2005" aims at giving a broad and comprehensive picture of the Nordic Information Societies, including the latest development. Furthermore, the aim has been to present new ways of describing the Information Society that can be used to develop future statistics in this area.
- Eight main chapters* The publication is structured in eight main chapters covering various aspects of the Information Societies.
- ICT infrastructure* Chapter one is about *ICT infrastructure*, which is centred on the common technological factors, i.e. the telecommunication networks both in terms of subscriptions, traffic, and access and use possibilities. Moreover, a small part on prices of services is included.
- Use of ICT in households and by individuals* Chapter two concerns *Use of ICT in households and by individuals*. The main areas of ICT usage in households and by individuals form the basis of this chapter. These areas are based on the EU harmonised questionnaire. Moreover, special analysis from Denmark focusing on Internet connection paid by an employer and analysis from Finland centred on versatility of Internet use complete this chapter.
- Use of ICT in enterprises* Chapter three analyses the *Use of ICT in enterprises*, by use of recent official statistics. Charts on development in basic ICT indicators are followed by descriptions of use of broadband, networks, index of extended ICT use, Internet use, websites and electronic commerce. Special national studies are included: ICT-usage and economic performance (Denmark), automated data exchange (Denmark) and outsourcing of ICT related activities (Sweden and Finland).
- Use of ICT in the public sector* Chapter four focuses on the *Use of ICT in the public sector*. Statistics Norway and Statistics Denmark collect, among few NSIs, regularly ICT-usage data from the public sector. A benchmarking is presented for the first time in this publication as a follow-up of a 2003 project in the Nordic ICT group. In addition, Finnish surveys on digital services are reported from the perspective of both users and suppliers. Nordic and EU data on the use of digital public services are included.
- ICT security* Chapter five offers a thematic part on *ICT security*. Detailed results are presented from the perspective of the three user groups: Population, enterprises and the public sector. Additional security indicators of the latter two groups are included from the Danish and Norwegian surveys.
- E-skills and e-learning* Chapter six regards *e-skills and e-learning*. The chapter is mainly based on the comprehensive Nordic registers on education and employment. It presents an analysis combining the ICT sector and persons with higher ICT-educations. Unemployment for persons with a longer ICT-education is analysed by data from Denmark and Finland. Finally e-learning is included.

*ICT sector, ICT products and R&D*

Chapter seven deals with the *ICT sector, ICT products and R&D*. The ICT sector's economic performance is analysed by various indicators, such as employment and turnover. Indicators of production of and international trade with ICT products is presented, as well as on ICT services. Research and development and innovation in the ICT sector are compared with the general level of the economy. A special analysis from Finland and Norway on the content sector is presented.

*ICT and productivity*

Finally, chapter eight presents *ICT and productivity*. Nordic approaches to the connection between ICT and productivity are presented. Both macro and micro level analyses are included. The result of a Danish survey of ICT expenditures and investments, which is based on Nordic recommendations, ends this chapter.

*Structure*

The chapters are generally structured with a short introduction followed by charts and descriptive text. Primary sources are mentioned at the end of the chapter before an annex, which comprises tables with more detailed data than presented in the charts.

## 1. ICT infrastructure

### 1.1 Introduction

*The backbone of the Information Society*

ICT infrastructure can be described in terms of both a technological base and the actual diffusion and utilization among users in the Nordic countries. This chapter will focus on the common technological factors, i.e. the telecommunication networks both in terms of subscriptions, traffic, and access and use possibilities. Furthermore, a short paragraph on prices of services will be included. The purpose is to give an overview of the development of ICT infrastructure over the years in the Nordic countries. After all, ICT infrastructure constitutes the backbone of the Information Society.

### 1.2 Infrastructure of fixed networks

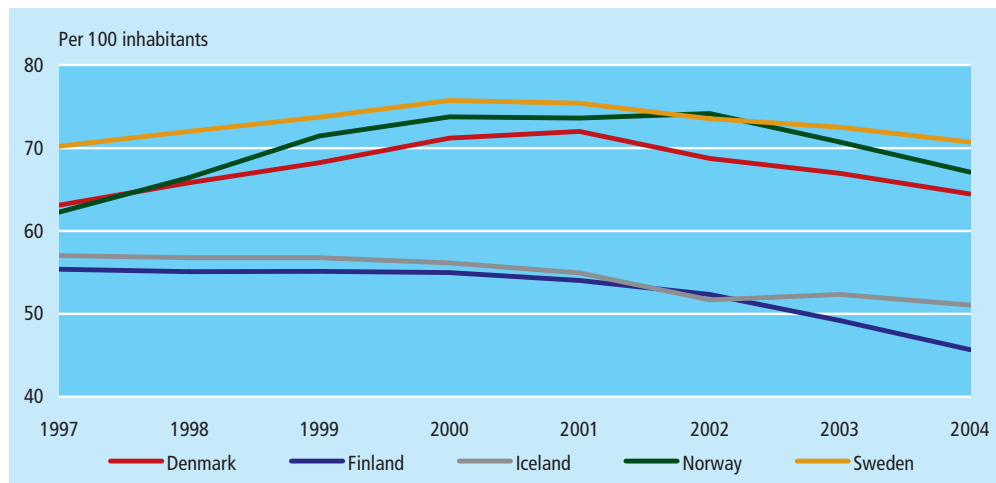
*Increasing competition from mobile networks and broadband*

The fixed telephone lines are subject to an increasing competition from mobile networks and broadband. Figure 1.1 illustrates the development in the number of fixed subscriber lines per 100 inhabitants from 1997 to 2004 in the Nordic countries. The number of subscriber lines includes both ordinary telephone lines and ISDN subscriber lines measured as channels.

*Fixed subscriber lines have peaked*

The figure clearly indicates that the fixed subscriber lines have reached their peak in the period with Iceland and Finland having, by far, the lowest share per 100 inhabitants in 2004.

**Figure 1.1** Fixed network: Number of subscriber lines. 1997-2004



Source: National data, annex table 1.2.

*Number of fixed subscriber lines peaked years ago*

While Iceland and Finland reached their peak in 1997 with 57 and 55 fixed subscriber lines per 100 inhabitants, the number of fixed lines peaked later in the other Nordic countries. Sweden had the highest number of subscriber lines per 100 inhabitants in 2000, while Denmark and Norway peaked in 2001 and 2002, respectively.

*General phenomenon among OECD countries*

The decline in the number of fixed subscriber lines is a world-wide phenomenon. Thus, fixed network penetration per 100 inhabitants, as measured by channels, declined in more than two-thirds of all OECD countries from 2002 to 2003. (OECD, Communications Outlook 2005).

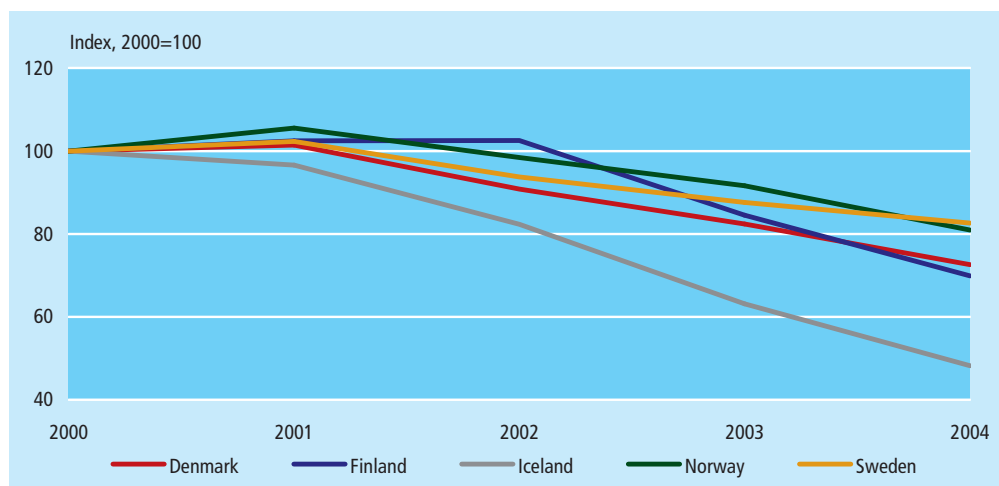
*The Nordic countries higher than OECD average apart from Finland*

The OECD average peaked in 2001 with approximately 53 fixed line channels per 100 inhabitants. In 2003, this indicator had declined to 52 channels. Apart from Finland, which only had approximately 46 channels per 100 inhabitants in 2004, the OECD average was considerably lower than in each of the Nordic countries.

*Drop in outgoing traffic from fixed networks*

The development of outgoing traffic in fixed networks in the Nordic countries appears from figure 1.2, where the year 2000 is used as reference year. Not surprisingly, the decline in fixed network subscriber lines in the period from 2000 to 2004 has resulted in a significant drop in outgoing traffic from fixed networks.

**Figure 1.2 Fixed network: Outgoing traffic in total. 2000-2004**



Source: National data, annex table 1.3.

*Outgoing traffic more than halved in Iceland*

Outgoing traffic in fixed networks peaked in 2001 in Denmark, Norway and Sweden. Finland and Iceland have experienced a decline since 2002 and 2000 respectively. As such, outgoing traffic in fixed networks has more than halved in Iceland from 2000 to 2004.

*Broadband replaces traditional means of Internet access*

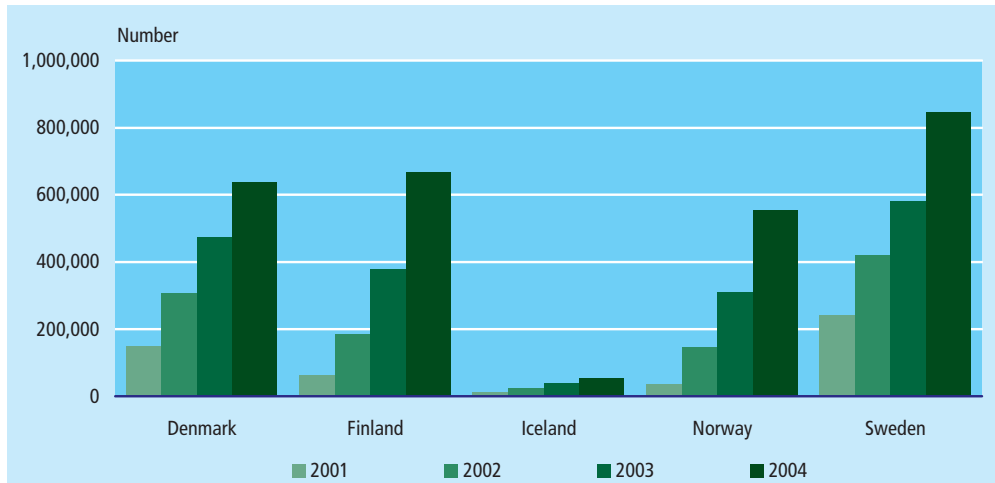
The data on outgoing traffic also comprise Internet connection calls. It must be assumed that the share of Internet connection calls in the fixed network is significant, although declining as broadband connections are

replacing traditional means of access such as modem via the fixed telephone line or ISDN.

*xDSL promoted heavily in all the Nordic countries*

In figure 1.3, the number of broadband subscriptions (only xDSL, i.e. ADSL, SHDSL etc.) is illustrated for each of the Nordic countries from 2001 to 2004. Active promotions of broadband connections in the Nordic countries have resulted in a significant rise in xDSL based Internet connections as can be seen from the figure.

**Figure 1.3** Number of xDSL subscriptions in the Nordic countries. 2001-2004



Source: National data, annex table 1.4.

*Broadband improving communication possibilities*

In 2004 there were almost 16 times as many xDSL connections in Norway as compared to 2001. In Finland the approximately 60,000 xDSL connections in 2001 had increased to over 660,000 connections in 2004, or 11 times as high as in 2001. The same picture applies to all the other Nordic countries, thus enhancing and improving communication possibilities in the Nordic region in a short period of time.

*Cable modems important broadband technologies*

The most common, by far, broadband technologies in the Nordic countries are xDSL and cable modem, whose number of subscriptions is given in annex, table 1.4. Apart from Iceland, some of the Nordic countries, especially Denmark and Sweden, have a significant number of cable modem subscriptions.

*High broadband penetration rates in the Nordic countries*

The average broadband penetration rate per 100 inhabitants was 11.8 for the OECD area as a whole in June 2005<sup>1</sup>. The Nordic countries were well above the OECD average. As such, the shares of the Nordic countries lay between 16.5 (Sweden) and 21.8 (Denmark) subscriptions per 100 inhabitants in June 2005.

<sup>1</sup> OECD Broadband Statistics, June 2005. Broadband is defined as DSL, Cable and other.

*Newer broadband technologies*

Although given an increased favour in most countries in the last couple of years, the use of newer broadband technologies such as wireless networks and those offered via electricity providers, are still quite insignificant.

### 1.3 Infrastructure of mobile networks

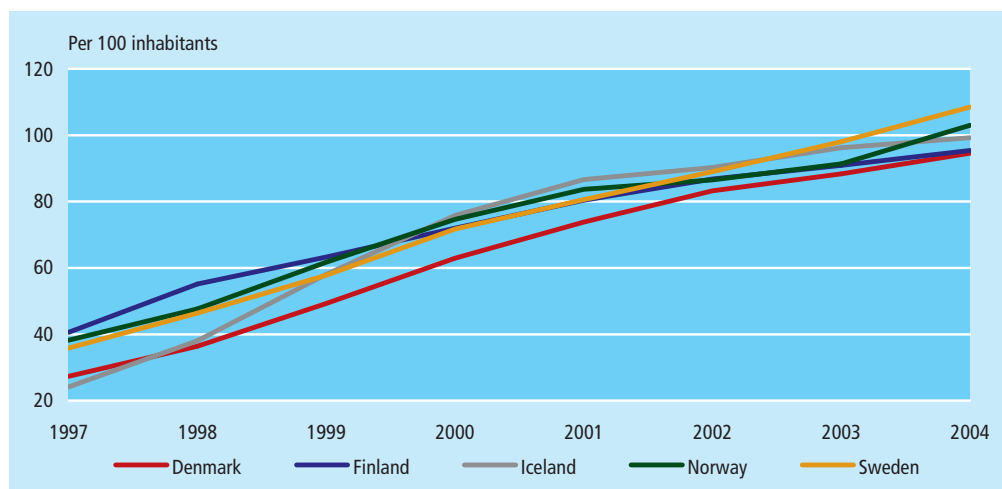
*Mobile subscriptions have started to saturate*

Since 1997 the number of mobile subscriptions per 100 inhabitants has risen every single year for each of the Nordic countries. At the end of the period from 1997 to 2004, the development has slowed down as markets start to saturate.

*More mobile subscriptions than inhabitants in Norway and Sweden*

For Norway and Sweden the number of mobile subscriptions per 100 inhabitants even exceeded 100 in 2004. Mobile communication was very popular early on in Finland, with approximately 40 subscriptions per 100 inhabitants in 1997, which was the highest among the Nordic countries at that time.

**Figure 1.4** Mobile network: Number of subscriptions per 100 inhabitants. 1997-2004



Source: National data, annex table 1.5.

*High rates in all the Nordic countries*

From 2000 and onwards, Finland was exceeded by countries like Iceland and Norway and soon also Sweden. However, figure 1.4 clearly shows that there is no Nordic country which significantly lack behind the others.

*Mobile subscriptions exceed fixed line subscriptions*

For Finland, the number of mobile subscriptions exceeded those of fixed line subscriptions already in 1999. The same happened in Iceland and Norway in 2000, while fixed line subscriptions exceeded mobile subscriptions until 2001 in Denmark and Sweden.

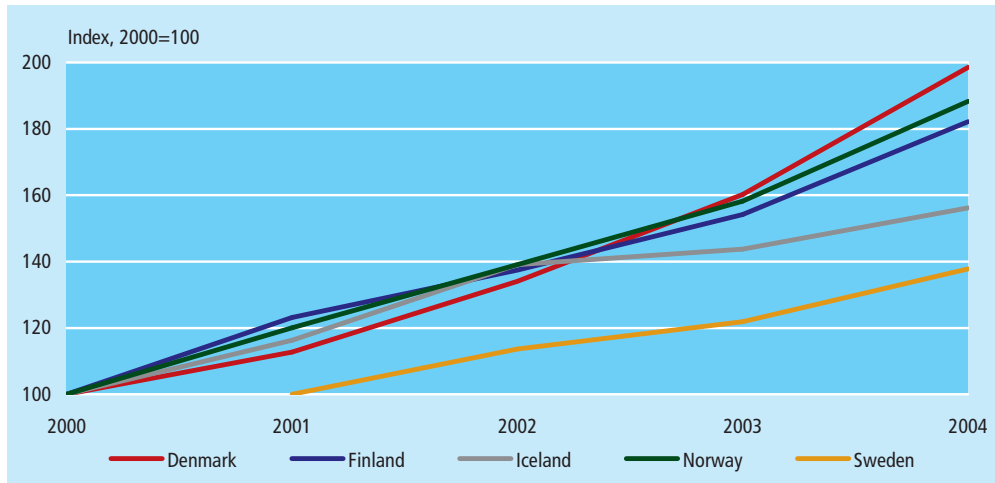
*The Nordic countries on top in mobile communications*

The OECD average of cellular mobile subscriptions per 100 inhabitants was 64.2 in 2003. The corresponding average for EU-15 was much higher with 84.8. However, both averages were well below all the Nordic countries.

*Trend towards mobile networks*

By comparing the development of outgoing traffic in fixed line networks (figure 1.2) with the development of outgoing traffic in mobile networks in figure 1.5, it can be concluded that voice communication has, to a large extent, moved to mobile networks.

**Figure 1.5 Mobile network: Outgoing traffic in total. 2000-2004**



Index, 2001=100 used for Sweden as no data available for year 2000.

Source: National data, annex table 1.6.

*Rapid growth in outgoing mobile traffic*

In all of the Nordic countries the outgoing traffic in mobile networks has grown rapidly, especially in 2003 and 2004. From 2000 to 2004 outgoing traffic in mobile networks almost doubled in Denmark. Similarly, growth rates apply to Finland and Norway.

*Importance of SMS and MMS*

The increasing use of mobile communication and thereby mobile equipment also brings in new ways of communicating. SMS (short messaging service) and MMS (multimedia messaging service) has grown in importance together with the increasing use of mobile communication as shown in table 1.1 below.

*SMS most popular in Denmark*

As can be seen from the table, SMS is most popular in Denmark with over 6.5 billion messages in 2004. On the contrary, MMS has the highest popularity in Norway, with approximately 72 millions of messages.



Table 1.1 SMS and MMS sent. 2001-2004

	SMS				MMS	
	2001	2002	2003	2004	2003	2004
	1,000 messages					
Denmark	1,334,298	2,018,892	3,989,143	6,554,569	2,759	12,382
Finland	1,202,000	1,324,668	1,647,218	2,193,498	2,314	7,386
Iceland	90,201	124,451	154,144	154,236	•	•
Norway	2,117,159	2,540,953	3,136,748	3,648,740	19,429	72,131
Sweden	1,020,000	1,325,000	1,816,000	2,045,000	6,700	26,900

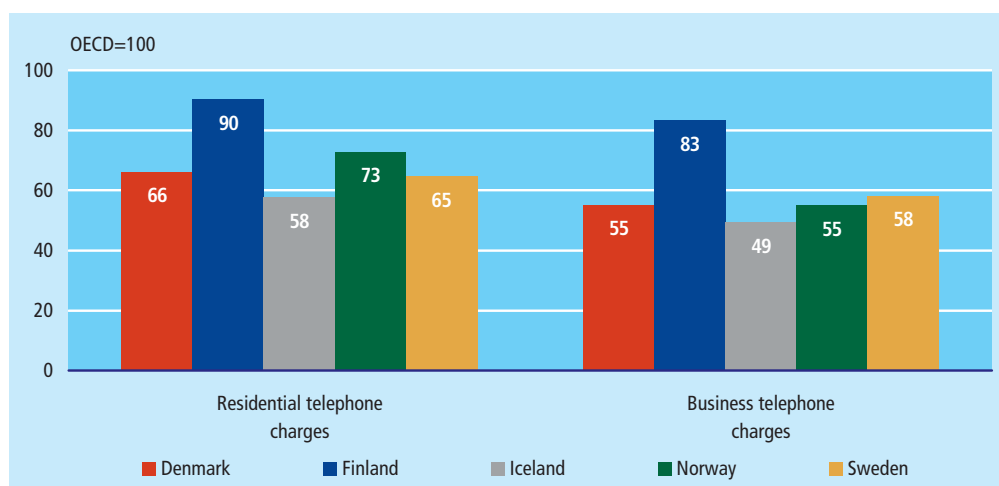
Source: Denmark: National IT and Telecom Agency. Finland: Statistics Finland and Ministry of Transport and Communications. Iceland: Post and Telecommunication Administration in Iceland. Norway: Norwegian Post and Telecommunications Authority. Sweden: Swedish National Post and Telecom Agency.

### 1.4 Prices of services

*Nordic telephone charges*

Figure 1.6 illustrates the Nordic telephone charges compared to the OECD average in May 2005, both for residential and business telecommunication. In the calculations, OECD’s composite basket of telephone charges covering fixed line services has been used, which measures charges in USD using purchasing power parity (PPP).

Figure 1.6 Composite basket of telephone charges by incumbent operator in the Nordic countries compared to the OECD average. May 2005



Composite basket includes domestic calls, international calls and calls to mobile networks. Only prices of incumbent operators are included in the comparison.

Source: OECD/Teligen, annex table 1.7.

*Telephone charges least expensive in Iceland in May 2005*

As can be seen from the figure, all the Nordic countries are below the OECD average. Among the Nordic countries, Iceland has the least expensive residential and business telephone charges. Finland is most expensive with telephone charges well above the other countries, both on residential and business telecommunication.

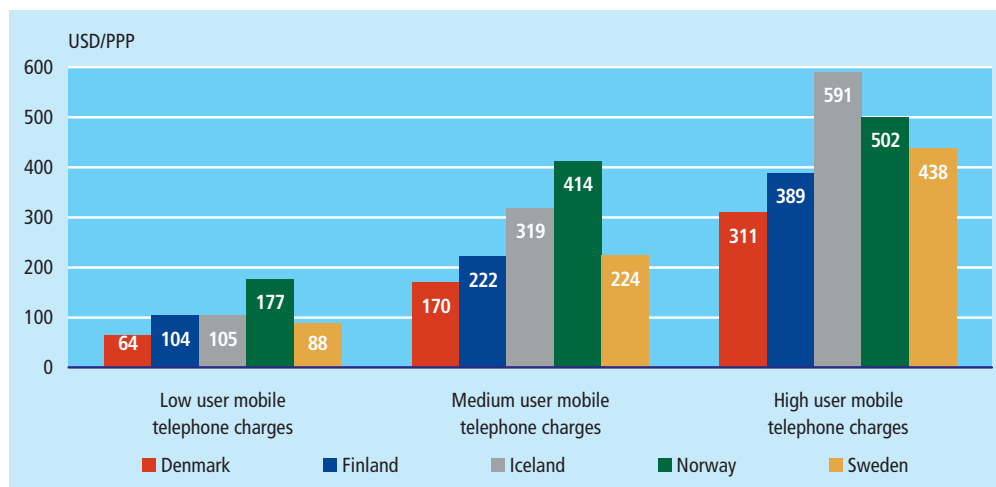
*OECD's different types of mobile users when comparing prices*

When comparing cellular mobile communication prices, the OECD has three baskets: Low user, medium user and high user. The low user makes 25 calls per month, the medium user makes 75 calls per month and the high user makes 150 calls per month. Calls are spread over different times of the day and days of the week. (OECD, Communications Outlook 2005).

*The three types of users in the Nordic countries*

In figure 1.7, mobile telephone charges are shown for all three types of users in the Nordic countries in May 2005. The prices are given in USD using purchasing power parity (PPP).

**Figure 1.7** Basket of mobile telephone charges by incumbent operator or biggest competitor in the Nordic countries. May 2005



Only incumbent operators and, in some cases, the biggest competitors are included. The comparison includes fixed costs and usage expenses. Both pre-paid and post-paid subscriptions are compared.

Source: OECD/Teligen, annex table 1.8.

*Mobile telephone charges least expensive in Denmark in May 2005*

Denmark was the least expensive country among the Nordic countries in May 2005 for all three kinds of mobile users. For low user and medium user, Norway is the most expensive country, while Iceland was the most expensive regarding high user mobile users.

## 1.5 Sources

National IT and Telecom Agency, Denmark  
 Statistics Finland and Ministry of Transport and Communications,  
 Finland  
 Post and Telecom Administration in Iceland  
 Norwegian Post and Telecommunications Authority  
 Swedish National Post and Telecom Agency

OECD, Communications Outlook, Paris 2005  
 OECD Broadband Statistics, June 2005  
 OECD/Teligen, October 2005

## 1.6 Annex

Table 1.2 **Fixed network: Number of subscriber lines per 100 inhabitants. 1997-2004**

	1997	1998	1999	2000	2001	2002	2003	2004
	per 100 inhabitants							
Denmark	63.1	65.8	68.3	71.2	72.0	68.7	66.9	64.5
Finland	55.4	55.1	55.1	55.0	54.0	52.4	49.2	45.6
Iceland	57.0	56.8	56.8	56.1	54.9	51.7	52.4	51.1
Norway	62.2	66.4	71.5	73.8	73.6	74.2	70.7	67.1
Sweden	70.2	72.0	73.7	75.7	75.4	73.6	72.5	70.7

Sources: Denmark: National IT and Telecom Agency. Finland: Statistics Finland and Ministry of Transport and Communications. Iceland: Post and Telecommunication Administration in Iceland. Norway: Norwegian Post and Telecommunications Authority. Sweden: Swedish National Post and Telecom Agency.

Table 1.3 Fixed network: Outgoing traffic in total. 2000-2004

	2000	2001	2002	2003	2004
million minutes					
<b>Denmark</b>					
<b>Total</b>	<b>23,145</b>	<b>23,481</b>	<b>21,002</b>	<b>19,073</b>	<b>16,798</b>
Domestic traffic	22,438	22,741	20,342	18,432	16,164
International traffic	707	740	661	641	635
<b>Finland</b>					
<b>Total</b>	<b>16,374</b>	<b>16,781</b>	<b>16,791</b>	<b>13,832</b>	<b>11,443</b>
Domestic traffic	...	...	16,322	13,601	11,227
International traffic	...	...	469	231	215
<b>Iceland</b>					
<b>Total</b>	<b>1,983</b>	<b>1,916</b>	<b>1,633</b>	<b>1,253</b>	<b>955</b>
Domestic traffic	1,923	1,851	1,589	1,210	922
International traffic	60	65	44	43	33
<b>Norway</b>					
<b>Total</b>	<b>24,785</b>	<b>26,161</b>	<b>24,393</b>	<b>22,691</b>	<b>20,049</b>
Domestic traffic	24,226	25,525	23,822	22,135	19,531
International traffic	559	636	571	556	518
<b>Sweden</b>					
<b>Total</b>	<b>55,421</b>	<b>56,720</b>	<b>51,944</b>	<b>48,535</b>	<b>45,769</b>
Domestic traffic	54,335	55,557	50,791	47,373	44,585
International traffic	1,086	1,163	1,153	1,162	1,184

Sources: Denmark: National IT and Telecom Agency. Finland: Statistics Finland and Ministry of Transport and Communications. Iceland: Post and Telecommunication Administration in Iceland. Norway: Norwegian Post and Telecommunications Authority. Sweden: Swedish National Post and Telecom Agency.

Table 1.4 Number of xDSL and cable modem subscriptions. 2001-2004

	2001	2002	2003	2004
xDSL				
Denmark	150,173	306,944	473,359	637,847
Finland	61,467	183,482	379,305	665,760
Iceland	10,618	23,484	39,502	53,264
Norway	35,267	145,418	310,499	553,693
Sweden	241,500	421,400	581,100	845,800
cable modems				
Denmark	87,500	155,375	244,582	345,618
Finland	...	54,000	87,304	113,124
Iceland	...	...	...	...
Norway	45,402	52,253	69,734	92,315
Sweden	112,000	156,800	211,500	243,400

Sources: Denmark: National IT and Telecom Agency. Finland: Statistics Finland and Ministry of Transport and Communications. Iceland: Post and Telecommunication Administration in Iceland. Norway: Norwegian Post and Telecommunications Authority. Sweden: Swedish National Post and Telecom Agency.

Table 1.5 Mobile network: Number of subscriptions per 100 inhabitants. 1997-2004

	1997	1998	1999	2000	2001	2002	2003	2004
	per 100 inhabitants							
Denmark	27.3	36.3	49.3	62.9	73.8	83.2	88.3	95.5
Finland	40.6	55.2	63.3	72.0	80.4	86.8	90.9	95.5
Iceland	24.1	37.9	58.1	75.8	86.6	90.3	96.2	99.2
Norway	38.2	47.7	61.7	74.6	83.6	86.5	91.5	103.0
Sweden	35.8	46.4	57.8	71.7	80.6	88.9	98.1	108.5

Sources: Denmark: National IT and Telecom Agency. Finland: Statistics Finland and Ministry of Transport and Communications. Iceland: Post and Telecommunication Administration in Iceland. Norway: Norwegian Post and Telecommunications Authority. Sweden: Swedish National Post and Telecom Agency.

Table 1.6 Mobile network: Outgoing traffic in total. 2000-2004

	2000	2001	2002	2003	2004
	million minutes				
<b>Denmark</b>					
<b>Total</b>	<b>2,600</b>	<b>2,929</b>	<b>3,484</b>	<b>4,164</b>	<b>5,160</b>
Domestic traffic	...	2,800	3,349	4,015	4,989
International traffic	...	129	135	149	171
<b>Finland</b>					
<b>Total</b>	<b>5,294</b>	<b>6,520</b>	<b>7,276</b>	<b>8,161</b>	<b>9,643</b>
Domestic traffic	...	...	...	7,914	9,466
International traffic	...	...	...	247	177
<b>Iceland</b>					
<b>Total</b>	<b>247</b>	<b>287</b>	<b>343</b>	<b>354</b>	<b>385</b>
Domestic traffic	235	274	327	341	376
International traffic	12	13	16	13	9
<b>Norway</b>					
<b>Total</b>	<b>2,994</b>	<b>3,594</b>	<b>4,164</b>	<b>4,736</b>	<b>5,637</b>
Domestic traffic	2,880	3,462	3,991	4,556	5,436
International traffic	113	133	174	180	200
<b>Sweden</b>					
<b>Total</b>	<b>...</b>	<b>5,529</b>	<b>6,283</b>	<b>6,739</b>	<b>7,620</b>
Domestic traffic	...	5,306	6,076	6,527	7,403
International traffic	...	223	207	212	217

Sources: Denmark: National IT and Telecom Agency. Finland: Statistics Finland and Ministry of Transport and Communications. Iceland: Post and Telecommunication Administration in Iceland. Norway: Norwegian Post and Telecommunications Authority. Sweden: Swedish National Post and Telecom Agency.

**Table 1.7 Composite basket of telephone charges in the Nordic countries compared to the OECD average. May 2005**

	Residential telephone charges	Business telephone charges
	————— OECD=100 —————	
Denmark	66,2	55,2
Finland	90,3	83,4
Iceland	57,6	49,4
Norway	73,0	55,0
Sweden	64,8	58,2

Prices are inclusive of tax.

Source: OECD/Teligen.

**Table 1.8 Mobile telephone charges in the Nordic countries. May 2005**

	Low user mobile telephone charges	Medium user mobile telephone charges	High user mobile telephone charges
	————— USD/PPP —————		
Denmark	63,6	169,94	310,6
Finland	104,1	222,12	388,6
Iceland	104,9	319,1	590,9
Norway	177,3	413,74	501,5
Sweden	88,4	224,17	438,1

Prices are including tax.

Denmark: Low user: TDC Mobil (pre-paid). Medium and high user: Sonofon (post-paid).

Finland: Low user: Sonera (pre-paid). Medium and high user: Elisa (post-paid).

Iceland: Low and medium user: og Vodafone (pre-paid). High user: Siminn (post-paid).

Norway: Low user: Telenor (pre-paid). Medium and high user: Netcom (post-paid).

Sweden: Low, medium and high user: Tele 2 Comviq (post-paid).

Source: OECD/Teligen.



## 2. Use of ICT in households and by individuals

### 2.1 Introduction

*Four main areas* This chapter is centred on four main areas of ICT usage in households and by individuals for the year 2005. These areas are:

1. Access to the Internet in households
2. Use of the Internet by individuals
3. Purpose of activities on the Internet
4. Internet commerce.

*Access to the Internet* Access to the Internet in households focuses on access at home to different ICT technologies and the number of households which have access to the Internet at home. To put stress on mobile Internet connections, an indicator describing access at home via mobile devices is also included. Finally, use of broadband at home sums up this part.

*Use of the Internet* Use of Internet by individuals will focus on the frequent users of the Internet, i.e. daily and regular users of the Internet. Furthermore, figures on where individuals use the Internet are also included.

*Purpose of Internet activities and Internet commerce* Purpose of the Internet activities such as communication, information search and ordering/selling goods or services is also touched upon. Internet commerce focuses briefly on what goods or services, the Nordic citizens order or purchase over the Internet.

*Detailed comparison of the Nordic countries* Comparison with European counterparts will be included where it is considered to be of interest and relevance. To broaden the scope, special analyses from Denmark and Finland will give examples of the Nordic work, which is not part of the EU harmonised questionnaire on ICT usage in households and by individuals.

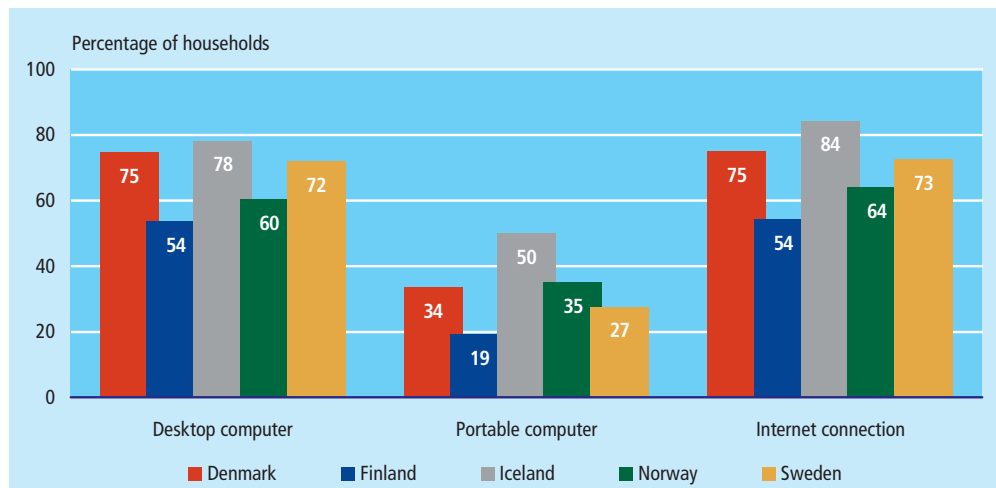
### 2.2 Access to the Internet in households

*Access to a PC at home* Access to a PC at home is quite common in the Nordic countries. The highest share of access to a PC at home is in Iceland with 89 per cent of all households. Finland has the lowest share with 64 per cent, see annex table 2.2. Households with children have the highest share of access to a PC in all the Nordic countries.

*Portable computers at home most common in Iceland* In figure 2.1 below, households' access to a PC is split up between desktop and portable computers. Portable computers are least common in Finland and Sweden with Iceland having the highest share for both types of computers. Apart from desktop computers, portable computers are primarily seen in densely populated areas in the Nordic countries.



Figure 2.1 Access to desktop/portable computer and Internet at home. 2005



Source: National data, annex table 2.2.

*Access to mobile phone and handheld computer*

While almost all households in the Nordic countries have access to a mobile phone, the share of households with access to a handheld computer at home is still limited in all countries. Denmark has the highest share of access to a handheld computer with 8 per cent of all households.

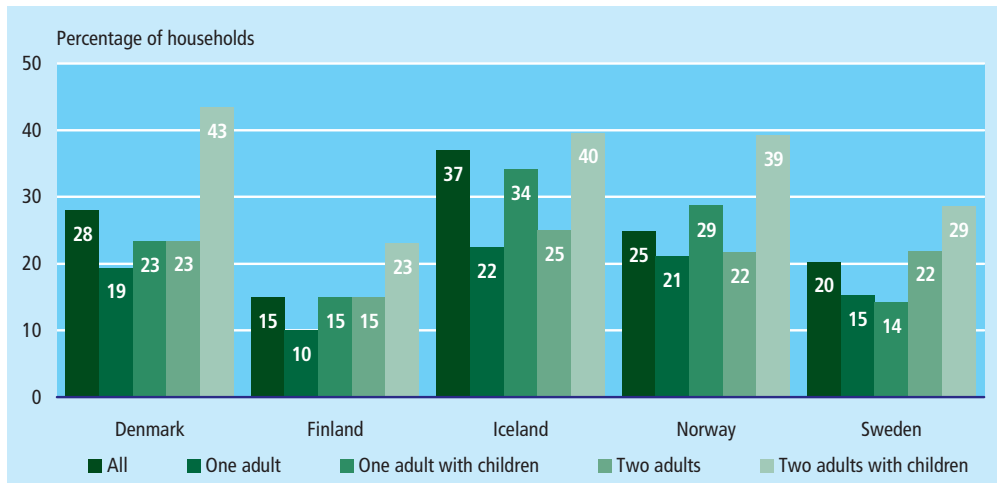
*Internet connection at home*

Internet connection at home is also illustrated in figure 2.1 and the ranking between the Nordic countries follows the same pattern as with access to a PC at home. Households with two adults and children have, by far, the highest share for Internet connection in all the Nordic countries.

*Internet access via portable computer popular among households with portable computer in Denmark*

Given the increasing focus on access to mobile devices and thereby possibility for mobile Internet connectivity, it is interesting to compare the Nordic countries with regard to mobile access to the Internet. 28 per cent of all households in Denmark access the Internet at home via a portable computer. This corresponds to 83 per cent of households with access to a portable computer at home in Denmark. The similar rates for Finland, Iceland, Norway and Sweden are 79 per cent, 74 per cent, 71 per cent and 74 per cent, respectively.

Figure 2.2 Access to the Internet at home via portable computer. 2005



Source: National data, annex table 2.3.

*Differences between types of household*

Households with two adults and children have the highest share for Internet access via portable computer in all countries. In Iceland and Norway there is a significant positive connection between children and access to the Internet via a portable computer. The same pattern is not seen in the other Nordic countries.

*Internet access via mobile phone and handheld computer*

Although most households have access to a mobile phone, only a few actually access the Internet from home via this device. The shares for Internet access from a handheld computer are not surprisingly very low given the modest shares of households which actually have access to this type of mobile device at home, see annex table 2.3.

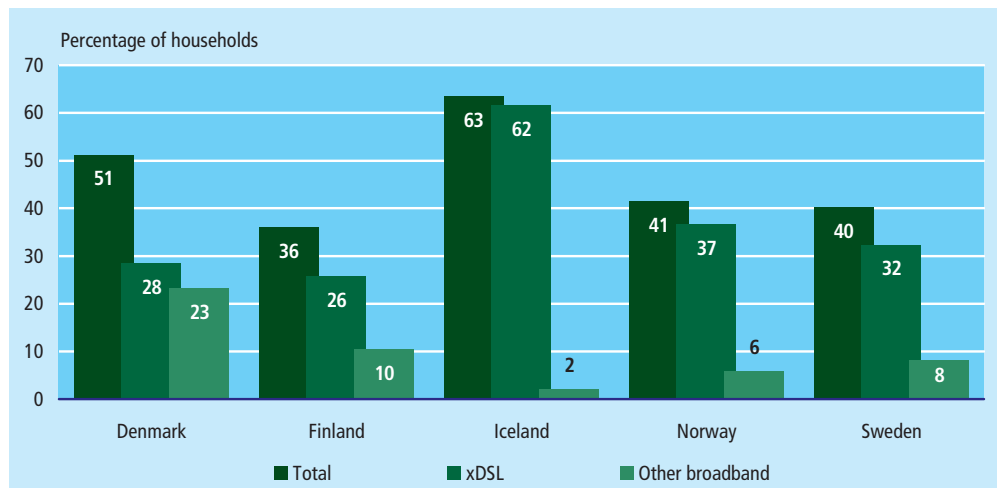
*High share of broadband users in Iceland and Denmark*

The increasing availability and use of fast Internet connections, i.e. broadband, all over the world in the last couple of years, has also been apparent not least in the Nordic countries. Iceland and Denmark have the highest share of broadband users at home among the Nordic countries, with 63 per cent and 51 per cent of all households, respectively.

*Use of different types of broadband*

Only 56 per cent of households in Denmark, which use broadband at home, access the Internet via xDSL (i.e. ADSL, SHDSL etc.) connections. This is the lowest share among the Nordic countries. For instance, almost all use of broadband in Iceland is via xDSL connections. Use of other broadband such as cable modem, is primarily a Danish phenomenon.

Figure 2.3 Use of broadband at home. 2005



Source: National data, annex table 2.4.

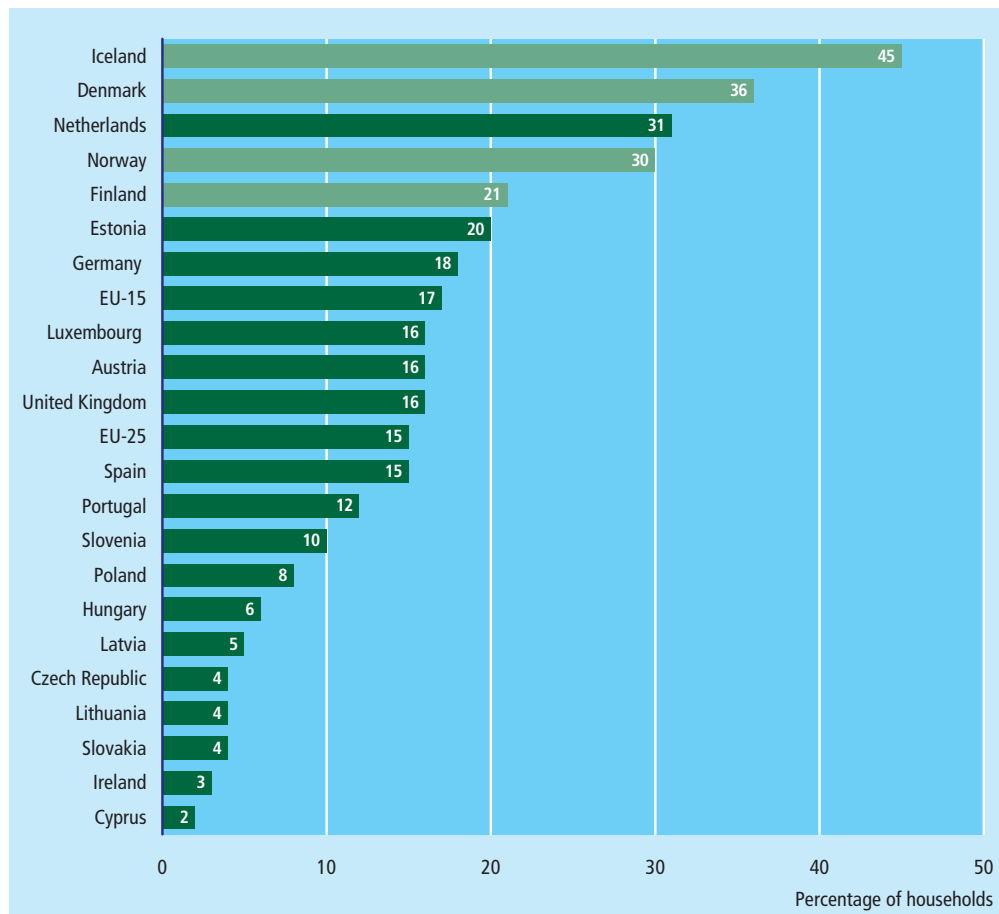
*Lowest use in thinly populated areas*

In all the Nordic countries the use of broadband among households is highest in densely and intermediate populated areas. The shares of broadband use in thinly populated areas are significantly lower, see annex table 2.4.

*Nordic countries among the leading in Europe*

To give an idea of how well the Nordic countries are doing in an international comparison, use of broadband in households is illustrated in figure 2.4 for 21 European countries in 2004. As the use of broadband is increasing rapidly in many countries these years, it is primarily the ranking of the countries which is interesting. The figure shows that together with the Netherlands, the Nordic countries are the leading countries, well above the EU-25 and EU-15 averages.

Figure 2.4 Use of broadband at home - international comparison. 2004



No figure available for Sweden.

Source: Eurostat, October 2005 (<http://europa.eu.int/comm/eurostat/>).

### 2.3 Use of the Internet by individuals

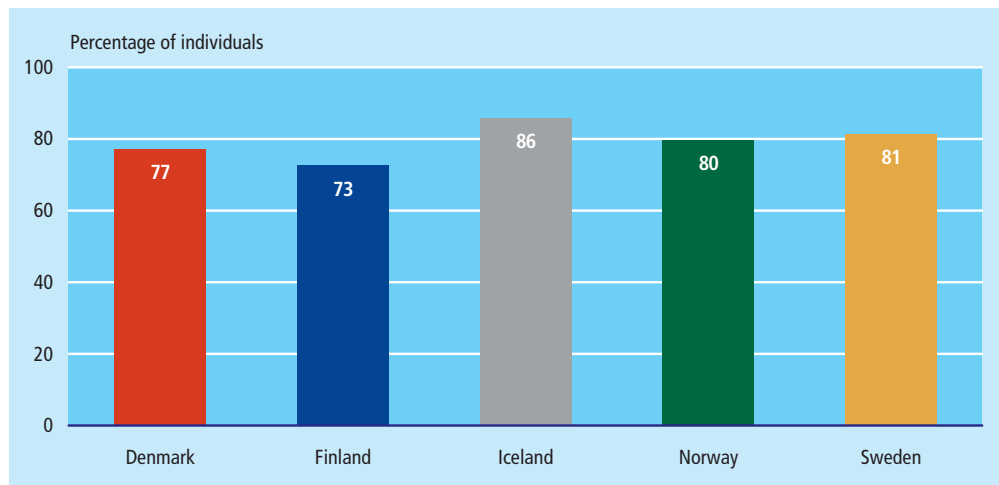
#### *Use of the Internet in the last 3 months*

The share of individuals who used the Internet in the last 3 months is illustrated in figure 2.5. In Iceland almost nine out of ten individuals have used the Internet in the last 3 months. The shares of the other Nordic countries are also high ranging between 73 per cent (Finland) and 81 per cent (Sweden).

#### *Daily users of the Internet*

The majority of individuals between 16 and 74 years in Denmark, Iceland and Sweden are daily users of the Internet. No less than 65 per cent of individuals in Iceland use the Internet every day or almost every day. This is the highest share among the Nordic countries. In Finland and Norway approx. one out of two individuals uses the Internet on a daily basis.

Figure 2.5 Use of the Internet in the last 3 months. 2005

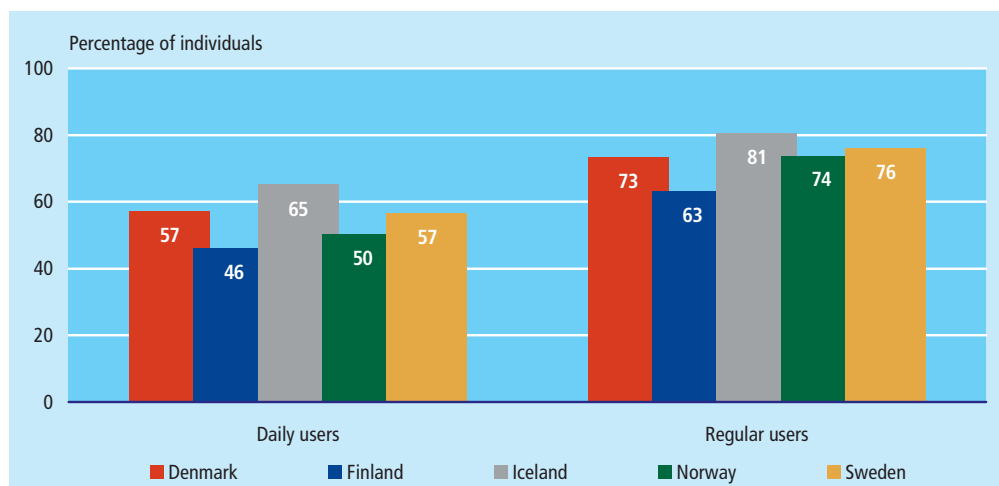


Source: National data.

*Males more frequent on the Internet*

Concerning male and female daily users, women have lower shares in each of the Nordic countries. By comparing employment groups, students have the highest part, for instance, 85 per cent of all students in Iceland access the Internet every day or almost every day. There is a significant difference between individuals, who are living in a household with broadband access or no broadband access, see annex table 2.5. Hence, individuals with access to broadband at home are more likely to use the Internet on a daily basis.

Figure 2.6 Frequent users of the Internet. 2005



Finland, data for 2004.

Source: National data, annex tables 2.5 and 2.6.

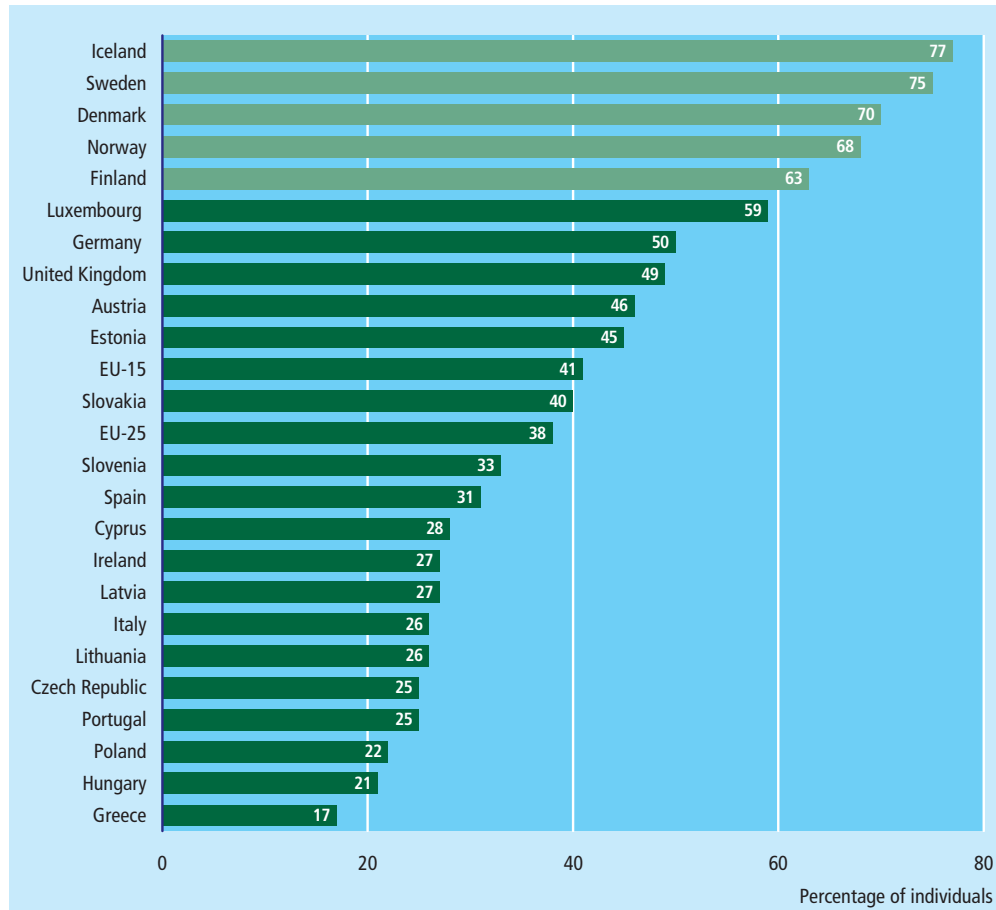
*Broadband access promotes frequent use of the Internet*

In figure 2.6, the individuals who use the Internet on a regular basis i.e. at least once a week, are also illustrated. The share of regular users is almost the same in Denmark, Norway and Sweden. Almost all individuals with access to broadband at home are using the Internet at least once a week (table 2.6 in annex).

*Nordic citizens most frequent user in Europe*

In international comparison of regular users of the Internet, the Nordic countries were leading ahead of countries like Luxembourg, Germany and United Kingdom in 2004. The EU-15 average is 41 per cent which is far below the Nordic shares between 63 per cent and 77 per cent, see figure 2.7.

**Figure 2.7** Regular users of the Internet - international comparison. 2004



Source: Eurostat, October 2005 (<http://europa.eu.int/comm/eurostat/>).

*Most people use the Internet at home*

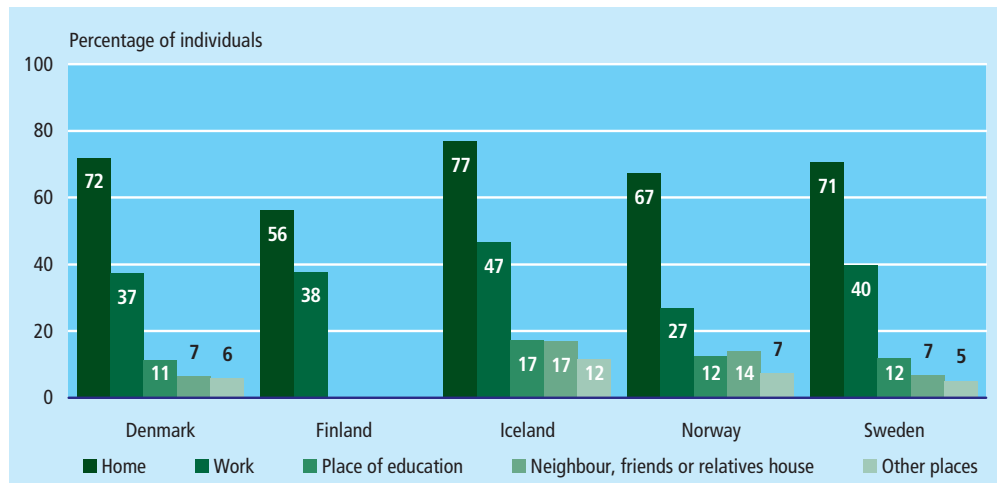
Where the Nordic individuals use the Internet is also an interesting indicator in describing usage by individuals. Figure 2.8 illustrates use of the Internet in the last 3 months at different places. With the high share

of Internet access at home in the Nordic countries, it is not surprising, that most people use the Internet at home.

*Use of the Internet at other places*

Also at work, individuals often use the Internet with shares between 27 per cent and 47 per cent of all individuals in the Nordic countries. Other places than at home and at work have much lower shares, but use of the Internet at a neighbour, friends or a relative's house seems to be more common in Iceland and Norway.

**Figure 2.8** Use of internet at home, at work, place of education and other places in the last 3 months. 2005



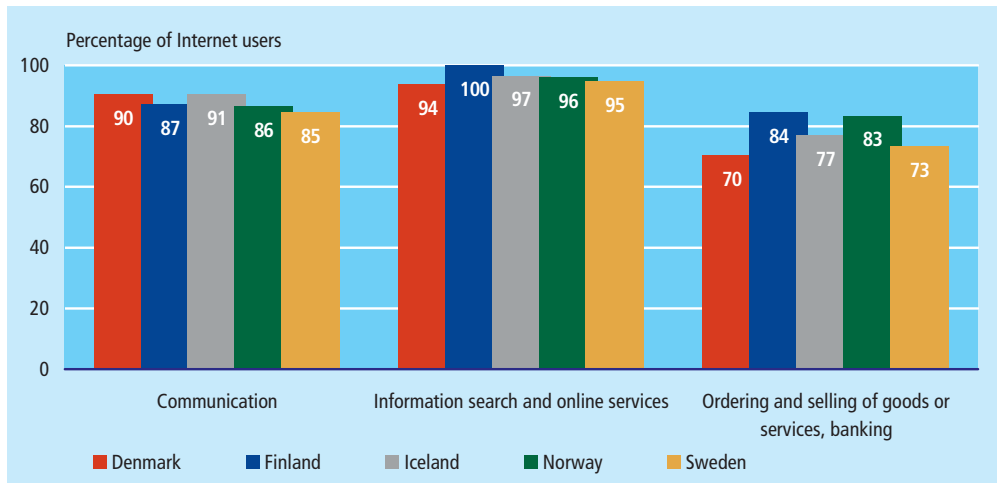
Finland: Only data for use of Internet at home and at work are available.  
 Source: National data, annex table 2.7.

**2.4 Purpose of activities on the Internet**

*Most common purposes*

Activities on the Internet related to communication and information search and online services are common among Internet users in all countries. Almost all Internet users have tried one of these activities in the last 3 months.

Figure 2.9 Purpose of Internet activities in the last 3 months. 2005



Source: National data, annex table 2.8.

*Very high shares for all main purposes in Finland and Norway*

Activities related to ordering and selling of goods or services and Internet banking are nearly as popular in Finland and Norway but less so in the other countries.

*Most popular Internet activities*

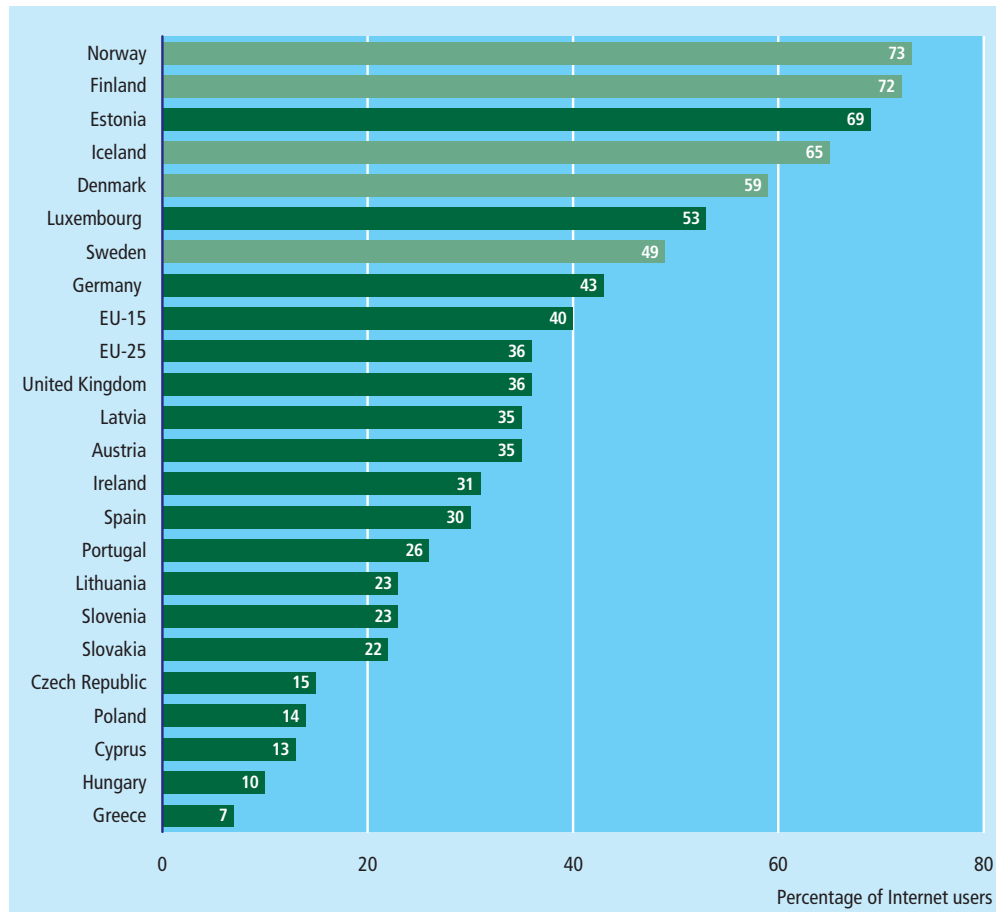
In annex, table 2.8, the different subgroups of the main activities are listed. Sending/receiving e-mails, finding information about goods or services and Internet banking are the most popular activities in the countries, apart from Iceland, where reading or downloading online newspapers/magazines is more popular than Internet banking.

*Least popular Internet activities*

The pattern is the same in all Nordic countries when it comes to the least popular activities on the Internet. Activities such as telephoning over the Internet, financial services (e.g. share purchases) and selling goods or services (e.g. via auctions) are not that common.



**Figure 2.10** Use of financial services (Internet banking, share purchasing) - international comparison. 2004



Source: Eurostat, October 2005 (<http://europa.eu.int/comm/eurostat/>).

*Financial services in international comparison*

One of the more advanced Internet activities, use of financial services, is illustrated for the European countries in figure 2.10 for the year 2004. Again, the Nordic countries are doing well in the comparison. Together with Estonia and Luxembourg, the Nordic citizens are frequent users of Internet banking and other financial services provided by the Internet.

## 2.5 Internet commerce

*Travel and holiday accommodation most common*

This section deals shortly with Internet commerce i.e. what types of goods or services the Internet users have ordered over the Internet in the last 12 months. Overall, ordering related to travel and holiday accommodation is the most common type of goods or services that Internet users have ordered over the Internet in the last 12 months.

Tickets for events seem to be very popular in Denmark and Norway with shares of 22 per cent and 21 per cent respectively.

**Table 2.1** Types of goods and services ordered over the Internet in the last 12 months. 2005

	Denmark	Finland	Iceland	Norway	Sweden
	percentage of Internet users				
Food / groceries	4	..	3	1	1
Households goods	6	6	10	6	4
Films, music	15	9	14	18	16
Books / magazines / newspapers / e-learning material	14	12	19	19	15
Clothes, sports goods	18	14	10	15	16
Computer software (incl. video games)	11	5	10	12	5
Computer hardware	13	8	5	11	7
Electronic equipment (incl. cameras)	11	6	6	13	9
Share purchases / financial services / insurance	3	3	4	5	3
Travel and holiday accommodation	23	14	36	28	20
Tickets for events	22	12	13	21	11
Lotteries or betting	2	9	6	3	2
Other	11	5	3	6	8

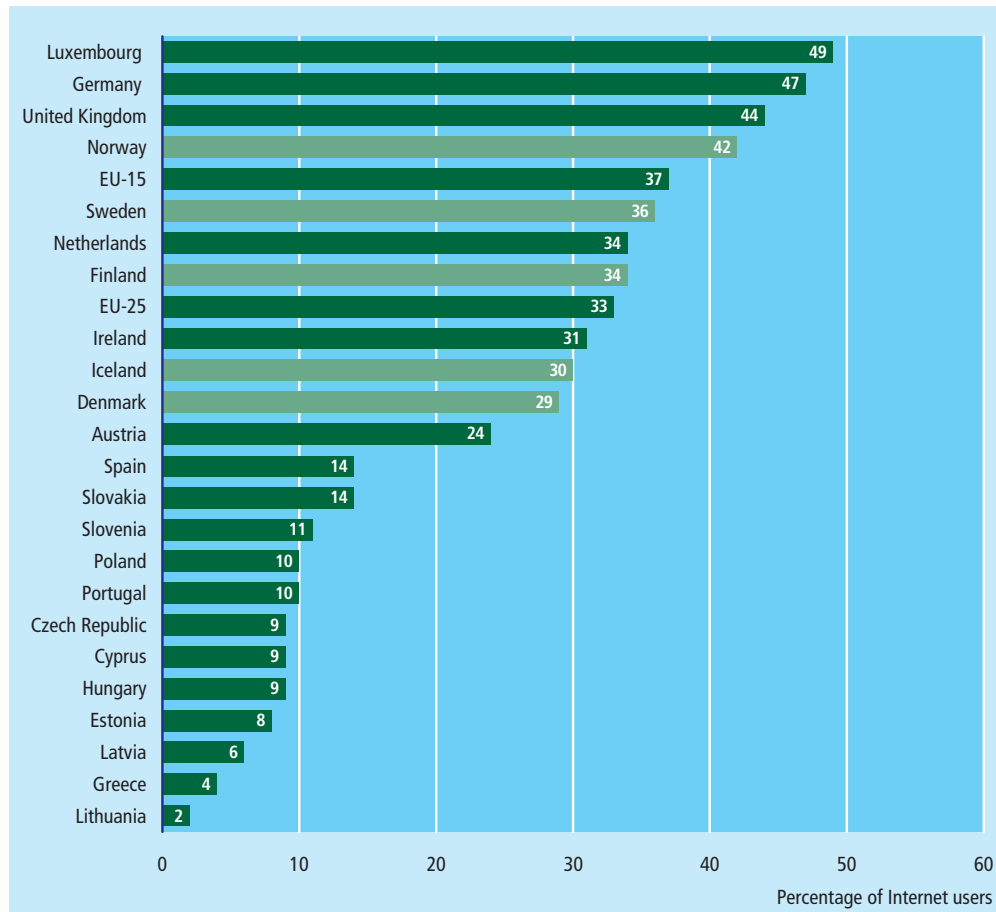
The higher share for Finland is due to a different routing in the questionnaire.

Sources: National data.

*Internet commerce  
in Europe*

Contrary to earlier comparisons on a European level, the Nordic countries are not in the same leading position when it comes to having ordered/bought goods or services over the Internet in the last 3 months. Figure 2.11 illustrates Internet commerce among Internet users in Europe and apart from Norway, the Nordic countries are below the EU-15 average. Luxembourg, Germany and United Kingdom have the highest shares of Internet users, who have ordered/brought goods or services in the last 3 months.

**Figure 2.11** Internet users having ordered/bought goods or services over the Internet in the last 3 months - international comparison. 2004



Source: Eurostat, October 2005 (<http://europa.eu.int/comm/eurostat/>).

## 2.6 Internet connection paid by an employer in Denmark

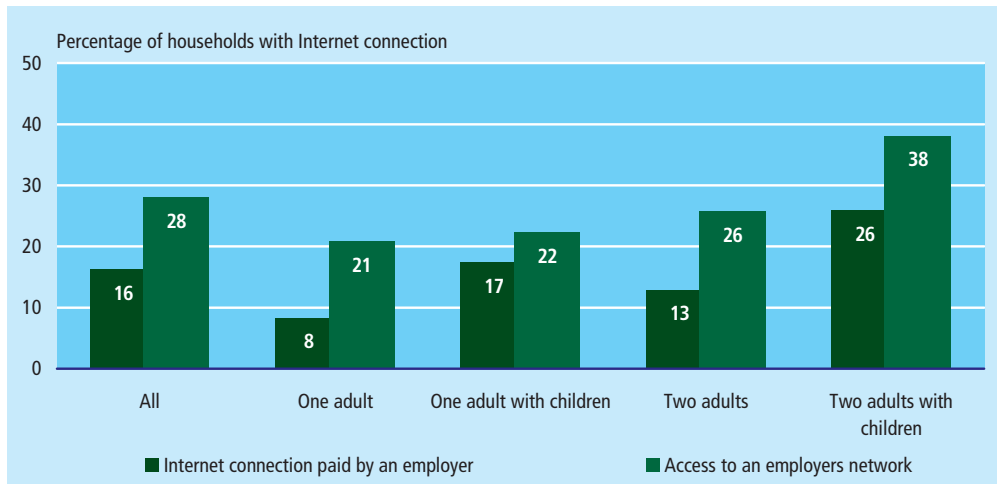
### *Danish questions related to employer paid Internet connection*

This section briefly describes the results of questions included in the Danish survey of ICT usage in households and by individuals. The results focus on the number of Danish households for which an Internet connection is paid by an employer and whether the households have access to an employer's network.

### *Internet connection paid by an employer for 16 per cent of all households*

Figure 2.12 illustrates the results of the questions carried out in the months of January through April 2005. The data shows that Internet connection is paid by an employer for 16 per cent of all households with Internet connection at home. Similarly, 28 per cent has access to an employer's network. Households with children have the highest share of Internet connection paid by an employer.

**Figure 2.12** Internet connection paid by an employer and access to an employer's network. 2005



Source: ICT usage in households and by individuals 2005. Denmark.

## 2.7 Ways of using the Internet in Finland

### *Purpose of Internet use in Finland*

This part describes the use purposes of the Internet and its versatility in Finland. What are the most common purposes of use for the Internet? Is the Internet used for entertainment or for running daily errands? What kinds of use modes are typical for different user groups?

### *Most and least common purposes in spring 2004*

The analysis is based on telephone interview data collected in spring 2004 in Finland. Results of the interviews can be found in annex, table 2.9. The most common purposes of Internet use in Finland in spring 2004 were the same as in 2005, i.e. sending/receiving e-mail, finding information about goods or services and Internet banking. The least common Internet purposes were telephoning over the Internet, completing other educational activities related specially to employment opportunities and video conferencing.

### *How versatile is Internet use?*

The first subject of this analysis is to find out how versatile the Internet use in Finland is. The versatility of Internet use is estimated on the basis of how many of the 21 purposes of use listed in table 2.9 were mentioned by the respondents in the survey.

### *One or two purposes*

Among those who had used the Internet in the last three months, only around four per cent (nearly 100,000 persons) had used the Internet for only one purpose. Nearly every tenth respondent, or 230,000 persons, had used the Internet for one or two purposes.

### *On average seven different purposes*

The average Internet user (around every second or 1,340,000 persons) had three to seven uses for the Internet. Almost every third (31 per cent) mentioned eight to 11 uses. Eleven per cent or 309,000 Internet

users had at least 12 purposes for the Internet. On average, the Internet had been used for seven different purposes.

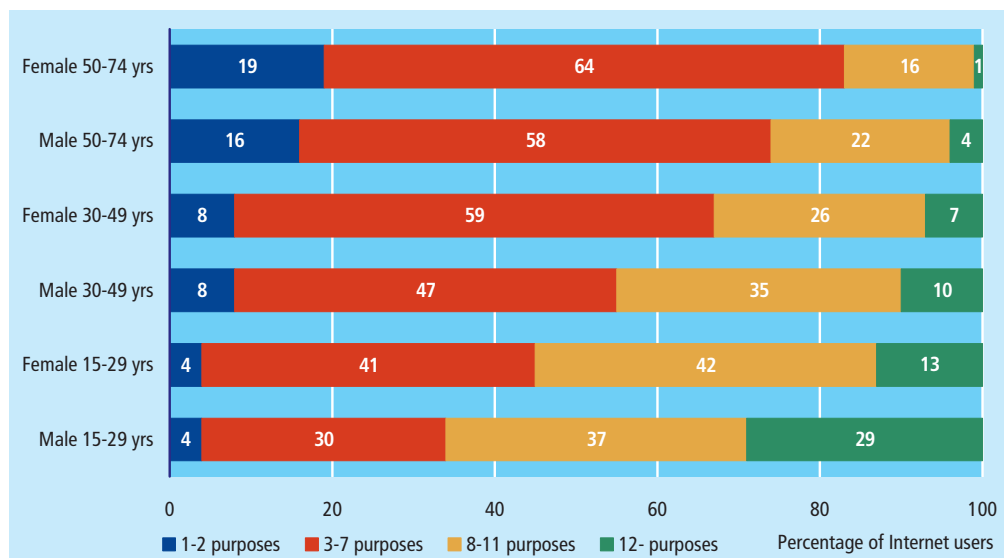
*Limited, average and multi-use*

Below one to two purposes of use for the Internet are called limited use, three to 11 purposes average use, and 12 or more purposes multi-use. Those with limited and multiple Internet use both made up around one tenth of Internet users, to which the division above was based.

*Sixteen per cent of men were multi-users*

Figure 2.13 illustrates the number of use purposes for the Internet in per cent of Internet users by age group and gender. Age and gender can explain the versatility of Internet use. Among men Internet use is more varied than among women. Limited use is equally common among men and women. When purposes of use increase, men’s proportion of users grows. Sixteen per cent of men and seven per cent of women were multi-users.

**Figure 2.13** Number of use purposes for the Internet in per cent of Finnish Internet users by age group and gender



Source: Statistics Finland.

*Use purposes decline with age*

The difference between women and men in versatility of Internet use was smallest for the age group 30 to 39-year-olds. With age the use purposes of the Internet declined, and nearly every fifth Internet user aged over 50 used it only for one or two purposes.

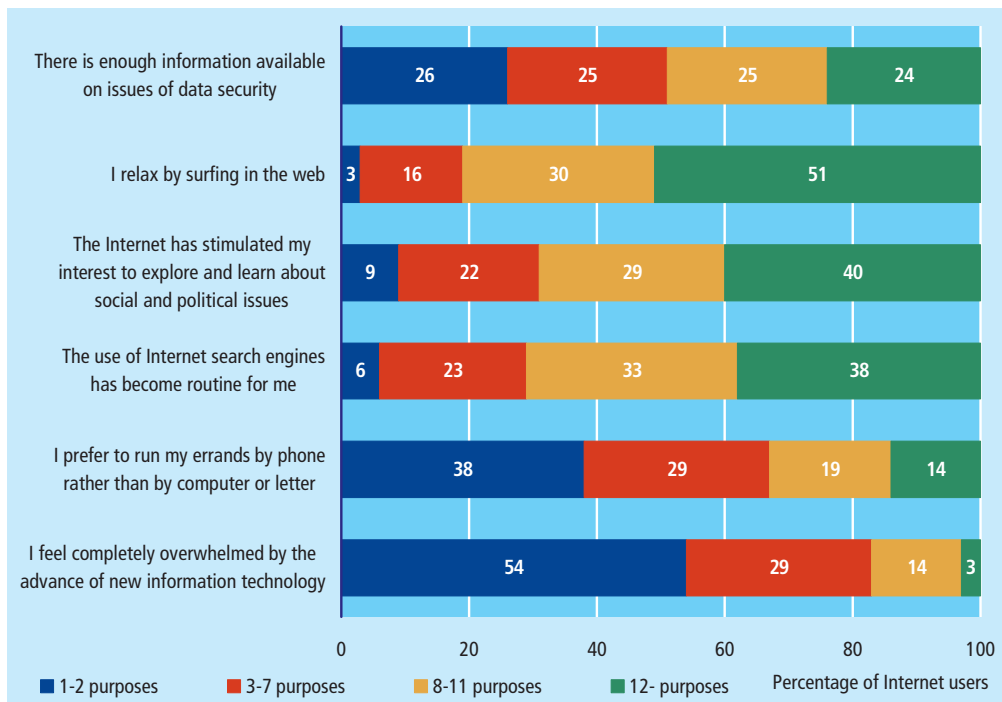
*More varied use among young people*

Young people used the Internet in considerably more varied ways than elderly people did. Six out of ten under 30-year-olds and just one of seven 60 to 74-year-olds had at least eight purposes of use. Nearly two thirds of students had at least eight uses for the Internet, while this was so for four tenths of all users.

*Versatile use connected to use habits?* Is the versatile use of the Internet connected to use habits of communication media and attitudes to information society? Interest in running daily errands by computer connections and not by telephone grows in step with the diversification of use purposes for the Internet. Over one half (53 per cent) of multi-users agreed completely with the statement "I would rather receive invoices by letter post than by email" as did nearly three quarters (72 per cent) of average users.

*Advances of new information technologies* Multi-users feel less often than others that they have fallen behind in the advance of information technology, see figure 2.14. Slightly over one half of all Internet users thought that sufficient information was available on data security issues. Agreement with the statement increases steadily as the uses of the Internet grow.

**Figure 2.14** Versatility of Internet use and usage habits of communication media and information society attitudes. Proportions of Internet users who agree completely or somewhat with the statement, according to versatility of use purposes



Source: Statistics Finland.

*Surfing, leisure and entertaining activity* Surfing the Internet and routine use of the search engine both indicate experience with Internet use and that it is gradually becoming a more habitual activity. Surfing is a leisure and entertaining activity and not primarily benefit-oriented or goal-oriented moving on the net. Versatile Internet users do not feel lost in the information society, they are active users of information technology and their attitude to information

society is more positive than average. On the other hand, they think that there is too much supervision.

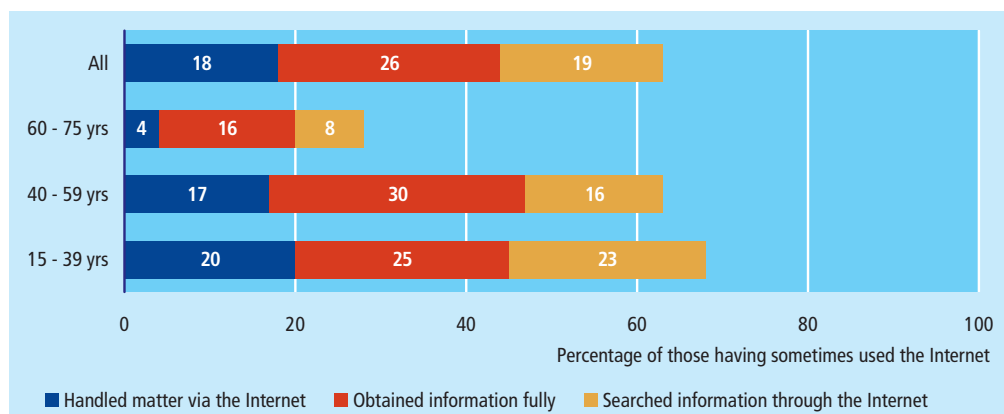
*Use of public services*

Finally it can be asked, how widely services are used through the Internet. Using of public services via the Internet is one of its most general use purposes in Finland.

*Degree of contact with public authorities*

Nearly two thirds of those having used the Internet sometimes had searched for information about municipal or State services via the Internet during 2004 (Memo to the Information Society Programme, autumn 2004). Seventy per cent of them obtained the information they needed fully through the net and around one quarter took care of the business via the net. Two thirds of the around half a million Finnish population who did this via the net, could do so completely over the Internet, see figure 2.15.

**Figure 2.15** Finnish persons having searched information about municipal and State services through the Internet during 2004 as per cent of those having used the Internet by age group. November 2004



Source: Statistics Finland.

*Use of Internet forms*

The Internet has various forms that can be used instead of paper forms in transactions with either authorities or private service providers. In the interview questions were asked about using of Internet forms in the last three months. The question covered both public sector and private sector forms. Every fifth (800,000) had used an Internet form. The oldest age group had used substantially less often Internet forms than other age groups, where their users made up one third.

**2.8 Sources**

In all the Nordic countries the data on ICT usage in households and by individuals are collected based on the harmonised model questionnaire developed by Eurostat. The surveys are conducted via telephone interviews and cover all individuals between 16 and 74 years, apart from Finland where the age band is between 15 and 74 years.

## 2.9 Annex

Table 2.2 Access to ICT technologies and Internet connection at home. 2005

	All	Type of household				Type of locality		
		One adult without children	Single parent with children	Two adults without children	Two adults with children	Densely populated area	Inter-mediate populated area	Thinly populated area
<b>Access to:</b>								
percentage of households								
<b>PC</b>								
Denmark	84	71	86	84	98	86	84	81
Finland	64	46	69	63	91	69	66	61
Iceland	89	63	84	80	97	.	90	88
Norway	74	63	90	75	95	74	80	72
Sweden	80	66	85	81	97	76	86	80
<b>Desktop computer</b>								
Denmark	75	57	77	77	93	73	77	75
Finland	54	34	61	52	80	53	57	53
Iceland	78	42	61	66	85	.	78	78
Norway	60	43	71	66	88	57	67	59
Sweden	72	56	75	72	92	64	78	74
<b>Portable computer</b>								
Denmark	34	24	32	29	50	43	32	24
Finland	19	15	11	19	28	29	18	14
Iceland	50	30	48	35	53	.	54	44
Norway	35	31	48	32	49	43	35	31
Sweden	27	19	21	29	39	38	31	22
<b>Handheld computer</b>								
Denmark	8	4	7	6	14	10	9	4
Finland	..	..	..	..	..	..	..	..
Iceland	6	5	2	4	8	.	7	4
Norway	6	4	11	6	8	8	8	4
Sweden	5	2	3	5	10	7	9	4
<b>Mobile phone</b>								
Denmark	91	83	92	92	98	92	90	90
Finland	95	89	98	96	100	95	94	95
Iceland	98	88	100	97	99	.	98	97
Norway	94	90	100	96	99	94	93	94
Sweden	95	91	95	95	99	94	96	95
<b>Internet connection at home</b>								
Denmark	75	60	71	76	94	80	74	70
Finland	54	35	57	54	82	59	56	51
Iceland	84	54	68	72	94	.	86	82
Norway	64	53	69	63	90	67	67	61
Sweden	73	56	69	76	93	67	83	72

By definition, there is no densely populated area in Iceland.



**Table 2.3** Mobile devices for connecting/accessing the Internet at home. 2005

	All	Type of household				Type of locality		
		One adult without children	Single parent with children	Two adults without children	Two adults with children	Densely populated area	Intermediate populated area	Thinly populated area
percentage of households								
<b>Access via portable computer</b>								
Denmark	28	19	23	23	43	36	28	20
Finland	15	10	15	15	23	14	7	6
Iceland	37	22	34	25	40	.	40	31
Norway	25	21	29	22	39	30	24	23
Sweden	20	15	14	22	29	30	24	15
<b>Access via hand-held computer</b>								
Denmark	4	1	4	3	8	5	4	3
Finland	..	..	..	..	..	..	..	..
Iceland	0	0	0	0	1	.	0	0
Norway	2	2	2	2	4	2	3	2
Sweden	2	1	2	2	4	3	2	1
<b>Access via mobile phone</b>								
Denmark	12	8	8	8	20	12	12	10
Finland	..	..	..	..	..	..	..	..
Iceland	1	2	0	1	1	.	1	1
Norway	14	12	9	10	26	17	12	13
Sweden	7	5	4	5	12	7	8	6

By definition, there is no densely populated area in Iceland.

Table 2.4 Use of broadband connection at home. 2005

	All	Type of household				Type of locality		
		One adult without children	Single parent with children	Two adults without children	Two adults with children	Densely populated area	Inter- mediate populated area	Thinly populated area
percentage of households								
<b>Broadband connection</b>								
Denmark	51	41	54	45	70	59	52	42
Finland	36	24	49	33	57	43	42	30
Iceland	63	34	52	47	72	.	69	54
Norway	41	37	49	36	61	51	51	32
Sweden	40	31	34	39	51	45	49	36
<b>xDSL connection</b>								
Denmark	28	17	31	23	47	32	29	24
Finland	26	15	34	23	43	28	28	24
Iceland	62	34	52	45	70	.	67	52
Norway	37	33	39	31	55	44	47	28
Sweden	32	23	24	31	44	34	39	30
<b>Other broadband connection</b>								
Denmark	23	24	23	22	23	28	24	18
Finland	10	9	15	10	14	15	14	6
Iceland	2	0	0	2	2	.	2	2
Norway	6	6	10	4	6	8	5	5
Sweden	8	8	10	8	8	11	11	6

By definition, there is no densely populated area in Iceland.

Table 2.5 Daily users of the Internet in the last 3 months. 2005

	Denmark	Finland	Iceland	Norway	Sweden
	percentage of individuals				
<b>All</b>	<b>57</b>	<b>46</b>	<b>65</b>	<b>50</b>	<b>57</b>
<b>Gender</b>					
Male	62	48	68	58	63
Female	52	44	62	43	50
<b>Age</b>					
16-24	70	63	77	60	73
25-34	68	67	80	60	69
35-44	71	54	72	64	66
45-54	59	45	60	51	57
55-64	44	33	49	37	47
65-74	16	4	25	10	13
<b>Education</b>					
Low	45	32	52	28	45
Medium	55	45	64	46	50
High	76	66	87	67	75
<b>Employment</b>					
Student	75	70	85	68	78
Employee	65	57	68	57	63
Self-employed	60	46	66	55	56
Unemployed	49	28	55	46	59
Retired and other inactive	19	11	26	14	21
<b>Type of locality</b>					
Densely populated areas	66	51	.	63	64
Intermediate populated areas	57	42	69	51	63
Thinly populated areas	48	34	58	45	52
<b>Broadband</b>					
Access at home	77	81	80	70	81
No access at home	33	50	51	31	38

Finland, data for 2004.

**Table 2.6 Regular users of the Internet in the last 3 months. 2005**

	Denmark	Finland	Iceland	Norway	Sweden
	percentage of individuals				
<b>All</b>	<b>73</b>	<b>63</b>	<b>81</b>	<b>74</b>	<b>76</b>
<b>Gender</b>					
Male	75	63	82	80	80
Female	71	63	79	67	72
<b>Age</b>					
16-24	90	88	94	90	93
25-34	88	85	95	86	90
35-44	85	75	89	90	86
45-54	76	62	78	74	77
55-64	58	47	61	55	68
65-74	27	9	36	22	26
<b>Education</b>					
Low	60	48	71	43	63
Medium	73	63	82	72	71
High	89	83	96	90	93
<b>Employment</b>					
Student	95	93	98	94	95
Employee	81	75	85	84	84
Self-employed	74	67	80	75	79
Unemployed	68	49	66	64	80
Retired and other inactive	31	23	41	25	36
<b>Type of locality</b>					
Densely populated areas	81	69	.	84	80
Intermediate populated areas	74	57	83	73	82
Thinly populated areas	66	51	76	70	73
<b>Broadband</b>					
Access at home	91	94	93	91	94
No access at home	52	78	78	56	62

Regular use is at least once a week. Finland, data for 2004.

**Table 2.7** Use of Internet at home, at work, place of education and other places in the last 3 months. 2005

	Denmark	Finland	Iceland	Norway	Sweden
	percentage of individuals				
At home	72	56	77	67	71
At work	37	38	47	27	40
At place of education	11	...	17	12	12
Neighbour, friends or a relative's house	7	...	17	14	7
Other places	6	...	12	7	5

**Table 2.8** Purpose of activities on the Internet in the last 3 months. 2005

	Denmark	Finland	Iceland	Norway	Sweden
	percentage of internet users				
<b>Communication</b>	<b>90</b>	<b>87</b>	<b>91</b>	<b>86</b>	<b>85</b>
Sending/ receiving e-mails	90	86	88	85	83
Telephoning over the Internet	11	13	16	10	6
Other (use of chat sites etc.)	16	24	50	37	28
<b>Information search and online services</b>	<b>94</b>	<b>100</b>	<b>97</b>	<b>96</b>	<b>95</b>
Finding information about goods or services	81	86	85	84	86
Using services related to travel and accommodation	51	67	63	58	50
Listening to web radios / watching web television	25	23	37	31	25
Playing or downloading games, images or music	27	31	33	32	39
Downloading software	25	33	29	31	25
Reading or downloading online newspapers / news magazines	50	56	76	75	48
Looking for a job or sending a job application	24	33	18	23	28
Seeking health-related information (e.g. injury, disease, nutrition improving health, etc.)	31	54	46	32	29
<b>Ordering and selling of goods or services, banking</b>	<b>70</b>	<b>84</b>	<b>77</b>	<b>83</b>	<b>73</b>
Internet banking	63	77	71	77	62
Other financial services (e.g. share purchasing)	5	19	7	6	12
Purchasing / ordering goods or services (excluding shares / financial services)	31	45	32	44	44
Selling goods or services (e.g. via auctions)	7	13	7	7	13

Table 2.9 Use purposes of the Internet in Finland. Spring 2004

	Percentage of internet users
Sending/ receiving e-mail	88
Finding information about goods or services	84
Internet Banking	71
Obtaining information from public authorities web sites	62
Using services related to travel and accommodation	60
Reading or downloading online papers/ news magazines	52
Purchasing/ ordering goods or services (excl. shares/financial services)	37
Downloading pictures onto the computer	37
Looking for a job or sending a job application	31
Listening to the music on the net or downloading it onto the computer or other device	30
Formalised educational activities at school, university or other educational institution	29
Chatting or writing to discussion forums	25
Playing games on the net	23
Listening to web radios or watching web television	17
Other financial and insurance services (e.g. buying of shares or securities)	16
Downloading of games from the net onto the computer	11
Selling goods or services (e.g. via auctions)	11
Completing post education courses	8
Telephoning over the Internet	5
Completing other educational activities related specially to employment opportunities	4
Video conferencing	4

Source: Statistics Finland



### 3. Use of ICT in enterprises

#### 3.1 Introduction

<i>Enterprises' ICT usage important to the information society</i>	ICT usage is of great importance to the production and organisation of enterprises in relation to employees, customers and suppliers. At the same time, enterprises make up a central engine for the development of the information society. In this context, Nordic countries are among the leading countries in Europe as well as in the world.
<i>Contents of the chapter</i>	The chapter focuses on a Nordic benchmarking and begins with an overview of the development of recent years in basic ICT indicators. Infrastructure and fundamental ICT usage is dealt with, followed by Internet use and website facilities. Electronic commerce is presented with alternative breakdowns and special national analyses are presented concerning automated data exchange and outsourcing of ICT activities.
<i>Detailed tables</i>	Detailed figures with breakdowns by size or industry of the enterprises are presented in 3.10 Annex: Tables. The annex includes also tables of European ICT usage in enterprises based on the 2004 surveys. These tables are not commented in the text, however, it should be noted that the Nordic countries in general have high positions compared to the rest of the European countries.
<i>Public sector service and ICT security</i>	Interaction with public authorities and ICT security are covered under chapter 4 and 5 respectively.
<i>Sources</i>	The figures in this chapter are almost entirely based on NSI statistics on ICT usage in Nordic enterprises. Recent figures from the 2005 surveys have been used largely. More information about the surveys can be found in 3.9 Sources.
<i>Icelandic figures are from 2003</i>	The most recent Icelandic figures on enterprises' use of ICT are from 2003. In accordance with the development in other Nordic countries, it is expected that Icelandic figures on ICT usage have changed since 2003.
<i>Coverage and breakdowns</i>	Figures refer to private enterprises with at least 10 employees when nothing else is stated. The size groups 10-19, 20-49, 50-99 and 100+ refer to the number of full-time employees in the enterprises. 10+ stands for enterprises with at least 10 employees. Icelandic figures concern head counts instead of employees.
<i>Deviations to national figures</i>	The figures used for this publication might show smaller deviations from national published figures due to harmonisation of the primary data.



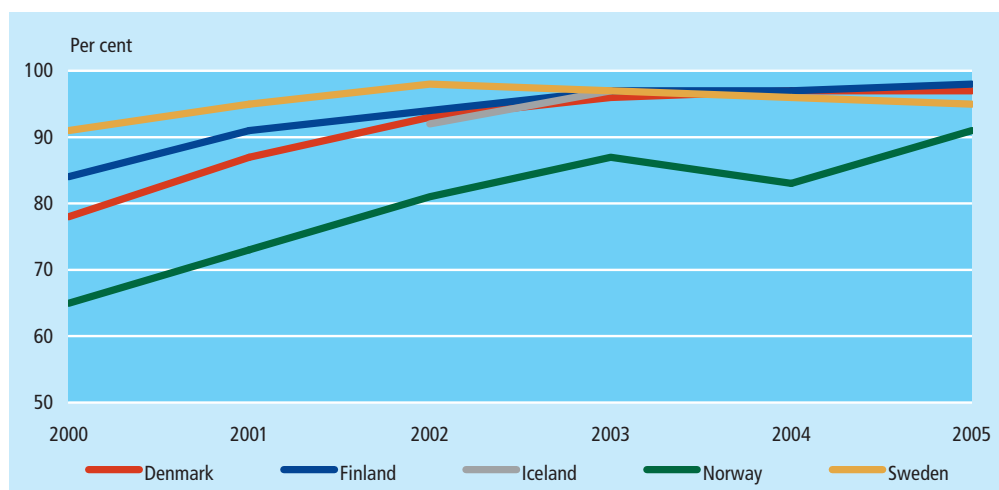
### 3.2 Development of recent years in basic ICT indicators

*Reference times for surveys* In general the reference time for the surveys is January. In Denmark, the surveys named 2000-2003 in this publication were conducted at the end of the previous years, and similar in Norway concerning 2000-2002.

*Internet access has reached a saturation point* The Internet penetration seems more or less to have reached a saturation point in all Nordic countries in 2005, however, with Norwegian enterprises at a lower level. The differences between the countries have narrowed in the last 5 years (figure 3.1).

*Less difference between the Nordic countries* From 2000-2002 Swedish enterprises were clearly in front, but Finnish and especially Danish enterprises have caught up on the difference in these years. A high growth in the penetration has occurred in the whole period concerning Norwegian enterprises, which are in 2005 only a few percentage points behind enterprises from the other countries.

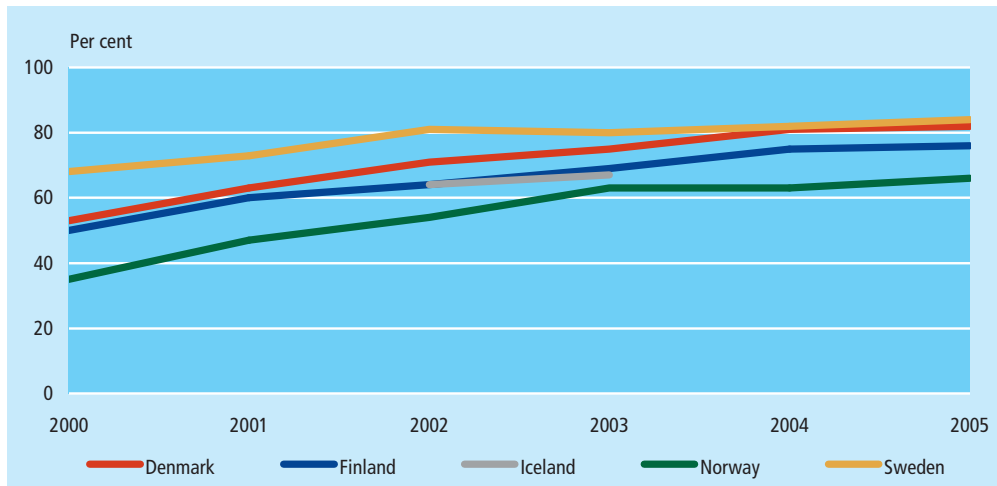
Figure 3.1 Internet access in enterprises



Sweden, 2002: "Have or plan to have access during 2002" (Source: Swedish survey on ICT usage in Enterprises 2002).  
 Source: NSI statistics, 2000-2005 surveys (Iceland 2002-2003).

*Strong growth in website diffusion, especially in Norway* A similar development to the Internet penetration is present concerning websites in enterprises. The growth of websites has been stronger as it started from a lower level compared to the Internet access. Swedish enterprises have the lead in all years from 2000-2005, but the gap is closing concerning Denmark and Finland and, apparently, also Iceland. Norwegian enterprises are also here at a lower level, but have caught up on some of the difference in the period due to significant growth.

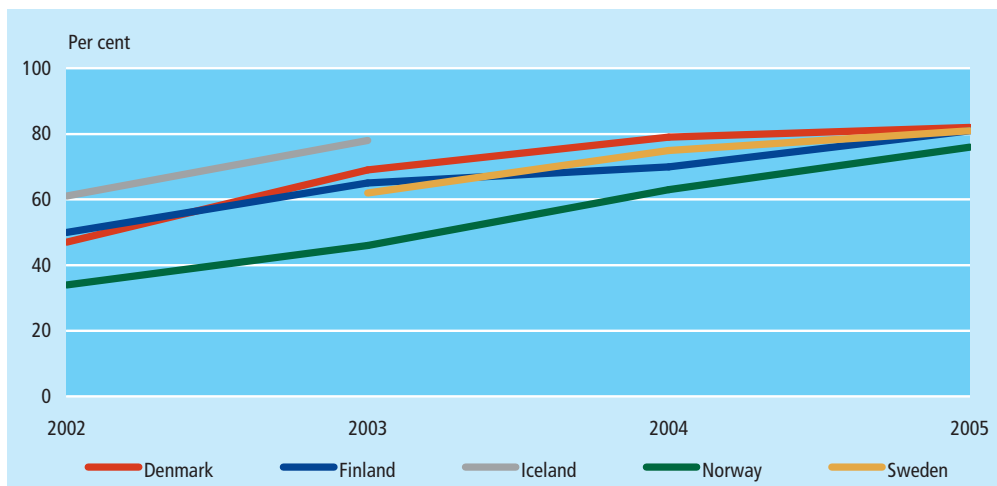
Figure 3.2 Website in enterprises



Source: NSI statistics, 2000-2005 surveys (Iceland 2002-2003).

*Steady increase in broadband access*

The diffusion of broadband access in enterprises, e.g. xDSL, has increased steadily in the period, especially until 2004 (figure 3.3). Finland, Denmark and Sweden have experienced a similar development from about 50 per cent penetration in 2002 until about 80 per cent in 2005. Norwegian enterprises have experienced a marked increase in broadband access and the division to the other countries has narrowed significantly. Icelandic enterprises had in 2002-2003 a higher level of broadband penetration than all the other Nordic countries.

Figure 3.3 Broadband access<sup>1</sup> in enterprises

<sup>1</sup> In general, broadband consists of xDSL-connections and fixed connections other than traditional modem and ISDN.

Source: NSI statistics, 2000-2005 surveys (Iceland 2002-2003).

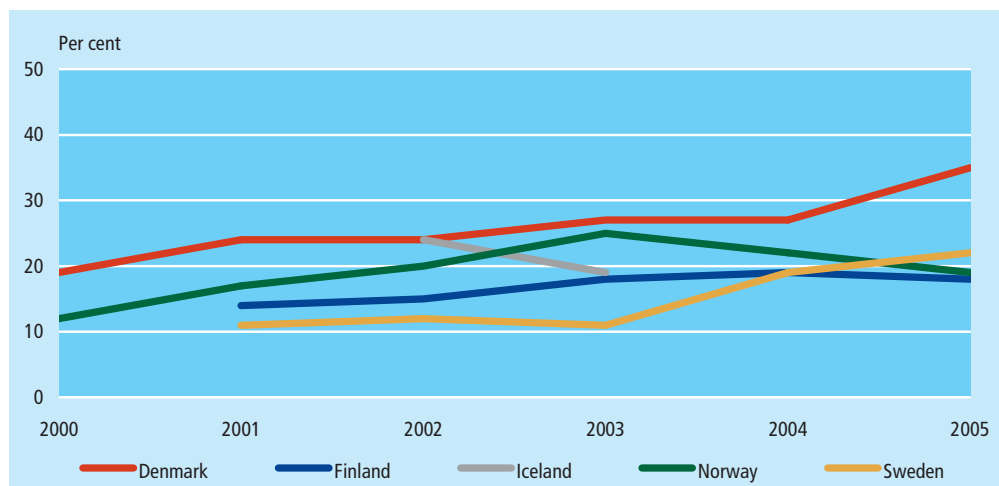
*Share of enterprises with Internet sales growing, but still a minority*

In 2000, it was a minority of the Nordic enterprises that have received orders via the Internet, and this is still the situation in 2005 (figure 3.4). An increasing tendency can be seen in all countries (except Iceland); although not as clear as compared to the previous described basic ICT indicators.

*Danish enterprises the most active*

Two years' data from Iceland indicate a level of Internet sales close to a Nordic average, but is not sufficient to describe the development. Danish enterprises seem to have been the most active in receiving Internet orders in the whole period.

**Figure 3.4 Receiving orders via the Internet**



The years in the chart are the survey years. In each year questions on e-commerce refer to the previous calendar year. Source: NSI statistics, 2000-2005 surveys (Iceland 2002-2003).

### 3.3 Broadband and networks

*8 in 10 enterprises have broadband Internet access*

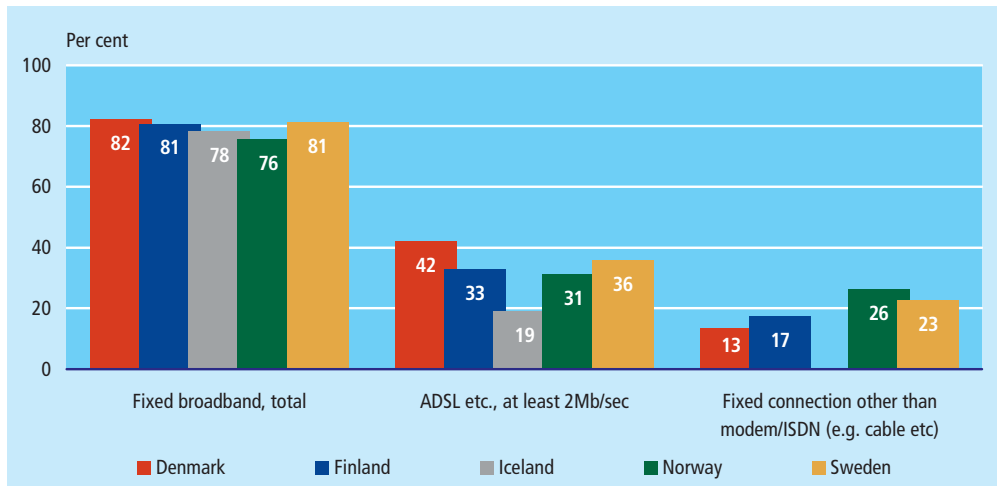
As described earlier in figure 3.3, about 8 in 10 Nordic enterprises have some kind of broadband connection to the Internet. Yet broadband speed varies a lot between the different technologies and market offers. High-speed xDSL (e.g. ADSL) and fixed connection such as cable access offers the possibility of more intensive use of the Internet than e.g. the entry level of ADSL.

*High speed xDSL more common than fixed connection other than modem*

Fast xDSL, i.e. with a capacity of at least 2Mb/second, is most common among Danish enterprises, followed by Swedish, Finnish and Norwegian enterprises<sup>1</sup> (figure 3.5). However, concerning fixed connection other than modem, (typically high speed), has almost the reverse ranking of countries with Norway in the lead, followed by Sweden and Finland. High speed xDSL is in all countries more common than fixed connection other than modem.

<sup>1</sup> Iceland figures have likely developed from 2003.

Figure 3.5 Broadband connections in enterprises. 2005



The total of the access ways exceeds 100 per cent as some enterprises use more than one type of connection.

Fixed broadband consists of xDSL-connections and fixed connections other than traditional modem and ISDN.

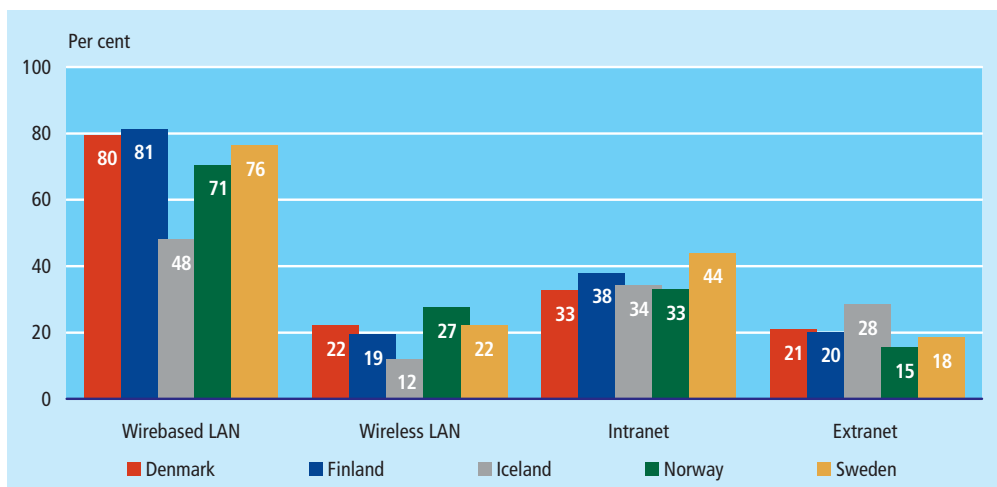
'Fixed connection other than modem/ISDN' will usually have a capacity of at least 2 Mb/sec.

Source: NSI statistics, 2005 surveys (Iceland 2003 survey).

*Relative high spread of wireless LAN in Norway*

Wirebased LAN (Local Area Networks) is very common among the Nordic enterprises. Finland and Denmark have the highest proportions, 81 and 80 per cent, followed closely by Sweden and Norway (figure 3.6). The Icelandic use of LAN is notably lower than in the other countries. Looking at wireless LAN, Norway has the highest rate and Iceland is again the least using country, based on 2003 figures.

Figure 3.6 Networks of the enterprises. 2005



LAN: Local Area Network. Intranet: An internal company communications network using Internet protocol.

Extranet: A secure extension of an Intranet that allows external users to access some parts of an organisation's Intranet.

Source: NSI statistics, 2005 surveys of ICT usage in enterprises (Iceland 2003 survey).

*Intranet popular in Sweden* About 1 in 3 enterprises in Denmark, Iceland and Norway use intranet. The use of intranet in Sweden is as high as 44 per cent and 38 per cent in Finland. The spread of intranet is normally related to the size of enterprises and national business structure could affect e.g. the Swedish figures. However, the lead seems to be present in all size groups of the enterprises (see detailed tables in annex).

*Extranet popular in Iceland* Extranet, which can be used to manage customers' access to contents, is most frequent in Iceland, 28 per cent, and somewhat lower in the other countries. In all countries, the diffusion of extranet is somewhat lower than that of intranet.

### 3.4 Index of extended ICT use

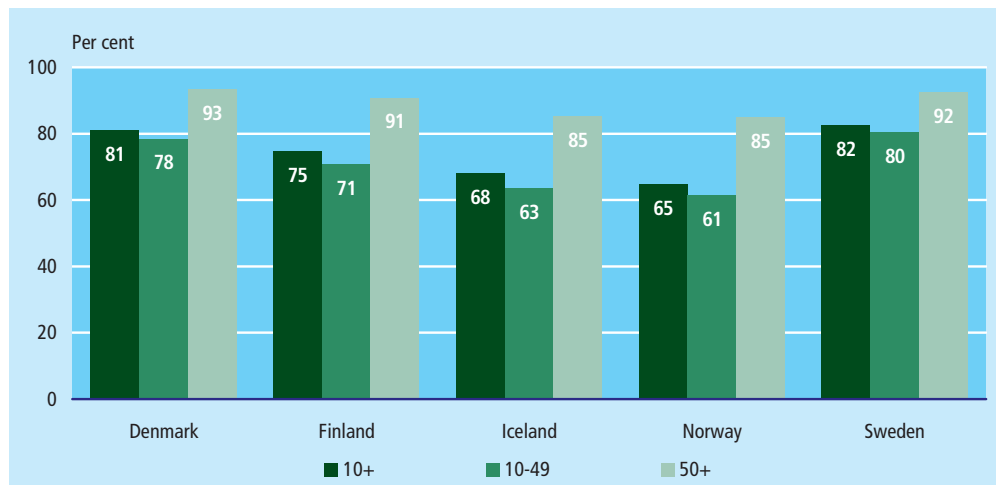
*Extended ICT use* Today, a vast majority of enterprises uses ICT and has access to the Internet. A composite indicator has thus been constructed to give a condensed expression of the share of enterprises that have more than a basic ICT use concerning the Internet.

*Definition* The definition of 'extended' ICT usage covers enterprises that fulfil the following conditions: Access to the Internet, website and at least one of the following Internet-usages: Interaction with the public sector (in one way or another), banking and financial transactions or ordering via the Internet (purchases).

*Most enterprises with extended ICT use in Sweden and Denmark* A majority of enterprises fulfils these conditions in all Nordic countries (figure 3.7). Most enterprises with extended ICT use are in Sweden and Denmark, followed closely by Finland - and fewest in Norway and Iceland, where more enterprises have only a basic ICT usage (Iceland: Data from 2003).

*Difference between smaller and bigger enterprises* However, basic usage applies especially to the smaller enterprises. Enterprises with at least 50 full-time employees show less difference between the five countries. This also indicates that the national difference between smaller and bigger enterprises is more marked in Norway.

Figure 3.7 Extended ICT use. 2005



Source: NSI statistics, 2005 surveys of ICT usage in enterprises (Iceland 2003 survey).

*Correlation between ICT use and value added*

An analysis of Danish data shows a correlation between ICT use and economic performance in the form of value added per full-time employee (figure 3.8). The data were based on a merge of 2001-figures on ICT usage and account figures, respectively.

*8 per cent higher value added compared to simple use*

Enterprises with extended ICT-usage had, on average, 8 per cent higher value added per full-time employee in 2001. The effect seems to be higher among smaller enterprises. Thus enterprises with extended ICT use in average have a value added 13 per cent higher than enterprises with simple ICT use among enterprises with 10 to 49 employees.

Figure 3.8 ICT usage and value added per full-time employee in Denmark. 2001



Non-raised sample data for selected industries (Manufacturing and Trade). About 1/3 of the enterprises - 36 per cent - belonged to the group of 'simple' ICT use in 2001.

Source: Use of ICT in Danish Enterprises 2001, special data run 2004 for The Ministry of Science, Technology and Innovation.

### 3.5 Internet use and websites

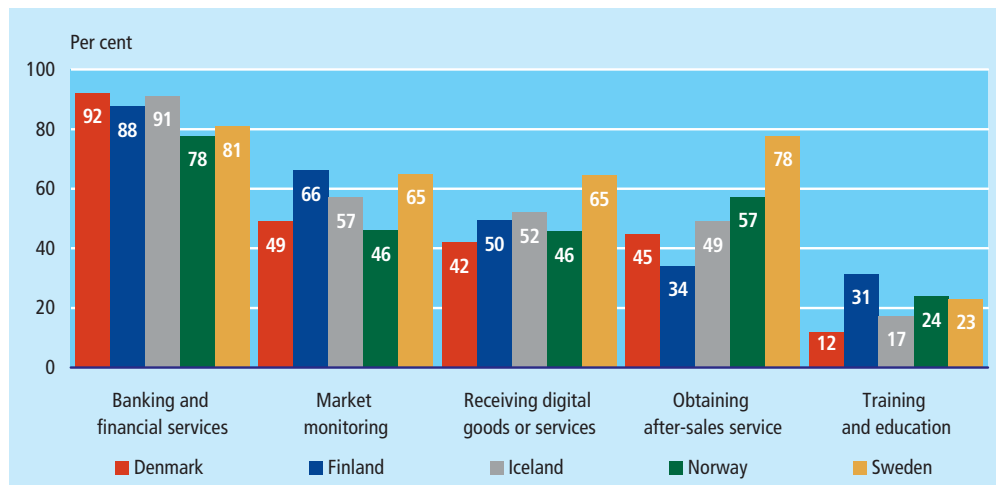
*E-banking and financial services most popular use of the Internet*

Banking or other financial services are the most popular use of the Internet in all the Nordic countries (figure 3.9). These activities are especially frequent in Denmark, Iceland and Finland; whereas Sweden and Norway have a use about 10 percentage points lower.

*Swedish enterprises most active in receiving digital goods and services*

Market monitoring is most frequently used in Finland and Sweden, and least in Denmark and Norway. Swedish enterprises have a marked lead concerning receipt of digital goods and services, and likewise concerning after-sales service.

Figure 3.9 Internet use in enterprises. 2005



Swedish wording: "Financial transactions" has been used instead of "Banking and financial services".  
 Source: NSI statistics, 2005 surveys of ICT usage in enterprises (Iceland 2003 survey).

*Training and education via the Internet most common in Finland*

Use of the Internet for training and education is most common in Finland, 31 per cent, followed by Norway, Sweden, Iceland and Denmark. The Finnish lead is particularly visible in industry groups such as manufacturing and construction (see annex tables).

*Highest rate of websites in Sweden*

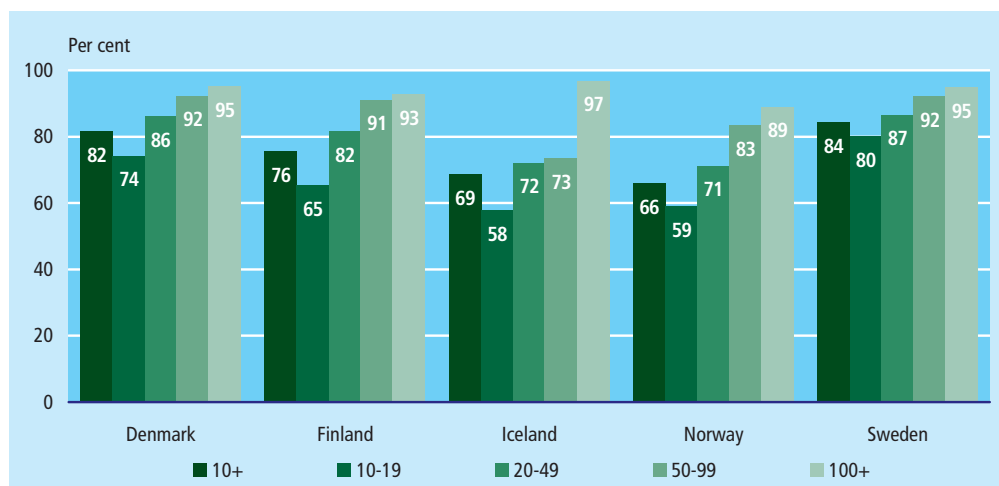
A vast majority of enterprises have a website in all the Nordic countries (figure 3.10). Most common among enterprises in Sweden, where 84 per cent of enterprises with at least 10 employees have a website. Close to Sweden is Denmark with a website penetration of 82 per cent, followed by Finland (76 per cent), Iceland (69 per cent in 2003), and Norway somewhat lower than the other countries, with 66 per cent.

*Almost full website coverage of the biggest enterprises*

In general, ICT usage increases with the size of the enterprises and websites are no exception to this rule. Among enterprises with at least 100 employees, the Nordic countries typically have a penetration rate about 95 per cent.



Figure 3.10 Enterprises with website - by size group. 2005



Source: NSI statistics, 2005 surveys of ICT usage in enterprises (Iceland 2003 survey).

*Smallest gap between small and large enterprises in Sweden and Denmark*

The countries with the highest website spread, Sweden and Denmark seem to have smallest gap between small and large enterprises. In the same line Norway has a bigger difference between the size groups due to a relative little spread of websites among the smallest enterprises, whereas the large Norwegian enterprises are closer to the other countries. Also Finland and Iceland seem to have a bigger gap between small and large enterprises compared to Sweden and Denmark.

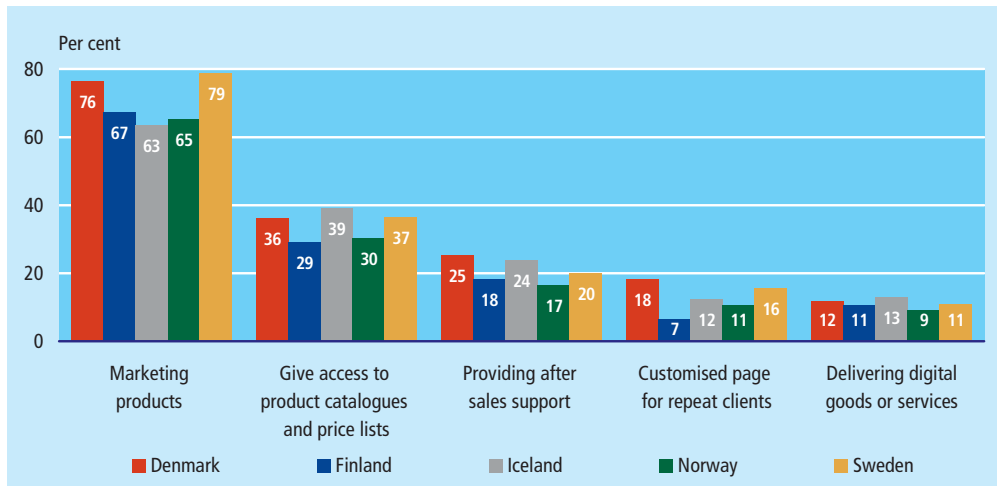
*Websites frequently used for marketing*

The most common purpose of having a website is for the marketing of products. 79 per cent of Swedish enterprises are marketing products, followed by Denmark, Finland, Norway and Iceland. This means that almost all enterprises with a website are using it for marketing purposes, as all enterprises are the percentage base.

*Delivery of digital goods and services relatively rare*

A less common purpose is to give access to product catalogues and price lists for customers etc. by a website - this roughly corresponds to every second of the enterprises that market products, with some national variation. Providing after-sales support is even less frequent and least common is to have customised page for repeat clients and the delivery of digital goods and services.

Figure 3.11 Website facilities of the enterprises. 2005



Source: NSI statistics, 2005 surveys of ICT usage in enterprises (Iceland 2003 survey).

*Denmark, Iceland and Sweden have a lead in different purposes*

Denmark, Iceland and Sweden have in general the highest proportions of enterprises with websites with the mentioned facilities. If the percentages, however, were calculated with website users only as a base, the ranking of countries would be different, e.g. Iceland would have an even higher score.

*Mobile Internet services are rare*

Not included in the chart are enterprises providing mobile Internet services on their websites. Two per cent of all the Nordic enterprises provide such services - with no significant differences between the countries. The percentage for the Nordic enterprises with at least 100 employees is, however, higher, 6 per cent.

### 3.6 Electronic commerce

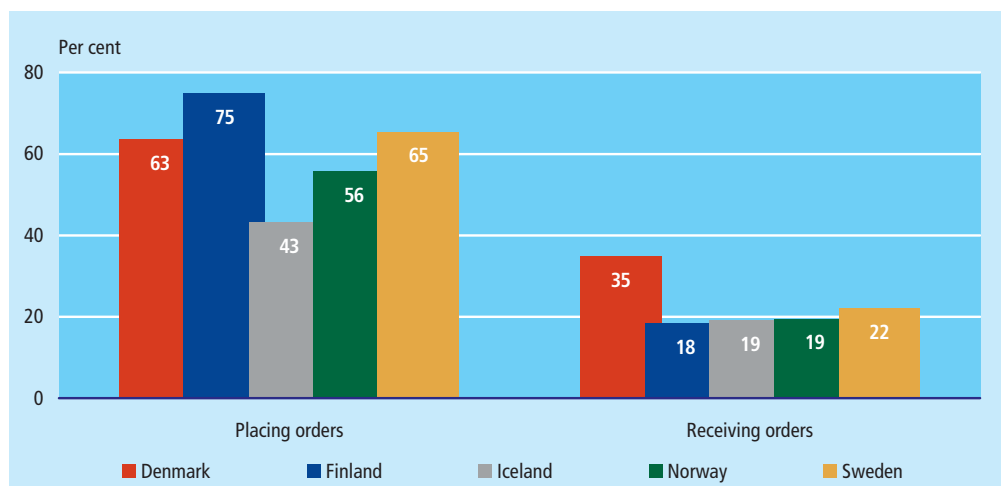
*Internet-purchase most spread in Finland*

Most of the Nordic enterprises have experienced e-purchases in the form of placement of orders via the Internet. Finnish enterprises are most active with 3 in 4 enterprises, followed by Sweden, Denmark, Norway and Iceland (figure 3.12).

*More enterprises have received orders via the Internet in Denmark*

While most enterprises have purchased via the Internet, it is much lower share that is active on the supply side of e-commerce. Typically, around 1 in 5 enterprises have received orders, with Denmark as an exception, where more than 1 in 3 enterprises have received orders via the Internet.

Figure 3.12 E-commerce in enterprises - purchases or sales via the Internet in 2004



Time of surveying: January 2005. Reference period for e-commerce activities: Calendar year 2004 (Iceland 2002).  
 Source: NSI statistics, 2005 surveys of ICT usage in enterprises (Iceland 2003 survey).

*What is electronic commerce?*

Electronic commerce (e-commerce) is defined as orders send via electronic networks, e.g. the Internet. E-commerce is defined independently of electronic business processes such as electronic payment or marketing.

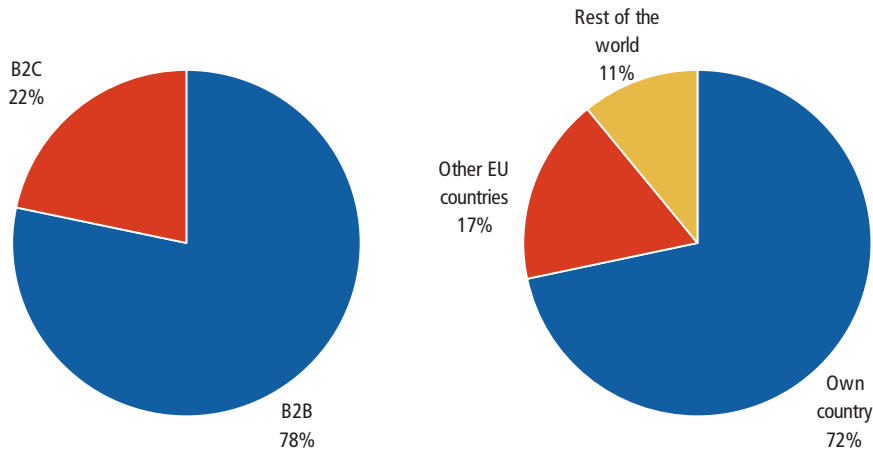
The figures presented in this part of the publication are about e-purchases (ordering) as well as e-sales (receipt of orders). The most detailed figures are on e-sales, which are broken down by network, destination and customer group.

*Internet sales are primarily generated as B2B*

78 per cent of the total Scandinavian Internet sales, measured in currencies, can be attributed to business-to-business sales, including sales to the public sector. The home markets dominate the Scandinavian Internet sales as a whole, as 72 per cent comes from domestic sales. 28 per cent comes from export - most often to other EU countries.

Figure 3.13

**Composition of the Scandinavian Internet sales in 2004<sup>1</sup>**  
**- by customer group<sup>2</sup> and by destination<sup>3</sup>**



<sup>1</sup> Revenues from orders received via the Internet during 2004 (excluding manually typed e-mails) - in per cent of the total turnover in 2004 (in monetary terms, excluding VAT). Time of surveying: January 2005.

<sup>2</sup> B2B: Sales to other enterprises or to public authorities. B2C: Sales to private consumers.

<sup>3</sup> The export figures includes turnover from trade between the Scandinavian countries (Denmark, Norway and Sweden).

Source: NSI statistics, 2005 surveys of ICT use in enterprises, exclusive Finland and Iceland.

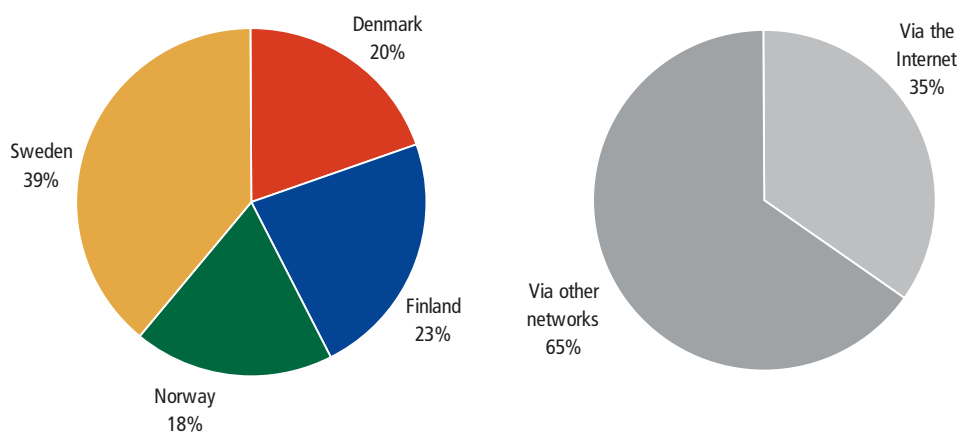
*Sweden has the biggest share of the Nordic e-sales*

The total electronic sales consist of sales via the Internet or via other electronic networks. Sweden has the biggest part of the total Nordic electronic sales - almost 40 per cent, and Denmark, Finland and Norway share the remaining parts with almost equal proportions around 20 per cent (Iceland excluded from these figures).

*2/3 of Nordic e-sales come from other networks than the Internet*

The largest part of the e-sales comes from other network than the Internet. That is almost two third of the total e-sales, and sales via the Internet only accounts for one third, more precisely 35 per cent. However, national evidence from previous surveys shows that Internet has a growing importance as a transport way for electronic orders.

**Figure 3.14**                      **Composition of the Nordic electronic commerce in 2004<sup>1</sup>**  
**- share by country and by network**



<sup>1</sup> Revenues from orders received via any electronic networks during 2004 (excluding manually typed e-mails) - in per cent of the total turnover in 2004 (in monetary terms, excluding VAT). Time of surveying: January 2005.  
 Source: NSI statistics, 2005 surveys of ICT use in enterprises, exclusive Iceland. Finland not included in the network-chart.

*Statistical uncertainty on volume of e-sales*

The figures based on calculations of the volume of e-sales in currency are, even at a combined Nordic level, connected with some statistical uncertainty.  
 Percentage bands of the e-sales share of the total turnover has been chosen as the most reliable way of comparing the levels of e-commerce between countries, but should anyhow be understood as indicative.

*Internet sales of 1-2 per cent most common*

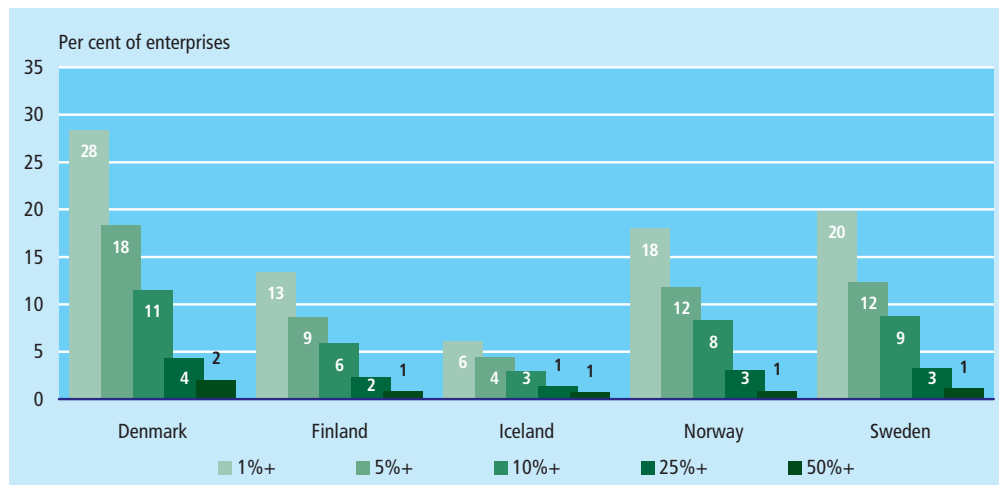
For most enterprises in the Nordic countries receiving orders via the Internet, these sales only account for small shares of the total sales of the enterprises. Among all enterprises, small Internet-sales of 1-2 per cent of the total sales is much more common than sales of e.g. 10 per cent or more (figure 3.15).

*Decreasing number of enterprises with higher percentages*

The share of e-selling enterprises decreases quickly with higher percentages of Internet sales. Internet sales of at least 1 per cent of total sales account for between 6 per cent of all enterprises in Iceland and 28 per cent of the Danish enterprises. The share of enterprises claiming to have at least 2 per cent Internet sales is visibly lower, spanning from 4 per cent in Iceland to 18 per cent in Denmark.

*Less difference between countries concerning intensive Internet sales*

The difference between countries grows narrower, looking at the number of enterprises with more intensive Internet sales. Enterprises with at least 10 per cent Internet sales make up 3 per cent of the Icelandic enterprises and 11 per cent of the Danish enterprises. Enterprises with Internet sales of at least 25 per cent are rare in all countries as sales only account for 2-4 per cent of all enterprises.

Figure 3.15 Sales via the Internet - per cent of total sales in 2004<sup>1</sup>

<sup>1</sup> Revenues from orders received via the Internet during 2004 (Iceland 2003) - in per cent of the total turnover in 2004 (in monetary terms, excluding VAT). Orders are exclusive manually typed e-mails. Finnish figures: Sales via homepages or netshops. The total number of enterprises that have received orders via that Internet can be seen in Figure 3.12, (includes enterprises with either a small share below 1 per cent or an unknown share).

Source: NSI statistics, 2005 surveys of ICT usage in enterprises (Iceland 2003 survey).

*Danish enterprises most active in Internet sales*

Denmark has the highest share of enterprises receiving orders via the Internet regarding both the lower and the more significant Internet-sales, followed by Sweden, Norway and Finland. Iceland has, in general, the lowest number of enterprises selling via the Internet, however, this is based on 2003-figures.

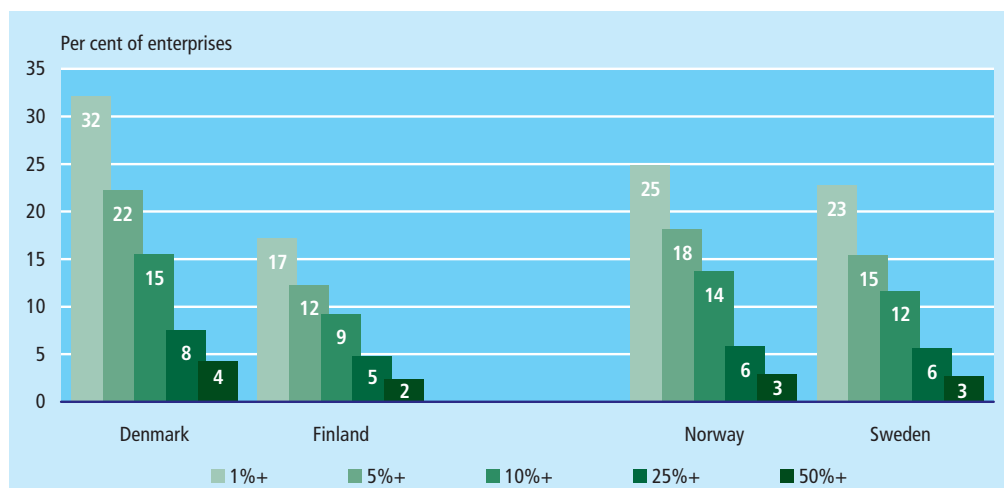
*Sales via all electronic networks*

Looking at sales via all electronic networks makes the number of enterprises higher than the previously described sales via the Internet. Danish enterprises are still more active than the other countries, followed by Norway, Sweden and Finland. Data are not available for Iceland (figure 3.16).

*Intensive e-sellers use often other networks than the Internet*

The Danish lead is reduced somewhat concerning sales via all electronic network compared to Internet sales, and Norway has gained a higher position compared to the other countries. Some of the most intensive e-sales take place via other network than the Internet. This can be seen from the number of enterprises with e-sales of e.g. at least 25 per cent of total sales, which is about twice as many as for Internet sales only (figure 3.15).

Figure 3.16 Sales via all electronic networks - per cent of total sales in 2004<sup>1</sup>



<sup>1</sup> Revenues from orders received via the Internet or other electronic networks during 2004 (excluding manually typed e-mails) - in per cent of the total turnover in 2004 (in monetary terms, excluding VAT).

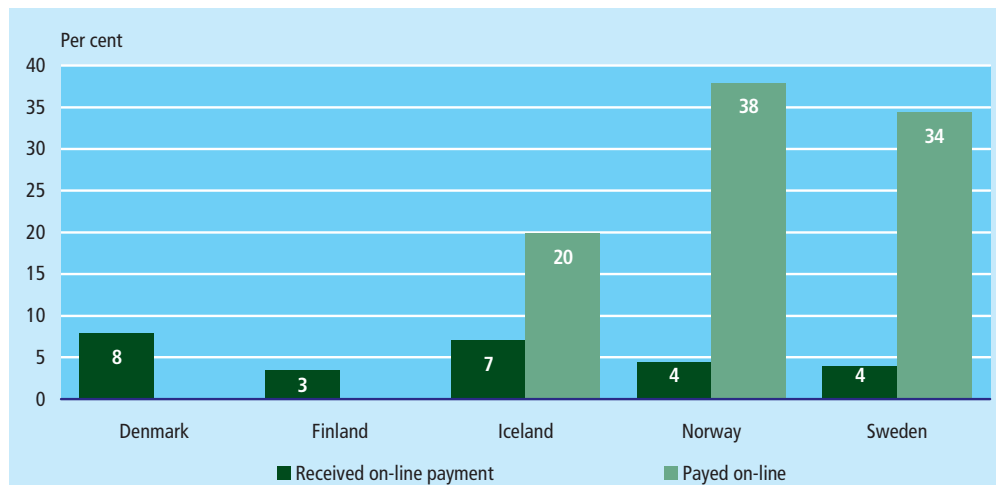
Source: NSI statistics, 2005 surveys of ICT usage in enterprises. No data available for Iceland.

*On-line orders not always paid on-line*

On-line payment in connection with Internet orders is not the most common use of the Internet for enterprises. 38 per cent of the Norwegian enterprises and 34 per cent of the Swedish enterprises have paid on-line during 2004, and 20 per cent of the Icelandic enterprises during 2002 (figure 3.17).

*Few enterprise have received on-line payment*

This means that buying via the Internet is more frequent than paying on-line for Internet orders (see also figure 3.12). Enterprises that have received on-line payments for Internet orders are even less frequent, i.e. less than 10 per cent of the enterprises in all countries.

Figure 3.17 On-line payment<sup>1</sup>, during 2004

<sup>1</sup> Payments concerning orders, respectively received or placed via the Internet.

Source: NSI statistics, 2005 surveys of ICT usage in enterprises (Iceland 2003 survey).

### 3.7 Automated data exchange

*One in two Danish enterprises use automated data exchange*

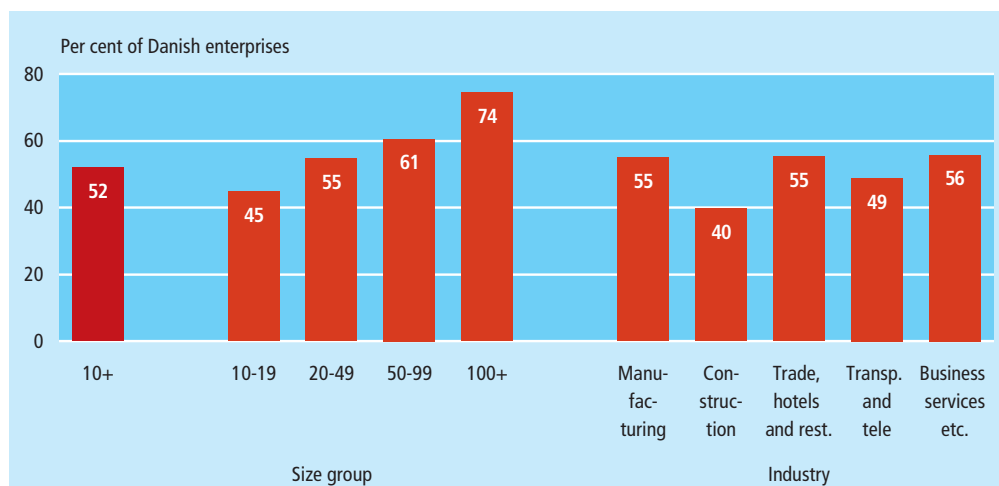
In the Danish survey of ICT usage by enterprises 2005, a new question on automated data exchange was introduced. The results show that 52 per cent of Danish enterprises use automated data exchange between the business' systems and other entities' systems - e.g. with banks, other enterprises or public authorities (figure 3.18).

*Most frequently spread to the big enterprises*

There is no marked difference between industries regarding the spread of automated data exchange. However, this kind of communication is seen more often in the larger enterprises - e.g. 74 per cent of the Danish enterprises with at least 100 employees use automated data exchange.



Figure 3.18 Danish enterprises using automated data exchange in 2004

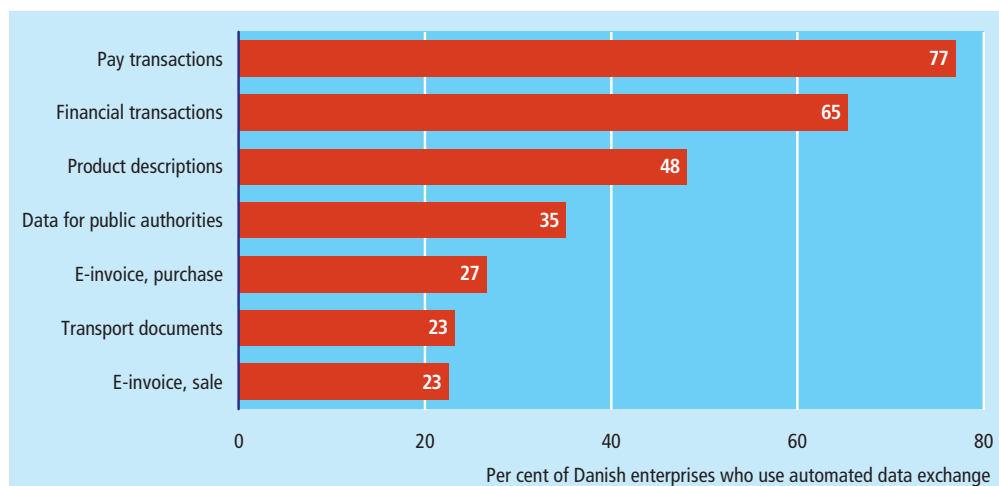


Source: Statistics Denmark, 2005 survey of ICT usage in enterprises.

*3 in 4 users send automated pay transactions*

77 per cent of the enterprises that have used automated data exchange use it for pay transactions (wages, salaries) and 65 per cent in connection with financial transactions (figure 3.19). 48 per cent exchange product descriptions and every third, 35 per cent, exchange data with public authorities. Electronic invoicing is used by 27 per cent in connection with purchases and by 23 per cent in connection with sales. Finally, 23 per cent of the users have exchanged transport documents.

Figure 3.19 Contents of automated data exchange in 2004



Source: Statistics Denmark, 2005 survey of ICT usage in enterprises.

*What is automated data exchange?*

Automated data exchange is electronic exchange of data between an entity's own ICT system and those of other entities. The exchanges in question make use of structured messages and agreed message standards. The purpose can be saving of time, error elimination or fulfilment of external demands.

The exchange of data may be via the Internet or other networks and is in the form of a structured message (e.g. relating to orders, invoices, payment transactions or descriptions of goods). It does not involve human data entry and uses agreed message standards (e.g. OIOXML or EDIFACT).

Depending on definition, automated data exchange can be referred to as EDI (Electronic Data Interchange); however, this term is sometimes associated with certain formats or technologies from before the diffusion of the Internet.

### 3.8 Outsourcing

*35 per cent of Swedish enterprises have outsourced ICT management*

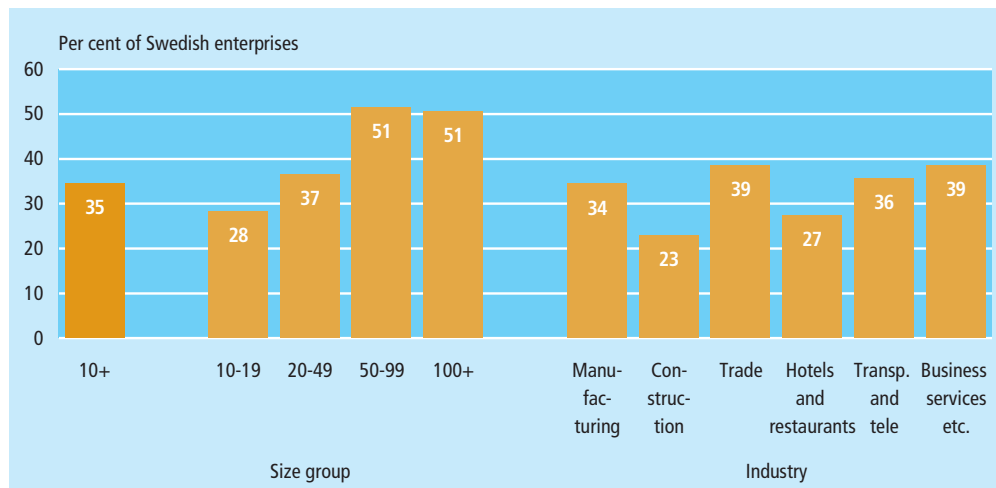
In the Swedish survey "Use of ICT in Swedish Enterprises 2005" the following question was asked: *Has the enterprise outsourced, that is assigned the management of the whole or parts of the enterprise's ICT management?* To this question 35 per cent of the enterprises responded that they have done so.

*Outsourcing of ICT management more prevalent among larger enterprises*

In figure 3.20, it can be noted that outsourcing of the enterprises' ICT management is more prevalent among larger enterprises than among smaller ones, possibly due to the fact that larger enterprises usually have more ICT services to outsource. In the sectors Trade and Business services 4 out of 10 enterprises have outsourced their ICT management. This phenomenon is least common among enterprises in the sectors Construction and Hotel and restaurants.

*ICT outsourcing*

ICT outsourcing is an arrangement where one enterprise provides ICT services for another enterprise that could also be - or have previously been - provided in-house. It could be the whole ICT management or parts of it that is being outsourced, for instance, taking care of user support, use/maintenance of servers, development of web pages etc. A reason for outsourcing ICT management is cost reduction and it also enables enterprises to focus on core business.

Figure 3.20 Outsourcing<sup>1</sup> of ICT management by Swedish enterprises. 2005

<sup>1</sup> Assignment of the whole or parts of the enterprise's ICT-management.  
Source: Statistics Sweden, 2005 survey of ICT usage in enterprises.

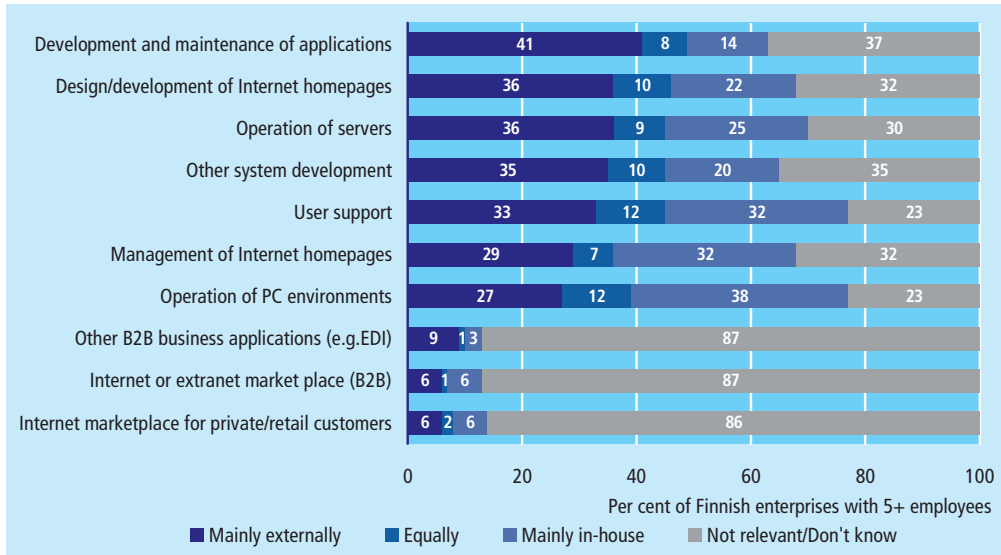
*Finnish results on outsourcing*

A set of questions about outsourcing was included in the 2005 Finnish survey on ICT usage in enterprises. A question was asked in respect of each function of whether it was performed totally or mostly by own or external staff, or equally by own and external staff. Respondents were also given the possibility to give a *Don't know/Not relevant* reply, since all enterprises do not engage in all the ICT functions asked about in the questions.

*ICT outsourcing very common in Finnish enterprises*

The results show that outsourcing of ICT is very common in Finnish enterprises. It was most widespread in the development and maintenance of applications, which was totally or mostly performed by external staff in 41 per cent of the enterprises with at least five employees. This was followed by design/development of Internet homepages, operation of servers, other system development and user support which were totally or mostly done by external staff in 33-36 per cent of the enterprises (see figure 3.21).

**Figure 3.21** ICT functions performed with external or own staff, Finnish enterprises. 2005

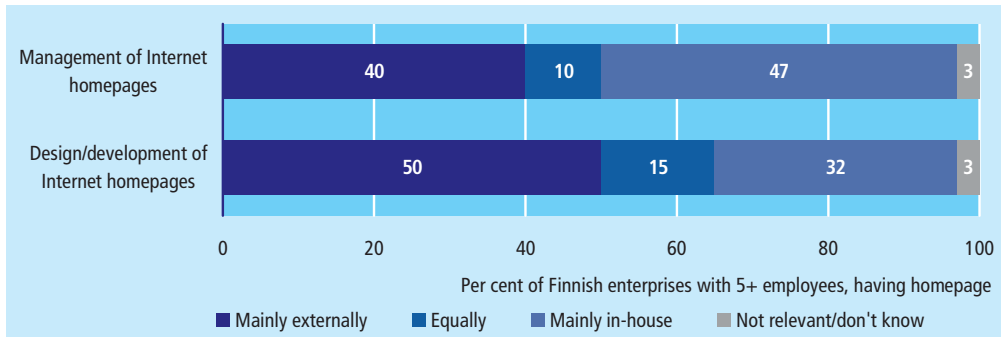


Source: Statistics Finland, 2005 survey on ICT usage in enterprises.

*Most enterprises with homepages have at least half of the work on design and development done externally*

When the design and development, and the management of homepages are examined among enterprises that have homepages it becomes clear that these functions are very widely outsourced. Fifty per cent of these enterprises have the design and development and 40 per cent the maintenance of their homepages totally or mostly performed by external staff. In 65 per cent of the Finnish enterprises with at least five employees and homepages, at least half of the work on the design and development of the homepages is done externally (see Figure 3.22).

**Figure 3.22** ICT functions performed with external or own staff, Finnish enterprises having homepages. 2005

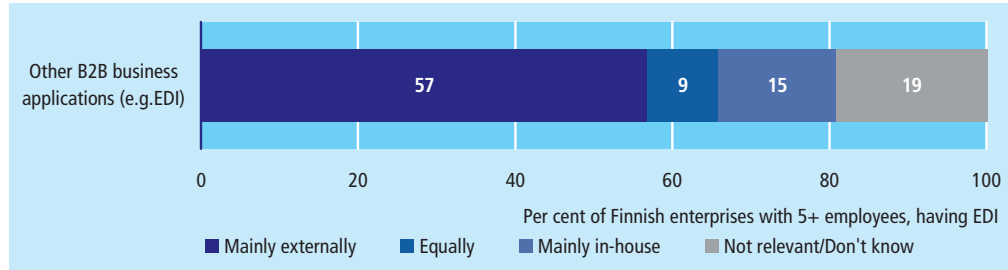


Source: Statistics Finland, 2005 survey on ICT usage in enterprises.

*Only few enterprises use mainly own staff in other B2B applications (e.g. EDI)*

Other B2B applications were also analysed among the enterprises having EDI. As could be expected, the results showed that this complex area of ICT is executed totally or mostly in-house in very few enterprises. At least half of the work on these applications is performed by external staff in 66 per cent of the enterprises with at least five employees and having EDI (see Figure 3.23).

**Figure 3.23** ICT functions performed with external or own staff, Finnish enterprises having EDI. 2005



Source: Statistics Finland, 2005 survey on ICT usage in enterprises.

### 3.9 Sources

**Table 3.1 Basic information on the enterprise surveys**

	Denmark	Finland	Iceland	Norway	Sweden
Name of survey in English	Use of ICT in Danish enterprises 2005	ICT and e-commerce in enterprises 2005	ICT and e-commerce in enterprises 2003	Use of ICT in enterprises 2005	Use of ICT in Swedish enterprises 2005
Expected availability for the next year	Aug. 2006	Sep. 2006	Midyear 2006	Oct. 2006	Nov. 2006
Information	<a href="http://www.dst.dk/it">www.dst.dk/it</a>	<a href="http://tilastokeskus.fi/til/ict/index_en.html">http://tilastokeskus.fi/til/ict/index_en.html</a>	<a href="http://www.statice.is">www.statice.is</a>	<a href="http://www.ssb.no/iktbrukn_en/">http://www.ssb.no/iktbrukn_en/</a>	<a href="http://www.scb.se">www.scb.se</a>
Contact information	Martin Lundø	Aarno Airaksinen	Guðfinna Harðardóttir	Geir Martin Pilskog	Lars Holm
E-mail	<a href="mailto:mlu@dst.dk">mlu@dst.dk</a>	<a href="mailto:aarno.airaksinen@stat.fi">aarno.airaksinen@stat.fi</a>	<a href="mailto:Guðfinna.Harðardóttir@hagstofa.is">Guðfinna.Harðardóttir@hagstofa.is</a>	<a href="mailto:gmp@ssb.no">gmp@ssb.no</a>	<a href="mailto:it-statistik@scb.se">it-statistik@scb.se</a>
Survey type	Mandatory	Mandatory	Voluntary	Voluntary	Voluntary
Final sample	3945	2743	1204	2739	3872
Response rate	100	75	75	75 <sup>1</sup>	68

<sup>1</sup> 10+ employees.

**Table 3.2 Coverage of industries**

Industry breakdown	Coverage, NACE rev. 1.1., 2 digit
Manufacturing	15-37
Construction	45
Trade	50-52
Hotels and restaurants	55
Transport and telecommunication	60-64
Business services etc.	70-74, 92.1-92.2, 93

Finland includes also in Manufacturing NACE 40, and in Business services 92.4 and 92.71

## 3.10 Annex

Table 3.3 Internet access and use. 2005

	All enterprises (10+)	By number of employees				By industry group					
		10-19	20-49	50-99	100+	Manu- factu- ring	Con- struc- tion	Trade	Hotels and rest.	Trans- port and tele.	Busi- ness servi- ces
per cent of enterprises											
<b>Internet access</b>											
Denmark	97	96	98	99	100	98	96	98	96	93	97
Finland	98	97	99	99	100	100	97	98	95	92	99
Iceland	97	95	98	98	100	97	97	96	93	98	99
Norway	91	88	94	97	99	95	95	89	75	94	96
Sweden	95	93	96	100	99	96	94	97	85	87	99
<b>Banking and financial services</b>											
Denmark	92	90	94	96	93	93	92	92	87	88	93
Finland	88	88	87	88	87	90	87	87	84	83	88
Iceland	91	89	92	96	94	90	95	90	85	91	96
Norway	78	75	80	86	87	82	84	75	53	85	85
Sweden	81	81	80	85	77	80	80	82	75	76	85
<b>Training and education</b>											
Denmark	12	9	12	15	25	8	5	15	6	9	24
Finland	31	26	32	39	49	28	22	39	24	26	39
Iceland	17	13	15	30	33	10	8	20	6	21	42
Norway	24	20	25	31	46	20	14	28	16	23	35
Sweden	23	19	24	29	38	15	10	29	13	17	39
<b>Market monitoring</b>											
Denmark	49	39	54	63	76	53	24	58	39	42	61
Finland	66	61	68	71	81	65	63	67	67	58	72
Iceland	57	50	57	66	77	55	45	61	48	72	63
Norway	46	40	49	57	70	56	32	42	35	51	59
Sweden	65	59	67	80	83	66	50	69	58	55	74
<b>Receiving digital goods or services</b>											
Denmark	42	36	45	50	60	43	30	45	29	35	55
Finland	50	44	52	56	64	54	37	50	30	35	64
Iceland	52	48	48	72	64	46	45	54	38	70	71
Norway	46	42	49	52	63	49	43	41	34	44	61
Sweden	65	60	64	77	80	70	63	60	36	54	78
<b>Obtaining after-sales service</b>											
Denmark	45	39	47	53	64	47	32	47	35	42	55
Finland	34	29	35	39	51	35	17	37	24	32	46
Iceland	49	44	50	63	59	48	40	52	25	66	63
Norway	57	53	61	63	74	65	59	52	46	49	69
Sweden	78	73	80	88	88	80	73	83	61	66	81

Source: NSI statistics, 2005 surveys of ICT usage in enterprises (Iceland 2003 survey).

Table 3.4 Enterprises with websites and website facilities. 2005

	All enterprises (10+)	By number of employees				By industry group					
		10-19	20-49	50-99	100+	Manu- factu- ring	Con- struc- tion	Trade	Hotels and rest.	Trans- port and tele.	Busi- ness servi- ces
per cent of enterprises											
<b>Enterprises with website</b>											
Denmark	82	74	86	92	95	86	66	85	85	72	91
Finland	76	65	82	91	93	86	53	76	78	58	83
Iceland	69	58	72	73	97	59	51	71	71	81	92
Norway	66	59	71	83	89	76	62	57	62	62	80
Sweden	84	80	87	92	95	86	69	88	77	73	93
<b>Marketing products</b>											
Denmark	76	68	82	88	91	81	58	80	82	68	85
Finland	67	59	72	83	82	79	46	65	74	50	73
Iceland	63	54	69	69	81	50	51	67	71	72	88
Norway	65	59	70	80	87	76	61	56	61	59	80
Sweden	79	75	80	87	90	82	63	81	74	64	90
<b>Give access to product catalogues and price lists</b>											
Denmark	36	30	38	43	54	38	9	53	60	27	34
Finland	29	25	28	40	41	32	8	37	57	24	25
Iceland	39	32	40	38	64	29	14	49	62	60	42
Norway	30	26	33	39	50	36	11	34	38	28	29
Sweden	37	32	38	49	50	38	11	48	58	28	31
<b>Providing after sales support</b>											
Denmark	25	22	25	27	42	23	12	32	36	24	30
Finland	18	14	19	26	30	18	6	23	20	15	22
Iceland	24	19	23	35	36	18	7	27	26	45	35
Norway	17	13	20	21	32	20	6	17	14	16	23
Sweden	20	18	19	26	32	17	9	26	10	10	30
<b>Customised page for repeat clients</b>											
Denmark	18	16	20	20	27	15	13	21	18	18	23
Finland	7	6	5	7	11	5	2	7	8	6	12
Iceland	12	8	11	21	25	7	4	12	15	21	25
Norway	11	9	11	14	22	8	4	12	9	14	15
Sweden	16	12	16	20	32	15	4	17	13	13	24
<b>Delivering digital goods or services</b>											
Denmark	12	9	12	14	23	10	2	15	16	13	18
Finland	11	9	11	14	16	10	1	9	11	10	21
Iceland	13	12	12	14	21	7	2	12	14	32	28
Norway	9	8	9	8	19	9	1	8	10	12	17
Sweden	11	9	10	17	19	9	1	13	5	8	21

Source: NSI statistics, 2005 surveys of ICT usage in enterprises (Iceland 2003 survey).



Table 3.5 Enterprises with fixed broadband and various networks. 2005

	All enterprises (10+)	By number of employees				By industry group					
		10-19	20-49	50-99	100+	Manu- factu- ring	Con- struc- tion	Trade	Hotels and rest.	Trans- port and tele.	Busi- ness servi- ces
per cent of enterprises											
<b>Fixed broadband<sup>1</sup></b>											
Denmark	82	77	85	90	94	86	76	85	74	76	83
Finland	81	75	83	89	94	86	73	80	75	74	84
Iceland	78	74	80	81	88	74	74	83	69	85	88
Norway	76	70	80	90	95	77	79	72	55	77	90
Sweden	81	77	82	93	96	82	77	83	63	70	92
<b>Wire based LAN<sup>2</sup></b>											
Denmark	80	70	86	92	98	85	66	83	62	75	86
Finland	81	74	85	93	98	87	65	83	71	74	90
Iceland	48	38	48	61	76	40	32	53	27	57	79
Norway	71	63	76	87	95	79	69	69	44	69	82
Sweden	76	70	79	92	96	82	69	82	52	59	83
<b>Wireless LAN<sup>2</sup></b>											
Denmark	22	16	23	28	46	22	12	25	30	18	30
Finland	19	14	19	27	42	19	10	20	24	19	26
Iceland	12	6	9	16	40	7	5	14	7	19	22
Norway	27	22	30	37	52	29	21	23	28	26	40
Sweden	22	16	21	42	47	21	7	26	24	17	29
<b>Intranet<sup>3</sup></b>											
Denmark	33	23	33	48	75	27	12	42	31	26	50
Finland	38	25	41	54	76	39	20	44	25	31	48
Iceland	34	26	34	46	57	23	22	39	23	47	62
Norway	33	25	37	48	73	28	12	43	17	29	46
Sweden	44	32	48	68	81	42	20	56	29	27	56
<b>Extranet<sup>4</sup></b>											
Denmark	21	16	20	30	45	17	7	27	20	19	33
Finland	20	13	21	30	46	18	7	29	6	19	26
Iceland	28	21	26	43	55	20	12	31	17	51	55
Norway	15	12	17	20	37	12	7	20	6	12	24
Sweden	18	13	19	31	44	18	5	21	10	14	29

<sup>1</sup> Fixed broadband consists of xDSL-connections and fixed connections other than traditional modem and ISDN.

<sup>2</sup> LAN: Local Area Network. <sup>3</sup> Intranet: An internal company communications network using Internet protocol.

<sup>4</sup> Extranet: A secure extension of an intranet allowing external users to access some parts of an organisation's intranet.

Source: NSI statistics, 2005 surveys of ICT usage in enterprises (Iceland 2003 survey).

Table 3.6 Purchase, sale and payment via the Internet during 2004

	All enterprises (10+)	By number of employees				By industry group					
		10-19	20-49	50-99	100+	Manu- factu- ring	Con- struc- tion	Trade	Hotels and rest.	Trans- port and tele.	Busi- ness servi- ces
per cent of enterprises											
<b>Placed orders<sup>1</sup></b>											
Denmark	63	58	65	71	81	67	51	67	58	54	71
Finland	75	69	79	83	86	79	70	71	68	70	81
Iceland	43	36	43	55	62	38	31	44	27	55	68
Norway	56	50	58	67	77	62	59	49	42	50	69
Sweden	65	61	64	81	83	68	56	67	49	55	76
<b>Received orders<sup>1</sup></b>											
Denmark	35	33	37	34	39	38	25	40	55	33	28
Finland <sup>2</sup>	18	16	19	22	26	20	6	20	30	20	20
Iceland	19	15	18	27	33	13	4	20	42	40	22
Norway	19	17	23	21	29	20	9	20	29	21	20
Sweden	22	20	24	22	29	23	12	28	28	17	20
<b>- for at least 1 per cent of turnover</b>											
Denmark	28	27	29	28	33	33	18	32	52	25	23
Finland	13	12	14	12	19	14	5	14	23	16	14
Iceland	6	6	6	13	2	4	0	5	14	15	10
Norway	18	16	20	19	26	18	9	18	27	18	19
Sweden	20	18	21	22	26	19	9	26	27	17	19
<b>- for at least 10 per cent of turnover</b>											
Denmark	11	11	11	13	15	14	4	13	27	11	10
Finland	6	6	6	4	6	6	2	6	15	7	5
Iceland	3	3	3	4	1	2	0	1	6	13	5
Norway	8	7	10	8	11	8	3	6	19	9	10
Sweden	9	7	9	14	12	9	2	12	13	6	8
<b>Paid on-line<sup>3</sup></b>											
Iceland	20	17	21	22	24	15	12	17	13	28	42
Norway	38	35	40	43	48	37	38	34	33	37	49
Sweden	34	32	34	44	39	31	24	35	23	30	51
<b>Received on-line payment<sup>3</sup></b>											
Denmark	8	7	8	9	10	8	4	11	14	7	6
Finland	3	2	4	5	7	4	1	2	7	6	5
Iceland	7	6	5	11	15	5	1	6	18	15	7
Norway	4	3	6	7	8	7	1	4	7	5	4
Sweden	4	3	5	4	7	4	2	4	4	3	5

<sup>1</sup> Manually typed e-mails not included. <sup>2</sup> Finnish figures: Sales via homepages or netshops.

<sup>3</sup> On-line payment concerning orders placed/received via the Internet.

Source: NSI statistics, 2005 surveys of ICT usage in enterprises (Iceland 2003 survey).

Table 3.7 Use of ICT in European enterprises. 2004

	Internet access	Broadband connection	Website	Received orders via the Internet 2003
	per cent of enterprises with at least 10 employees			
EU-25	89	52	58	13
EU-15	90	55	60	15
Belgium	96	70	68	18
Czech Republic	90	38	61	11
Denmark	97	80	81	25
Germany	94	54	72	18
Estonia	90	68	52	8
Greece	87	21	49	6
Spain	87	72	40	2
Ireland	92	32	59	19
Italy	87	51	44	...
Cyprus	82	35	45	5
Latvia	74	45	33	1
Lithuania	81	50	39	5
Luxembourg	90	48	59	11
Netherlands	88	54	66	17
Austria	94	55	71	12
Poland	85	28	44	4
Portugal	77	49	29	6
Slovenia	93	62	58	15
Slovakia	71	25	47	6
Finland	97	71	75	17
Sweden	96	75	82	20
United Kingdom	87	44	66	27
Iceland	97	20	68	12
Norway	86	60	61	13

Figures may have smaller deviations from national published figures due to EU-harmonisation of the data basis.

Source: Eurostat, October 2005 (<http://europa.eu.int/comm/eurostat/>).

NSI statistics, 2005 surveys of ICT usage in enterprises (Iceland 2003 survey).

Table 3.8 Networks in European enterprises. 2004

	LAN	Wireless LAN	Intranet	Extranet
	per cent of enterprises with at least 10 employees			
EU-25	58	9	33	12
EU-15	61	10	34	14
Belgium	75	15	45	23
Czech Republic	62	9	22	6
Denmark	67	12	33	16
Germany	77	14	39	15
Estonia	50	8	28	7
Greece	43	6	32	5
Spain	58	7	33	17
Ireland	53	9	38	12
Italy	38	7	30	14
Cyprus	65	7	33	9
Latvia	45	6	24	7
Lithuania	47	5	41	5
Luxembourg	91	8	...	...
Netherlands	79	9	28	14
Austria	52	15	36	12
Poland	46	4	26	3
Portugal	29	5	35	21
Slovenia	42	8	42	8
Slovakia	41	7	25	6
Finland	80	13	36	18
Sweden	75	17	42	15
United Kingdom	56	...	30	7
Iceland	50	11	36	29
Norway	69	15	33	13

Figures may have smaller deviations from national published figures due to EU-harmonisation of the data basis.

Source: Eurostat, October 2005 (<http://europa.eu.int/comm/eurostat/>).

NSI statistics, 2005 surveys of ICT usage in enterprises (Iceland 2003 survey).



## 4. Use of ICT in the public sector

### 4.1 Introduction

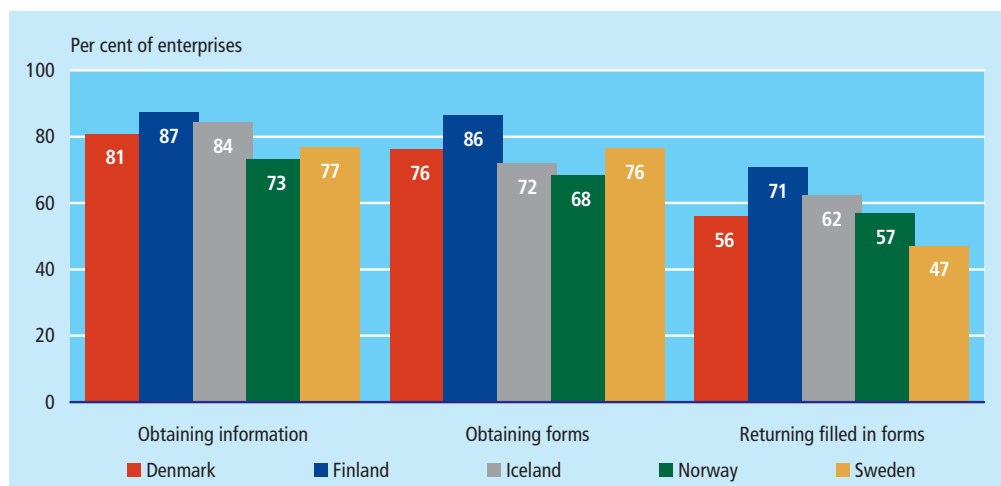
- Public digitisation on the agenda* ICT usage in the public sector is frequently on the public agenda. A growing number of citizens and enterprises, not least in the Nordic countries, are communicating with public authorities via the Internet. Correspondingly, more services are made available electronically.
- New statistical area* International ICT statistics on the public sector is a new area compared to other sectors of society. Many countries - including the Nordic countries - collect data from the demand side, that is, the use of digital public services by enterprises or the population.
- Few statistics from the public sector* However, few countries at a European level collect regularly supply side data describing ICT use based on information from the public sector itself. Such statistics might exist on a national level, however, not comparable with data from other countries.
- Sources* In this publication the topic will be covered by selected countries. Finnish results on digital services are shown from the perspective of both users and suppliers. Surveys compiled by Statistics Norway and Statistics Denmark are to some extent mutually harmonised. A benchmarking of these results is presented for the first time in this publication and is a follow-up of an earlier Nordic project (Nordic Council of Ministers: *"ICT Usage in the Public Sector"*, Copenhagen 2003). Basic figures on demand side are based on the EU harmonised surveys of enterprises and population.

### 4.2 Use of public services

#### Enterprises

- Finnish lead concerning most interactions with public sector* Enterprises with at least 10 employees were asked about different interactions with public authorities during 2004. The most commonly used service was obtaining general information, followed closely by obtaining forms and returning filled in forms (figure 4.1). Finnish enterprises have a lead in the three forms of interaction.

Figure 4.1 Enterprises interacting with public authorities via the Internet in 2004

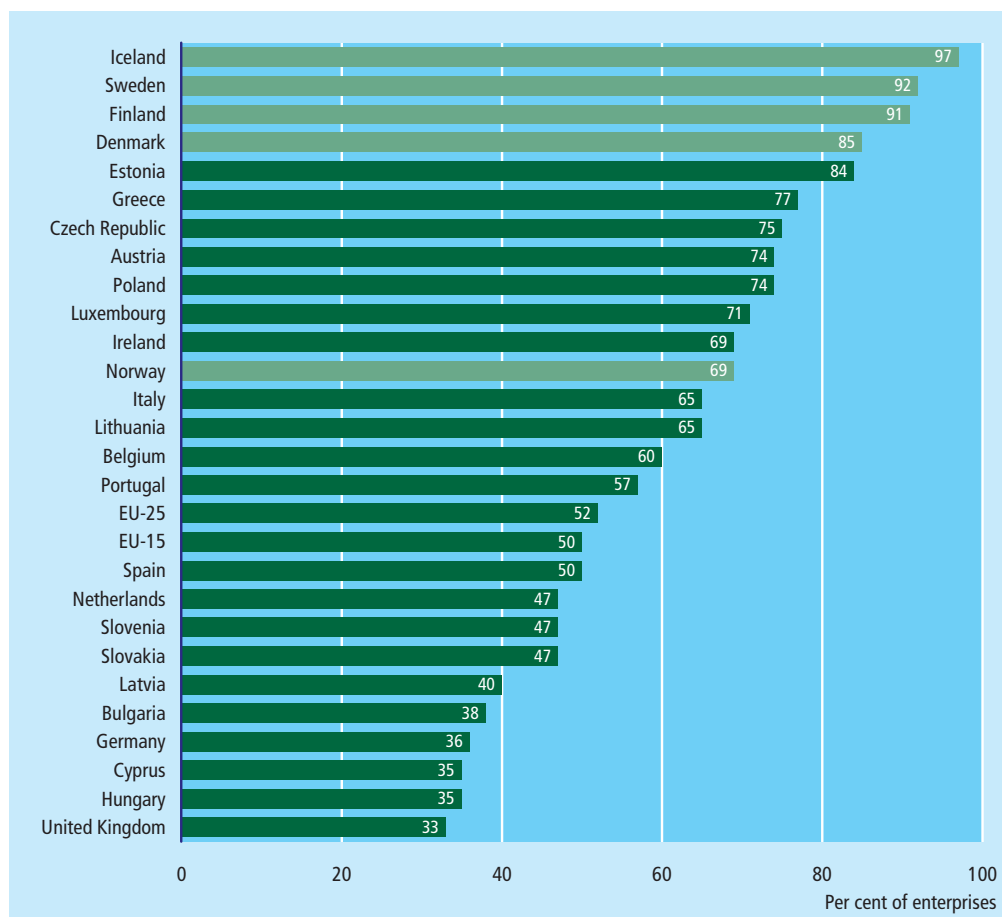


"Did your enterprise interact with public authorities in the following ways, during 2004?"  
 Swedish figures are not comparable to previous years due to a new wording of the question.  
 NSI statistics, 2005 surveys of ICT usage in enterprises (Iceland 2003 survey).

*Nordic enterprises often use public web services*

At a European level the Nordic enterprises have a lead concerning interaction with public authorities via the Internet (figure 4.2). This applies especially to Iceland, Sweden and Finland, where more than 9 in 10 enterprises are using public digital services and Denmark follows closely behind with 85 per cent. Norwegian enterprises are with 69 per cent closer to the typical level for European countries.

Figure 4.2 Enterprises interacting with public authorities via the Internet Jan. 2004



Icelandic figures refer to 2002.

Source: Eurostat, October 2005 (<http://europa.eu.int/comm/eurostat/>). NSI statistics, 2004-surveys on ICT usage in enterprises.

### Population

#### *Every second Nordic citizen uses digital public services*

About half of the citizens aged 16-74 years<sup>1</sup> in the Nordic countries interact with public authorities via the Internet (figure 4.3). Most in Iceland (55 per cent) and fewest in Finland (47 per cent). Almost all of the users of digital services obtain information from the web sites, but significantly fewer are downloading forms or sending filled in forms.

#### *Finland a little lower*

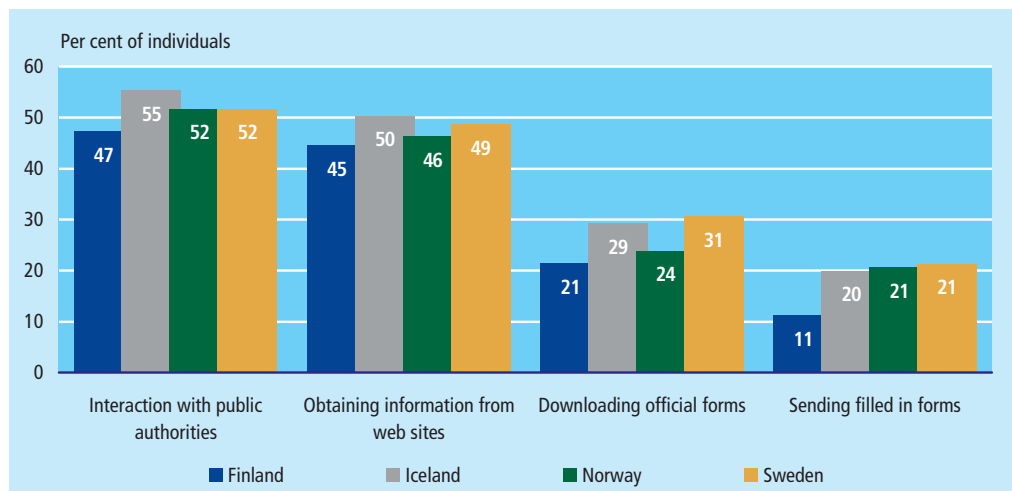
Finland is some percentage points below the other countries concerning citizens - a reversal of the pattern of the Finnish enterprises. An explanation might be that the level of Internet use in general in Finland among

<sup>1</sup> Finland 15-74 years.



individuals is some percentage points lower than in the other Nordic countries.

**Figure 4.3** Individuals interacting with public authorities via the Internet in the last 3 months. 2005

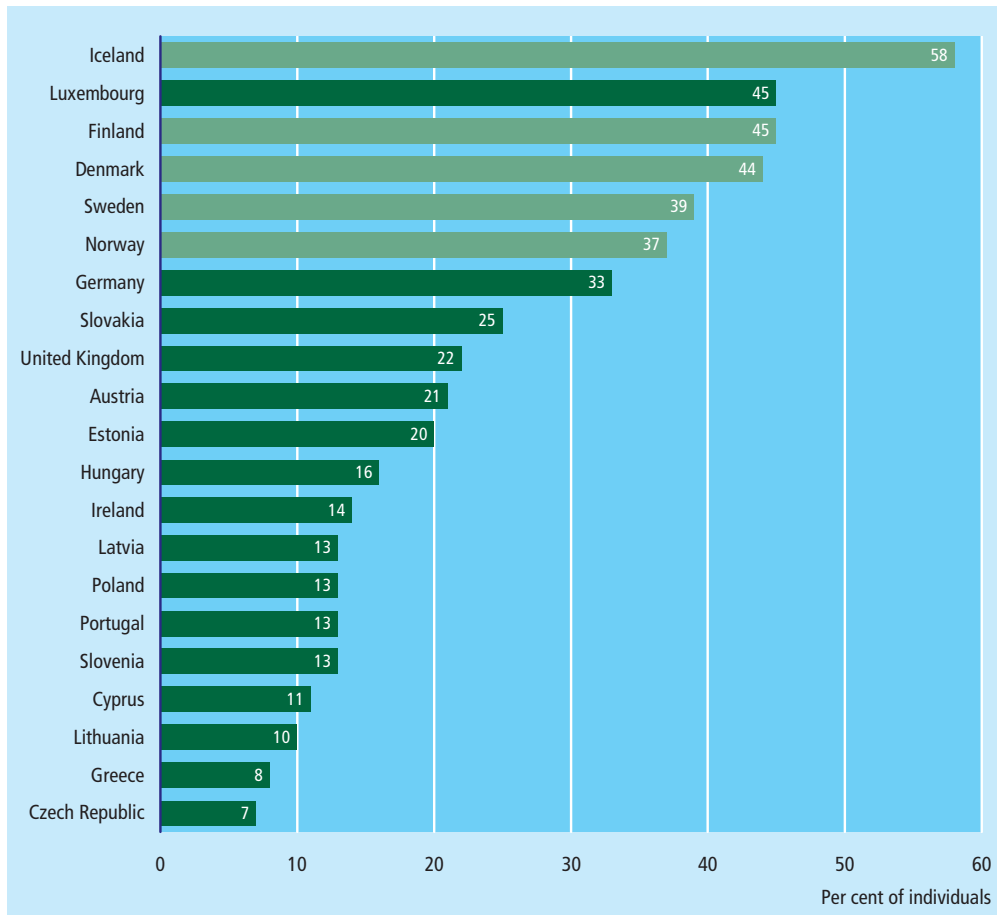


Statistics Denmark cover this indicator with a more narrow definition.  
 Source: NSI statistics, 2005 surveys of ICT usage in households and by individuals.

*Nordic citizens' use of public digital services has high international ranking*

The Nordic countries are among the most advanced countries in Europe as far as citizens' use of public digital services is concerned. Almost half of the individuals in Finland and Denmark are using such services somewhat ahead of Sweden and Norway (figure 4.4). No less than 58 per cent of the Icelandic citizens used public digital services in 2004.

**Figure 4.4** Individuals interacting with public authorities via the Internet in the last 3 months. 2004



Source: Eurostat, October 2005 (<http://europa.eu.int/comm/eurostat/>).  
NSI statistics, 2004 surveys of ICT usage in households and by individuals.

### 4.3 Use of ICT in Norwegian and Danish municipalities

*Interpretation  
of Danish-  
Norwegian  
results*

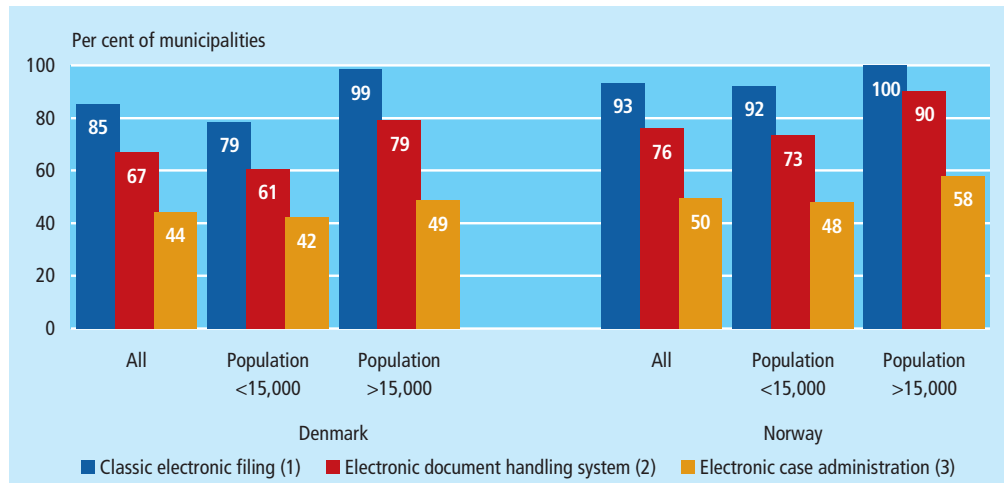
The figures in this part of the publication are based on figures from the 2004 surveys of ICT usage in the Norwegian and Danish municipalities, respectively. A number of questions from the two surveys have been harmonised. However, the figures and the analysis have not been presented before together. All results should be interpreted in the light of the structural differences between the municipal sectors of the two countries. This involves size and tasks of the municipalities and organisational ties to central governmental institutions.

**Digitisation**

*Case and document handling systems more frequent in Norway*

Case and document handling systems are widely distributed to the municipalities of the two countries (figure 4.5). Most common is classic electronic filing, followed by electronic document handling system and electronic case administration. The different systems are slightly more frequent in the Norwegian municipalities compared to the Danish municipalities.

**Figure 4.5 Case and document handling systems. 2004**



<sup>1</sup> Electronic storage of information on documents and cases, e.g. date of receipt, sender, etc. <sup>2</sup> Electronic recording and storage of documents of a case - scanned or internal documents. <sup>3</sup> Supporting the entire handling of a case and work flow between case officers.

*Frequency of electronic case handling*

The users of electronic case systems have estimated the share of all cases handled electronically (table 4.1). In both countries about half of the municipalities estimate that more than 25 per cent of the cases are handled electronically. This indicates that the majority of cases are typically handled manually even in the municipalities with electronic case handling.

Table 4.1 Share of the cases handled electronically. 2004

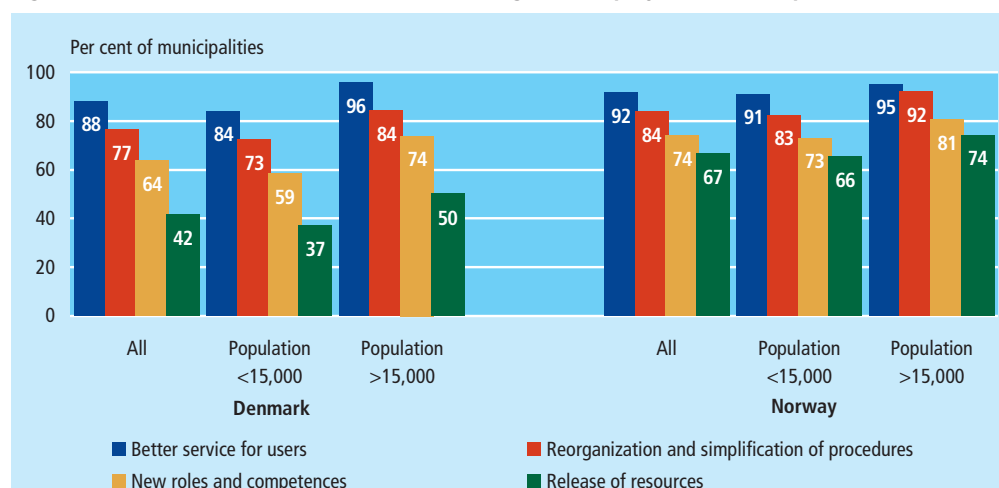
	Denmark			Norway		
	Population	Population		Population	Population	
	All	<15,000	>15,000	All	<15,000	>15,000
	per cent of municipalities with electronic case handling					
Less than 5 per cent	24	17	37	27	30	17
5-24 per cent	25	28	20	22	19	36
25-50 per cent	12	9	17	16	17	11
More than 50 per cent	39	46	27	35	35	36
Total	100	100	100	100	100	100

'Do not know/not relevant' has been excluded from the percentage base in the Danish figures, as this category was not present in the Norwegian figures.

*Better service for users is the most common effect from digitisation*

The impact of digitisation projects has been measured both in Danish and Norwegian municipalities. Better service for the users is the most common effect in both Denmark and Norway according to the municipalities (figure 4.6). This effect is followed by 'reorganisation and simplification of procedures', 'new roles and competences and, as the least common effect, 'release of resources'.

Figure 4.6 Perceived effect from digitisation projects in municipalities. 2004



In both countries the municipalities were asked: "To what degree has the recent 2-year digitisation projects caused changes compared to the previous task handling?" The figure shows municipalities having experienced at least some degree. The underlying answer categories differ to some extent in the two surveys, which might have an effect on the comparability of the results.

*Differences in data sources*

It is difficult to draw a firm conclusion with respect to the difference between the two countries as the respondents were given slightly different answer possibilities. In addition, the Danish municipalities had an extra indicator, 'Better professional quality in the task handling', which were experienced by 76 per cent as an effect.

*Similarities and differences concerning ICT effects*

However, the figures indicate the following:

- The effects have the same sequence in both countries
- The relative difference between small and big municipalities seems less significant in Norway
- Release of resources is less common in Denmark compared to the other effects.

### Outsourcing and strategy

*Municipal outsourcing more common in Denmark*

With a few exceptions, most ICT functions in Norwegian and Danish municipalities are handled by internal staff (table 4.2). However, 'programming and design of Internet solutions' and 'other system development' are most commonly handled by external suppliers. On average, Danish municipalities have a higher level of outsourcing compared to the Norwegian municipalities.

**Table 4.2** Outsourcing: Internal or external handling of municipal ICT functions. 2004

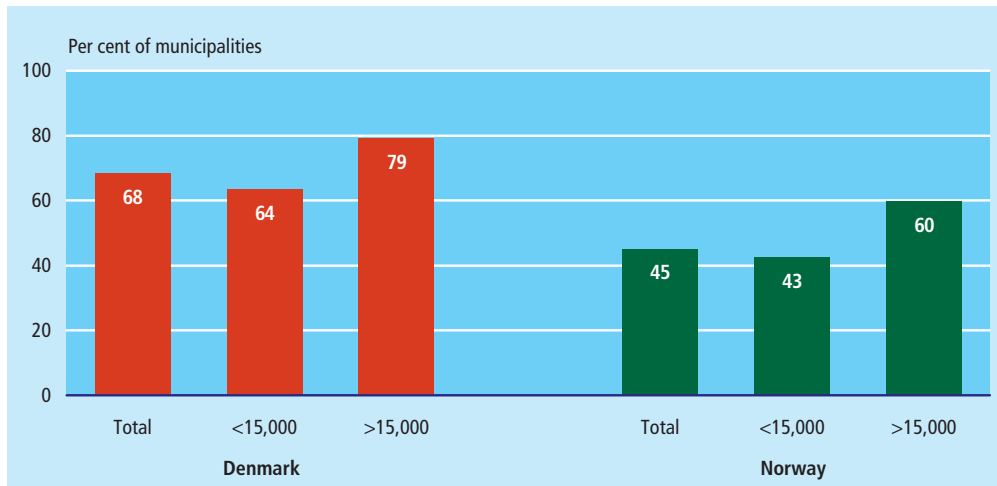
	Denmark			Norway		
	Mainly internal	Internal/external	Mainly external	Mainly internal	Internal/external	Mainly external
<b>Function:</b>	per cent of municipalities					
Project management at ICT acquisitions	69	24	8	77	19	4
Development of ICT strategy	83	14	3	81	16	3
Programming/design of Internet solutions	23	15	62	39	29	32
Other system development	10	12	79	29	19	52
Operation of municipal servers	83	8	9	75	10	15
Operation of PC environments	95	2	2	86	6	8
User training	53	25	22	58	28	15
User support	93	4	3	83	11	7

The question to the municipalities was "To what extent are the following ICT functions of the central administration handled by external suppliers and/or own staff?". Exclusive 'Don't know' (typically 1-3 per cent of all).

*ICT strategy more frequent in Denmark*

68 per cent of the Danish municipalities have an updated ICT strategy compared to 45 per cent of the Norwegian municipalities (figure 4.7). In both countries, more of the larger municipalities have an ICT strategy. The size factor might explain the difference between the countries, as Norway, on average, has smaller municipalities than Denmark.

Figure 4.7 Municipalities with updated<sup>1</sup> ICT strategy. 2004



<sup>1</sup> Within the last 2 years.

### Barriers

*Top 5 barriers shared*

Based on an array of comparable barriers to digital administration, the municipalities of the two countries have the same barriers as the five most significant barriers (figure 4.8).

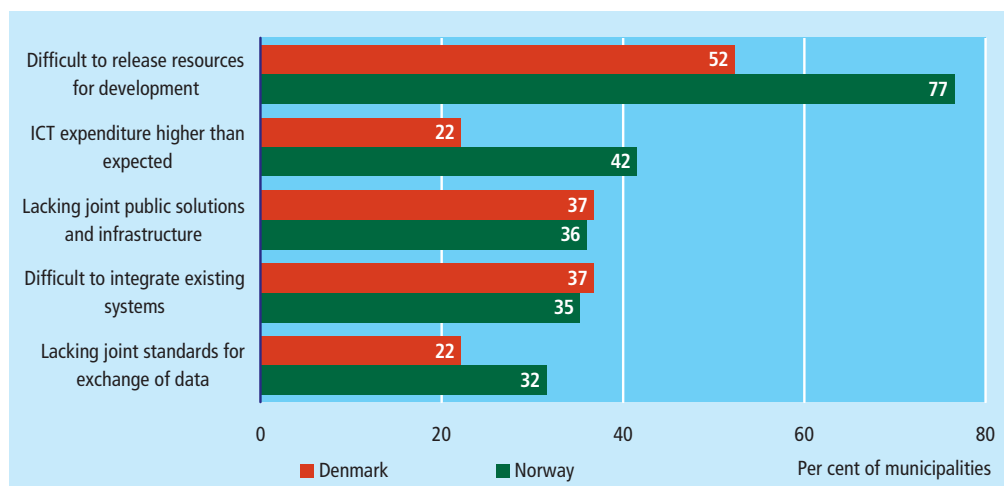
*Difficult to release resources*

In both countries, the barrier 'difficult to release resources for (digital) development' was the most significant, compared to the other barriers, however with at a higher level of significance in Norway. ICT expenditure higher than expected is the second most important barrier to Norwegian municipalities, while only a less significant barrier in Denmark.

*Data and system integration of major importance*

In both countries, more than 1/3 of all municipalities find that barriers concerning system and data integration are of high significance, and rate them among the most important - more specifically 'lacking joint public solutions and infrastructure', 'difficult to integrate existing systems' and 'lacking joint standards for exchange of data'.

Figure 4.8 Top 5 barriers related to digital municipal administration. 2004



Similar barriers were asked in both countries with only slightly different questions. However, as the total number of barriers answer categories varied, care should be taken in drawing comparisons. In Denmark: "What impact do the following barriers have on the use of ICT/digital administration?". Municipalities that responded "Large impact". In Norway: "To what degree do the following barriers have an impact on the development of the electronic administration?" Municipalities that responded "To a very high degree" or "To a high degree".

*Careful interpretation of barriers*

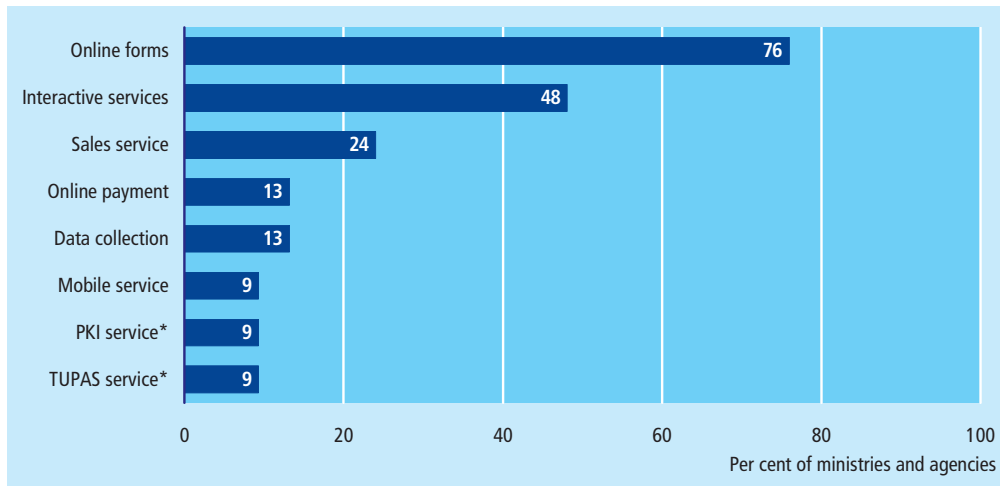
Though the barriers themselves are similar in the two national questionnaires, the answer categories varied (see note under figure). Hence, care should be taken regarding conclusions at the level of the experienced significance.

**4.4 Use of ICT in the Finnish public sector**

*Nearly half of the agencies in central administration offered public interactive services online*

All organisations in the Finnish central administration have launched their www sites on the Internet (figure 4.9). 76 per cent of the organisations had electronic forms on the Internet, and nearly half of the agencies in central administration offered public interactive services online. Moreover, 15 per cent of the agencies had plans to implement interactive online services.

Figure 4.9 Provision of online services in the Finnish central administration. 2004

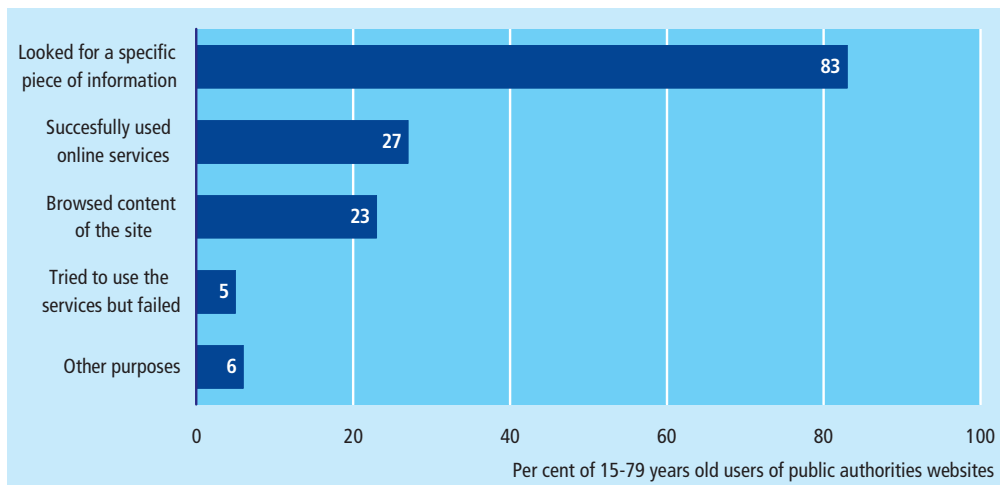


\* TUPAS and PKI are related to personal online identification, TUPAS using the identification key used in the banks. PKI = Public Key Infrastructure. Source: Ministry of Finance: 'Review on ICT within the Government of Finland 2004', June 2005. [www.vm.fi/sahkoinenasiointi](http://www.vm.fi/sahkoinenasiointi)

*Specific information searches is common among Finnish users*

83 per cent of the visitors had searched for a certain piece of information (figure 4.10). 27 per cent had successfully used online services. Especially, the following groups made use of online services: Women (31 per cent), people aged 35 to 49 (33 per cent), people living in cities with a population of over 100,000 (34 per cent), persons who use the Internet for more than five hours per week (31 per cent) and entrepreneurs/persons in management positions (38 per cent) had used online services.

Figure 4.10 Users' purposes of visiting Finnish public administration websites. 2004



n=509 (persons who had visited certain public services websites). Source: Ministry of the Interior, Taloustutkimus Ltd. Omnibus, November 2004. Online services of public administration, autumn 2004.



## 4.5 Sources

### Use of ICT in Norwegian and Danish municipalities

**Table 4.3** Background information

Country	Denmark	Norway
Name of survey in English	Use of ICT in the public sector	Use of ICT in municipalities
Voluntary/mandatory	Voluntary	Mandatory
Response rate, municipalities	78 per cent	95 per cent
Time for sending out the survey	August 2004	January 2005
Main reference time for results	August 2004	2004
Next year availability expected	December 2005	july 2006
Publication and dissemination	www.dst.dk/it	http://www.ssb.no/emner/10/03/iktbrukk/
Contact information	Martin Lundø, mlu@dst.dk	Mads Hansen-Møllerud, mhm@ssb.no

**Table 4.4** Composition of responses by size of municipalities

	Denmark				Norway			
	All municipalities	Responses	Response rate	Distribution of responses	All municipalities	Responses	Response rate	Distribution of responses
	number		per cent		number		per cent	
0-4,999	17	16	94	8	241	226	94	55
5-9,999	111	82	74	39	90	83	92	20
10-14,999	54	42	78	20	41	41	100	10
15-49,999	72	56	78	26	50	50	100	12
50,000+	17	16	94	8	12	12	100	3
Total	271	212	78	100	434	412	95	100

<sup>1</sup> Number of inhabitants: Norway, beginning of 2004, Denmark July 2005.

### Finland

*Review of ICT within the Government of Finland 2004*

The survey was conducted by the Ministry of Finance, published June 2005 and concerns the state of affairs as of December 31st, 2004. The agencies that provided information for this survey were Ministries and Administrative Agencies operating within the governmental budget. More information at [www.vm.fi/sahkoinenasiointi](http://www.vm.fi/sahkoinenasiointi).

*Online services of public administration, autumn 2004*

Ministry of the Interior, Taloustutkimus Ltd., Omnibus survey, November 2004. 992 persons aged 15-79 years participated, and 654 persons using the Internet during the past 3 months in the autumn 2004 were asked a list of public services if they had visited those websites. The 509 persons, who had visited the listed websites, reported the different purposes. Available in Finnish:

<http://www.intermin.fi/intermin/hankkeet/juhta/home.nsf/Pages/B335B57EDA78895DC2256F8500504B3F>

## 5. ICT security

### 5.1 Introduction

#### *Importance of ICT security*

Problems with ICT security have grown in line with the rapid increase in the number of computer users. The use of the Internet and other networks for communication has become widespread. In recent years, virus attacks and the like have brought attention to society's dependence on these networks and the far-reaching consequences if the ICT systems do not function.

#### *Sources*

The sources for describing ICT security are outlined in the three chapters on use of ICT by individuals, in enterprises and in the public sector, respectively.

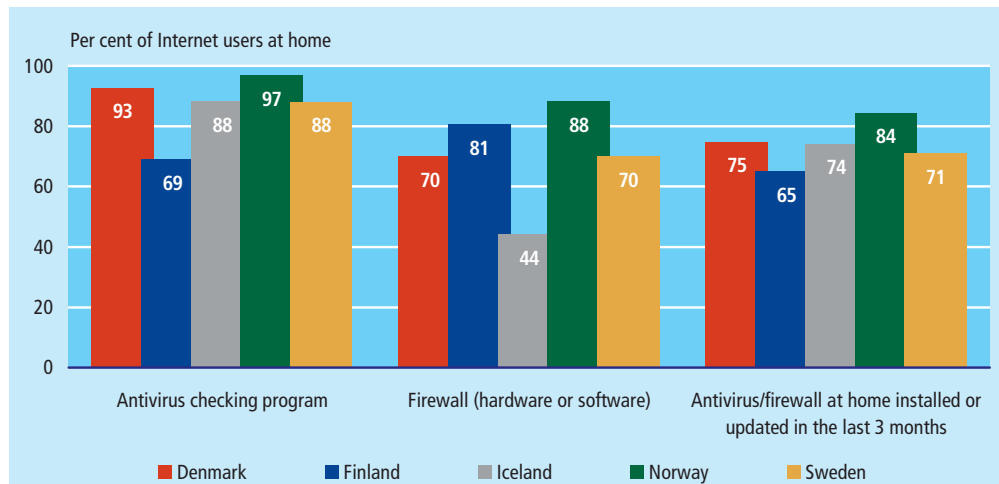
### 5.2 ICT security in the population

#### Security precautions

#### *Antivirus in 9 in 10 Nordic homes*

Security precautions at home are common in all Nordic countries. This concerns antivirus programs which have been installed by almost all Internet users at home (figure 5.1), firewall - hardware or software based - is almost as common as antivirus programmes. Antivirus seems to be less frequent in Finland whereas firewalls are less common in Iceland compared to the other Nordic countries.

Figure 5.1 Security precautions at home. 2005



Source: NSI statistics, 2005 surveys of ICT usage in households and by individuals.

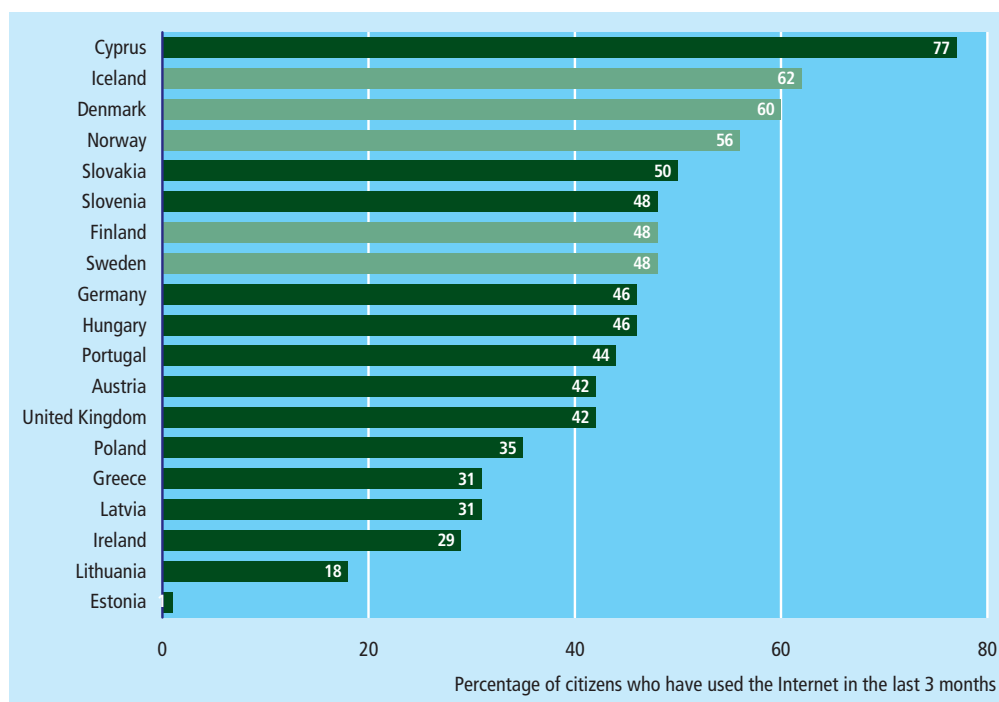
*Updated ICT measures more widespread in Norway*

A high proportion of the Internet users has updated ICT measures in the form of either their antivirus protection or firewall in the last three months. In general, the different security measures are more frequent among Norwegian Internet users than the other countries.

*Nordic citizens active concerning updated anti-virus widespread*

The Nordic countries have a relative high proportion of citizens with updated anti-virus programs compared to the other European countries (figure 5.2). This applies, especially, to Iceland, Denmark and Norway, which are only surpassed by Cyprus. Finland and Sweden follow somewhat lower in the ranking, yet still in the upper half of the ranking of the majority of EU countries.

**Figure 5.2** Citizens who have updated anti-virus programs within the last 3 months. 2004



Source: Eurostat, October 2005 (<http://europa.eu.int/comm/eurostat/>).  
 NSI statistics, 2005 surveys of ICT usage in households and by individuals.

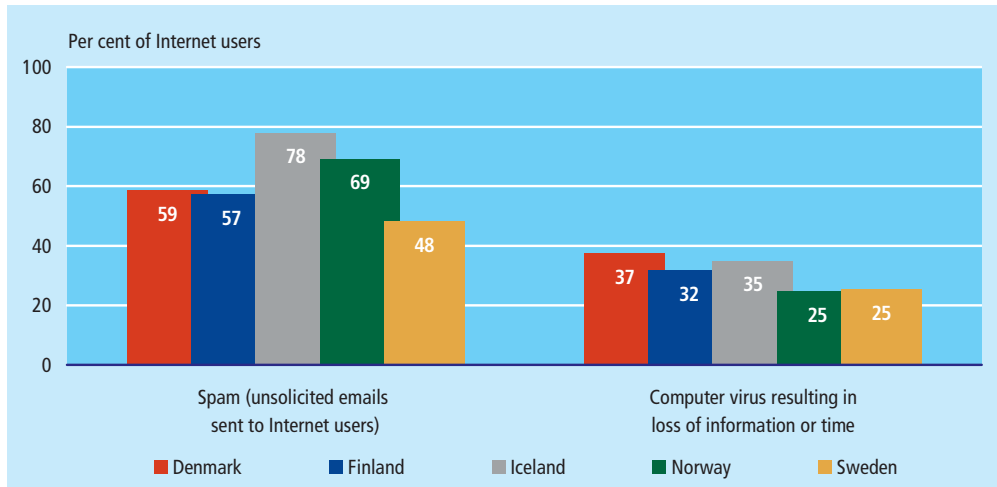
**Security problems encountered**

*Computer virus most common among Danish Internet users*

Half of the Internet users or more have typically encountered spam - the highest percentages are found in Iceland and Norway and the lowest number in Sweden (figure 5.3). The amount of spam or whether users feel it harmful has not been asked (except in Finland). Computer virus resulting in loss of information is significantly less frequent than spam, although virus probably causes more problems for users when it hap-

pens. Among Danish Internet users, 37 per cent have encountered this problem.

**Figure 5.3** Security problems encountered in the last 12 months when using the Internet. 2005



Source: NSI statistics, 2005 surveys of ICT usage in households and by individuals.

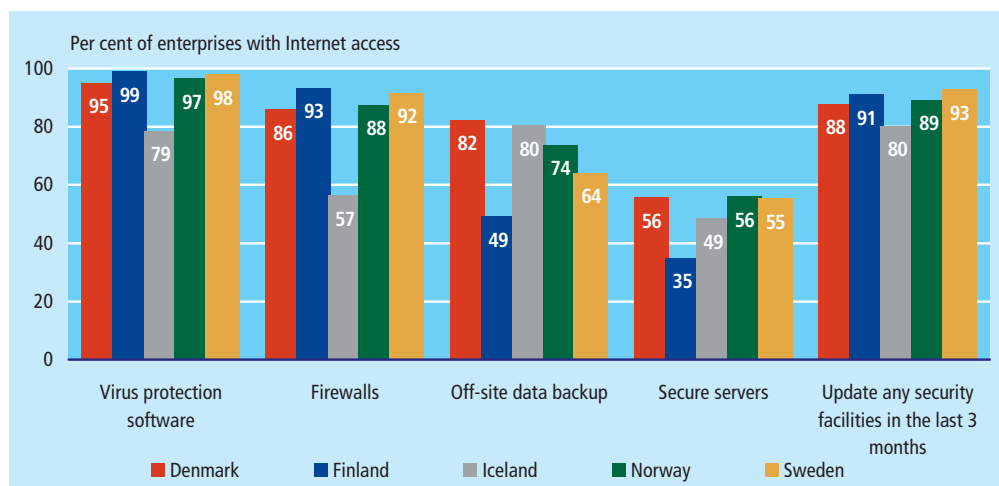
### 5.3 ICT security in the business sector

#### Security precautions

Virus protection software and firewalls are widespread security precautions in the Nordic enterprises and cover more than 95 per cent in all countries, except Iceland<sup>1</sup> (figure 5.4). Off-site data backup is prevalent in a large majority of Nordic enterprises, however, only in half of the Finnish enterprises.

<sup>1</sup> The lower frequency in Iceland concerning virus protection and firewalls reflects the situation in 2003 and is expected, based on development in the other Nordic countries, to have changed since 2003.

Figure 5.4 Use of security facilities in enterprises. 2005



Firewall: Software or hardware. Secure servers: Support secured protocols such as shttp.  
 High item nonresponse in the Finnish survey creates uncertainty to the Finnish data on off-site data back up and secure servers.  
 Source: NSI statistics, 2005 surveys of ICT usage in enterprises (Iceland 2003).

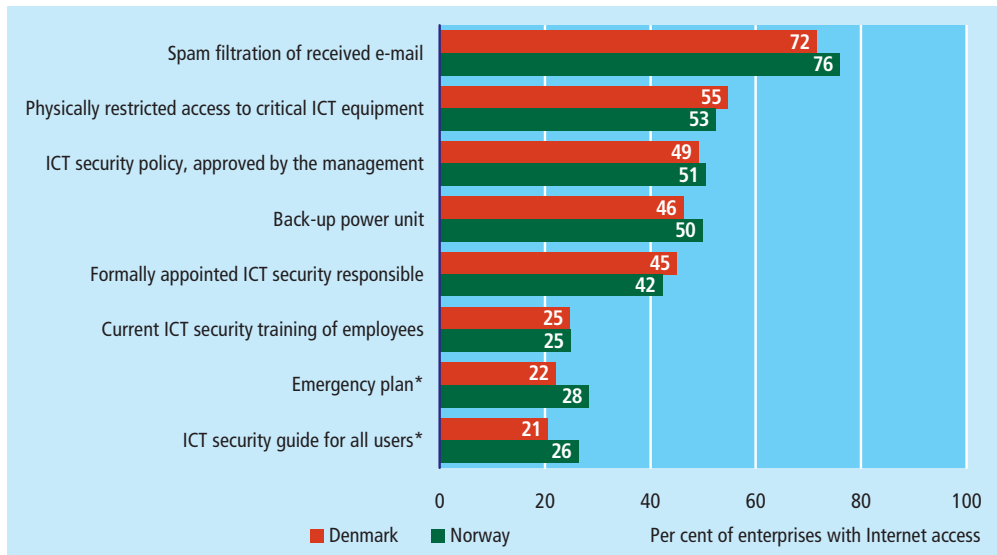
*9 in 10 enterprises have updated security facilities*

In general, about half of the enterprises use secure servers, however, with a lower proportion in Finland, where 35 per cent have this security facility. The share of enterprises that have updated any security facilities is in general 9 in 10 enterprises, with the highest proportion in Sweden (93 per cent).

*Additional Danish and Norwegian indicators*

The Danish and Norwegian enterprise surveys have additional indicators on ICT security. The diffusion is in many ways similar in the two countries with only small differences in the single indicators (figure 5.5).

Figure 5.5 Use of security facilities in Norwegian and Danish enterprises. 2005



\* Updated during the last 2 years.

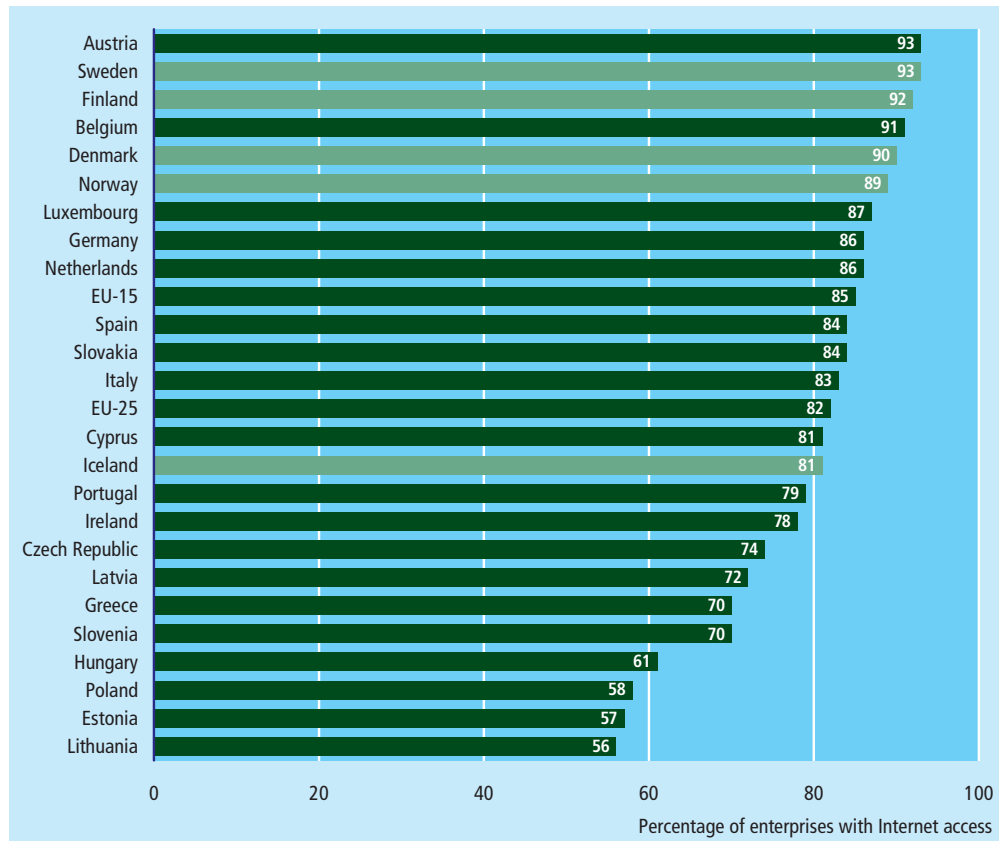
Source: Use of ICT in enterprises 2005-surveys, Statistics Norway and Statistics Denmark.

*Spam filtration in more than 7 in 10 Norwegian and Danish enterprises*

A large majority of the enterprises with Internet access use spam filtration of received e-mail, with 4 percentage points more users in Norway. About half of the enterprises have physically restricted access to critical ICT equipment, have an ICT policy and a back-up power unit. Least frequent in Denmark are updated emergency plans and ICT security guide for all users. Both are more frequent among Norwegian enterprises.

*Widespread Nordic security updates compared to other European countries*

The Nordic countries are at the top of European countries concerning prevalence of updated ICT security measures in 2004 (figure 5.6). In general, a large majority of European enterprises have updated their ICT facilities in one way or another. The Nordic countries lie in the upper fourth of countries - except Iceland (figures from previous year).

Figure 5.6 Enterprises with updated ICT security measures<sup>1</sup>. 2004

<sup>1</sup> Security measures mean at least one measure. The update must have been made within the last 3 months (including automatic updating of anti-virus programs).

Source: Eurostat, October 2005 (<http://europa.eu.int/comm/eurostat/>).

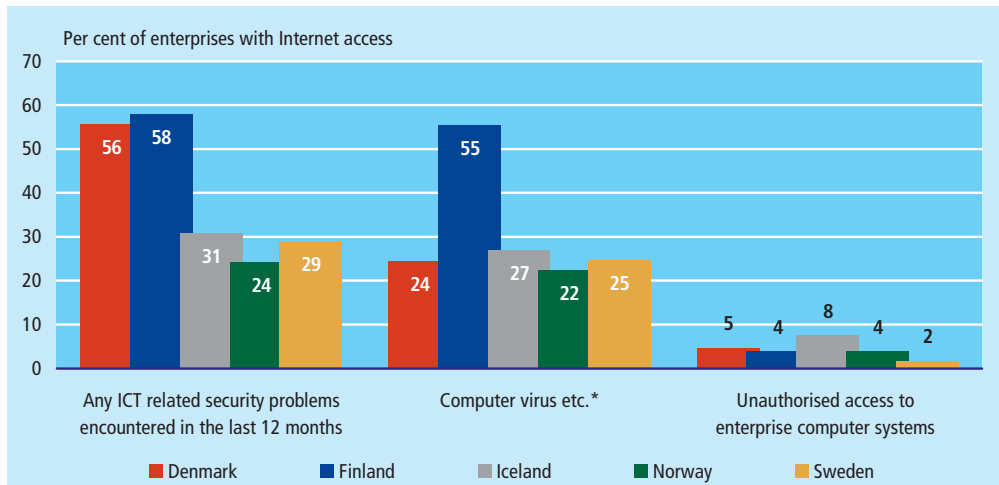
NSI statistics, 2005 surveys of ICT usage in enterprises (Iceland 2003 survey).

### Security problems encountered

#### *Security problems most common in Finnish and Danish enterprises*

More than half of the Danish and Finnish enterprises have encountered some sort of ICT related security problem in the last 12 months (figure 5.7). This is a significantly higher level compared to the three other Nordic countries. With respect to Finland the high level is explained by a relatively high share of enterprises that have encountered computer virus etc. resulting in loss of information or working time. As regards Denmark, the high share is due to a combination of various security problems.

Figure 5.7 Security problems encountered in enterprises in the last 12 months. 2005



\* Resulting in loss of information or working time. 'Any ICT related security problem...' is in Denmark calculated from a list of ICT problems, instead of being posed as a general question.

Source: NSI statistics, 2005 surveys of ICT usage in enterprises (Iceland 2003 survey).

*Unauthorized access to enterprise computer systems*

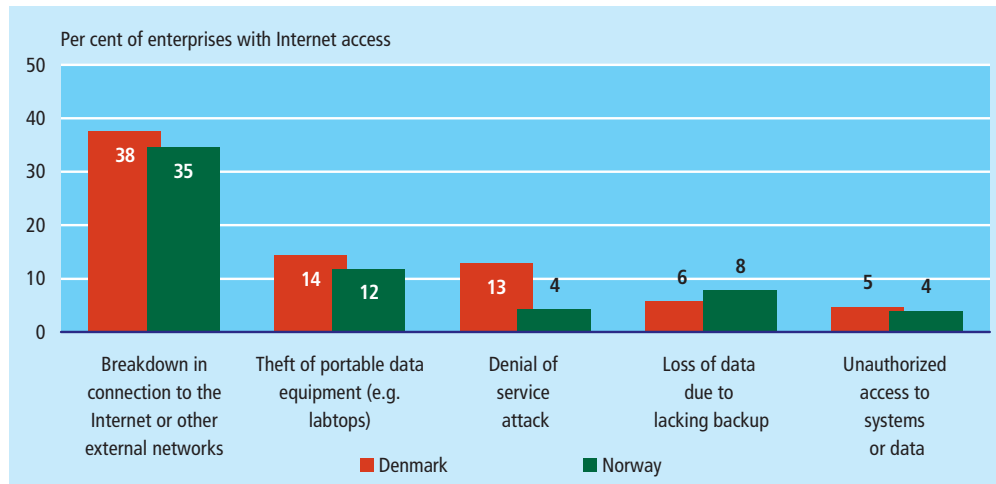
Unauthorized access to enterprise's computer systems occurs only in a few Nordic enterprises - typically 4-5 per cent. However, being a sensitive question for the enterprises to answer, the figures could, to some extent, underestimate the real extent of this problem.

*Additional Danish and Norwegian indicators*

From a list of additional security problems and related annoyances, breakdown in connection with the Internet was the most commonly cited and accounting for 38 per cent of the Danish enterprises and 35 per cent of the Norwegian enterprises (figure 5.8).



**Figure 5.8** Security problems encountered by Norwegian and Danish enterprises in the last 12 months. 2005



Source: 2005 surveys of ICT usage in enterprises, Statistics Norway and Statistics Denmark.

*Denial of service attack more common in Denmark than Norway*

Other security problems comprised theft of portable data equipment, denial of service attacks, loss of data due to lacking backup and unauthorized access to system or data. Denial of service attack is significantly more common among Danish enterprises than among Norwegian enterprises.

#### 5.4 ICT security in the public sector

*High security level in Danish and Norwegian municipalities*

Indicators on ICT security enter into the Norwegian and Danish surveys of ICT usage in the public sector. A comparison of the municipalities of the two countries shows a high and in general uniform dispersion of security facilities (table 5.1).

*Municipalities have the security profile of big enterprises*

For comparable indicators the spread of security facilities correspond to the spread among the largest enterprises of the two countries. E.g. 100 per cent of all municipalities have a firewall compared to 98-99 per cent of enterprises with at least 100 employees. The larger municipalities tend more frequently to use security precautions than the smaller municipalities, although the difference is only prevalent in few areas.

**Table 5.1 Use of security facilities in Norwegian and Danish municipalities. 2004**

	Denmark		Norway			
	All Population	Population	All Population	Population		
	<15,000	>15,000	<15,000	>15,000		
	per cent					
Firewall	100	100	99	100	99	100
Virus protection software <sup>1</sup>	98	98	99	100	100	100
Off-site data backup	85	85	86	84	84	86
Back-up power unit	85	85	85	59	56	74
Spam filtration of received e-mail	84	83	88	80	78	90
Formally appointed ICT security responsible	83	82	83	73	72	79
Emergency plan <sup>2</sup>	42	41	44	30	28	44
Current ICT security training of employees	42	39	50	23	18	52
Intrusion detection software	35	26	53	56	56	55

<sup>1</sup> Current subscription. <sup>2</sup> Updated during the last 2 years.

Source: 2005 surveys of ICT usage in municipalities, Statistics Norway and Statistics Denmark.

*Security training and emergency plans more common in Denmark*

Danish municipalities have a visible lead compared to Norway as regards back-up power unit, updated emergency plans and current ICT security training of employees. This lead is most prevalent among municipalities with less than 15,000 inhabitants, and seems to be smaller in a comparison of the larger municipalities. 'Intrusion detection software' is more common among the Norwegian municipalities compared to the Danish municipalities.

## 5.5 Annex

## Use of ICT security by the population

Table 5.2 Antivirus checking program at home. 2005

	Denmark	Finland	Iceland	Norway	Sweden
	per cent of Internet users at home				
<b>All</b>	<b>93</b>	<b>69</b>	<b>88</b>	<b>97</b>	<b>88</b>
<b>Gender</b>					
Male	94	71	88	98	86
Female	92	67	89	96	90
<b>Age</b>					
16-24	91	60	84	94	85
25-34	91	67	89	94	88
35-44	94	74	91	98	89
45-54	95	75	94	102	89
55-64	93	70	87	99	89
65-74	90	67	66	87	91
<b>Education</b>					
Low	90	60	87	98	88
Medium	93	71	87	97	87
High	94	74	94	97	89
<b>Employment</b>					
Student	92	60	86	93	87
Employee	94	73	90	100	89
Self-employed	93	76	88	100	83
Unemployed	93	59	100	85	83
Retired and other inactive	87	63	82	88	93
<b>Type of locality</b>					
Densely populated areas	94	71	.	92	86
Intermediate populated areas	93	67	88	95	89
Thinly populated areas	91	68	89	100	89
<b>Broadband</b>					
Access	95	73	90	96	91
No access	87	62	89	100	85

Source: NSI statistics, 2005 surveys of ICT usage in households and by individuals.

**Table 5.3 Firewall (hardware or software) at home. 2005**

	Denmark	Finland	Iceland	Norway	Sweden
	per cent of Internet users at home				
<b>All</b>	<b>70</b>	<b>81</b>	<b>44</b>	<b>73</b>	<b>70</b>
<b>Gender</b>					
Male	76	87	51	78	74
Female	64	74	36	66	66
<b>Age</b>					
16-24	75	80	48	71	74
25-34	73	84	53	74	68
35-44	74	83	50	75	70
45-54	70	80	35	70	72
55-64	61	77	32	71	63
65-74	52	68	21	68	82
<b>Education</b>					
Low	68	78	36	80	73
Medium	69	83	44	70	70
High	74	80	55	76	68
<b>Employment</b>					
Student	76	81	53	72	76
Employee	70	82	46	72	68
Self-employed	73	84	37	85	71
Unemployed	72	69	68	69	64
Retired and other inactive	53	73	21	67	77
<b>Type of locality</b>					
Densely populated areas	73	83	.	74	71
Intermediate populated areas	70	82	47	74	74
Thinly populated areas	66	79	39	71	69
<b>Broadband</b>					
Access	79	89	51	79	81
No access	48	62	21	59	55

Source: NSI statistics, 2005 surveys of ICT usage in households and by individuals.

**Table 5.4 Antivirus/firewall at home installed or updated in the last 3 months (incl. automatic updating). 2005**

	Denmark	Finland	Iceland	Norway	Sweden
	per cent of Internet users at home				
<b>All</b>	<b>75</b>	<b>65</b>	<b>74</b>	<b>83</b>	<b>71</b>
<b>Gender</b>					
Male	78	76	76	85	72
Female	72	53	72	80	70
<b>Age</b>					
16-24	75	73	77	77	67
25-34	78	72	79	81	71
35-44	78	65	74	88	74
45-54	72	59	76	86	72
55-64	72	54	69	80	67
65-74	62	38	41	68	79
<b>Education</b>					
Low	72	63	69	76	68
Medium	73	67	74	82	71
High	79	65	81	85	72
<b>Employment</b>					
Student	78	74	79	80	71
Employee	75	65	75	84	71
Self-employed	74	68	69	97	71
Unemployed	75	48	67	76	62
Retired and other inactive	65	50	61	71	74
<b>Type of locality</b>					
Densely populated areas	76	68	.	81	70
Intermediate populated areas	74	68	74	82	75
Thinly populated areas	73	62	74	84	70
<b>Broadband</b>					
Access	81	71	80	85	79
No access	59	51	58	76	60

Source: NSI statistics, 2005 surveys of ICT usage in households and by individuals.

**Table 5.5 Computer virus resulting in loss of information or time. 2005**

	Denmark	Finland	Iceland	Norway	Sweden
	per cent of Internet users				
<b>All</b>	<b>37</b>	<b>32</b>	<b>35</b>	<b>29</b>	<b>25</b>
<b>Gender</b>					
Male	40	35	38	32	26
Female	35	28	32	25	24
<b>Age</b>					
16-24	48	33	37	37	30
25-34	42	33	40	30	25
35-44	34	33	33	29	27
45-54	38	35	37	27	23
55-64	25	23	27	21	19
65-74	31	21	23	17	37
<b>Education</b>					
Low	41	29	35	28	30
Medium	35	32	34	31	22
High	37	34	36	24	27
<b>Employment</b>					
Student	45	30	40	34	33
Employee	38	33	33	28	23
Self-employed	32	38	36	37	25
Unemployed	26	25	47	21	28
Retired and other inactive	33	27	33	22	29
<b>Type of locality</b>					
Densely populated areas	34	30	.	31	24
Intermediate populated areas	38	34	35	27	24
Thinly populated areas	40	32	35	28	26
<b>Broadband</b>					
Access	41	38	36	33	30
No access	31	29	34	23	21

Computer virus resulting in loss of information or time encountered in the last 12 months.

Source: NSI statistics, 2005 surveys of ICT usage in households and by individuals.

**Table 5.6** Spam<sup>1</sup> received by Internet users. 2005

	Denmark	Finland	Iceland	Norway	Sweden
	per cent of Internet users				
<b>All</b>	<b>59</b>	<b>57</b>	<b>78</b>	<b>71</b>	<b>48</b>
<b>Gender</b>					
Male	61	58	82	73	53
Female	56	56	74	69	43
<b>Age</b>					
16-24	62	61	83	79	56
25-34	64	67	81	76	55
35-44	61	54	78	71	45
45-54	56	56	76	67	40
55-64	53	49	74	63	39
65-74	41	28	59	52	65
<b>Education</b>					
Low	54	48	73	71	47
Medium	56	56	75	71	44
High	66	66	89	71	55
<b>Employment</b>					
Student	59	64	83	81	56
Employee	61	59	78	70	46
Self-employed	57	58	78	85	49
Unemployed	49	40	36	63	46
Retired and other inactive	48	40	66	56	51
<b>Type of locality</b>					
Densely populated areas	65	66	.	78	56
Intermediate populated areas	56	54	80	67	50
Thinly populated areas	54	53	74	70	45
<b>Broadband</b>					
Access	64	64	81	76	57
No access	48	51	71	64	39

1 Unsolicited emails received by Internet users in the last 12 months.

Source: NSI statistics, 2005 surveys of ICT usage in households and by individuals.

## ICT security in enterprises

Table 5.7 Use of security facilities in enterprises. 2005

	All enterprises (10+)	By number of employees				By industry group					
		10-19	20-49	50-99	100+	Manu- factu- ring	Con- struc- tion	Trade	Hotels and rest.	Trans- port and tele.	Busi- ness servi- ces
————— per cent of enterprises with Internet access —————											
<b>Virus protection software</b>											
Denmark	95	93	97	97	99	97	90	96	95	92	97
Finland	99	98	99	100	100	99	97	98	100	100	99
Iceland	79	74	77	87	93	75	72	82	72	89	88
Norway	97	96	97	99	99	98	96	96	93	96	97
Sweden	98	97	98	99	99	99	99	97	98	98	97
<b>Firewalls<sup>1</sup></b>											
Denmark	86	80	89	96	99	88	75	87	79	83	94
Finland	93	89	96	98	99	94	90	93	93	87	96
Iceland	57	51	52	68	83	49	35	61	49	74	79
Norway	88	84	89	96	98	88	81	89	83	85	95
Sweden	92	90	91	98	99	92	86	93	87	91	94
<b>Secure servers<sup>2</sup></b>											
Denmark	56	46	60	67	79	58	36	61	46	52	67
Finland	35	25	37	44	68	37	17	33	26	34	50
Iceland	49	40	46	61	81	46	33	50	41	63	62
Norway	56	49	60	70	78	60	42	56	37	66	66
Sweden	55	48	59	67	76	52	35	62	45	50	68
<b>Off-site data backup</b>											
Denmark	82	77	85	92	94	86	74	83	69	79	89
Finland	49	39	53	57	81	58	33	46	28	36	61
Iceland	80	78	77	91	92	76	80	85	65	91	88
Norway	74	68	77	84	92	79	67	74	54	72	83
Sweden	64	59	68	71	75	66	54	68	51	56	69
<b>Update of any security facilities in the last 3 months<sup>3</sup></b>											
Denmark	88	84	91	93	96	90	82	88	76	86	93
Finland	91	89	92	93	94	92	85	92	89	93	92
Iceland	80	77	78	92	88	79	75	81	77	78	87
Norway	89	88	89	94	96	90	87	90	87	93	88
Sweden	93	92	93	92	97	95	89	94	93	91	91

<sup>1</sup> Software or hardware. <sup>2</sup> Support secured protocols such as shttp. <sup>3</sup> E.g. automatic updates of virus protection software.

Source: Source: NSI statistics, 2005 surveys of ICT usage in enterprises (Iceland 2003 survey).



**Table 5.8 Use of secure communication in enterprises. 2005**

	All enterprises (10+)	By number of employees				By industry group					
		10-19	20-49	50-99	100+	Manu- factu- ring	Con- struc- tion	Trade	Hotels and rest.	Trans- port and tele.	Busi- ness servi- ces
per cent of enterprises with Internet access											
<b>Digital signature<sup>1</sup></b>											
Denmark	10	9	11	11	14	8	9	9	5	10	16
Finland	4	4	4	6	8	5	2	4	2	4	6
Iceland	5	4	2	8	17	4	0	6	3	7	12
Norway	8	8	8	7	12	9	5	7	8	6	12
Sweden	16	13	18	18	29	16	10	19	10	14	20
<b>Other authentication mechanism (e.g. PIN code)</b>											
Denmark	16	13	16	19	28	14	11	18	11	17	20
Finland	14	9	14	19	36	16	6	17	8	16	16
Iceland	26	22	22	35	49	25	17	28	14	35	36
Norway	13	12	12	13	23	14	8	12	12	11	18
Sweden	20	16	20	27	41	22	14	22	13	16	23
<b>Data encryption for confidentiality</b>											
Denmark	17	11	18	25	43	17	8	18	3	15	30
Finland	8	5	7	9	22	8	4	7	4	6	14
Iceland	9	5	7	15	28	6	0	10	0	17	23
Norway	12	8	12	15	34	12	6	10	5	13	21
Sweden	22	17	21	34	50	23	9	24	8	15	34

<sup>1</sup> Electronic digital signature as customer's authentication mechanism.

Source: NSI statistics, 2005 surveys of ICT usage in enterprises (Iceland 2003 survey).

Table 5.9 Use of security facilities in Norwegian and Danish enterprises. 2005

	All enterprises (10+)	By number of employees				By industry group					
		10-19	20-49	50-99	100+	Manu- factu- ring	Con- struc- tion	Trade	Hotels and rest.	Trans- port and tele.	Busi- ness servi- ces
per cent of enterprises with Internet access											
<b>Spam filtration of received e-mail</b>											
Denmark	72	68	72	77	83	71	65	72	78	72	78
Norway	76	73	78	81	88	79	68	78	72	74	79
<b>Physically restricted access to critical ICT equipment</b>											
Denmark	55	42	58	75	92	61	39	56	50	48	64
Norway	53	44	55	73	91	55	37	52	46	59	64
<b>ICT security policy, approved by the management</b>											
Denmark	49	38	54	63	77	51	34	52	35	43	64
Norway	51	45	53	62	76	57	35	50	31	57	64
<b>Back-up power unit</b>											
Denmark	46	31	51	73	87	51	22	53	27	46	57
Norway	50	42	52	70	83	60	28	55	30	48	58
<b>Formally appointed ICT security responsible</b>											
Denmark	45	34	51	63	70	51	26	47	22	34	63
Norway	42	35	45	57	68	54	31	39	18	48	53
<b>Current ICT security training of employees</b>											
Denmark	25	18	26	33	51	23	16	26	12	22	40
Norway	25	20	26	32	50	26	13	27	10	33	34
<b>Emergency plan<sup>1</sup></b>											
Denmark	22	14	23	34	52	24	8	24	21	20	31
Norway	28	24	27	39	55	28	19	27	22	39	38
<b>ICT security guide for all users<sup>1</sup></b>											
Denmark	21	13	22	29	48	20	9	23	18	21	30
Norway	26	23	25	33	48	28	16	25	14	33	38

<sup>1</sup> Updated during the last 2 years.

Source: Use of ICT in enterprises 2005-surveys, Statistics Norway and Statistics.



## 6. E-skills and e-learning

### 6.1 Introduction

#### *E-skills foundation of information society*

E-skills are one of the most central aspects of the Nordic information society. Most of the ICT economy is knowledge-based and the use of ICT requires a fairly high level of competence. This chapter focuses on the formal E-skills - persons with a formal ICT-education. Iceland hasn't the necessary educational data, and is therefore not included in the register-based figures in this chapter.

At the end of the chapter E-learning is analysed as a non-formal aspect of E-skills. Formal ICT-education is classified according to the educational levels in the international ISCED-classification. See the fact box:

#### **ISCED education nomenclature:**

OECD has developed a manual for classifying educational programs, called International Standard Classification of Education (ISCED-97). ISCED operates with 7 basic level of education, divided by the degree of complexity of the content.

#### **Primary level:**

Level 0, 1 and 2 are the basic levels of school and either preparation for higher ISCED levels or shorter educations preparing for the labour market.

#### **Secondary level:**

Level 3 is either shorter educations of a few years' duration preparing students for the labour market or educations preparing students for level 5A.

#### **Tertiary level:**

Level 5b is practically oriented educations of at least two years' duration.

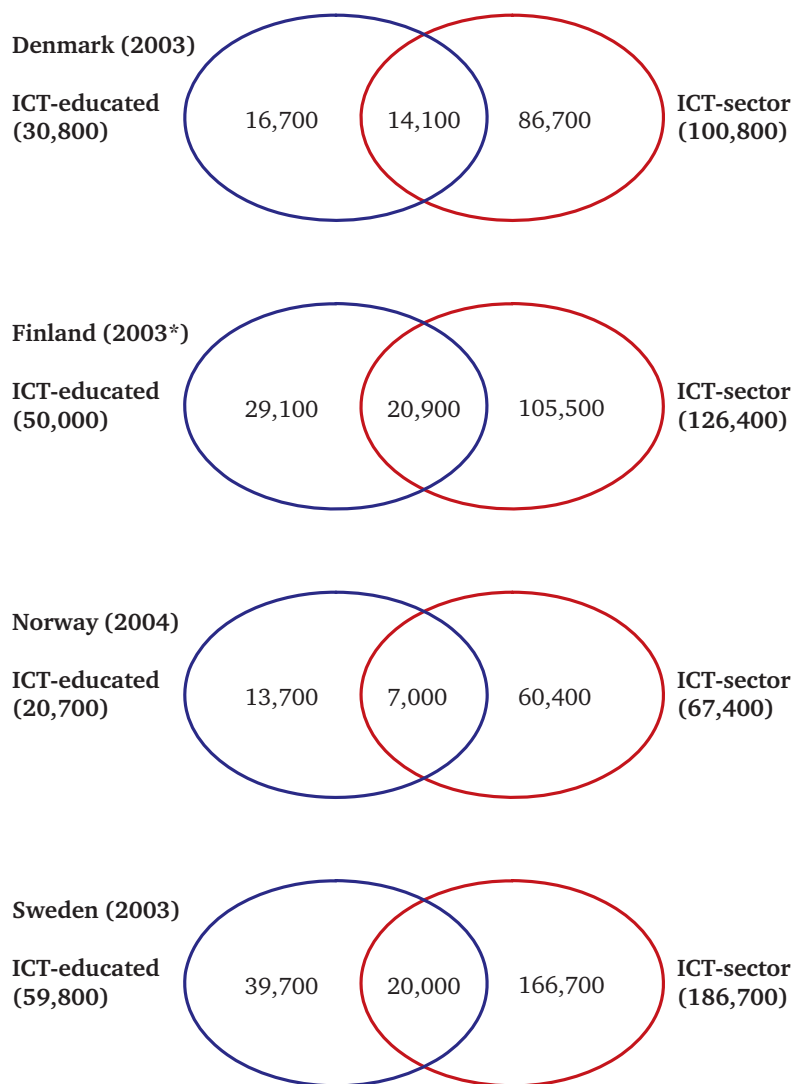
Level 5A is longer, theoretically based, educations of at least 3 years' duration. Completing a level 5A education gives the possibility of achieving an advanced research qualification. The level will also be referred to as a university-level education.

Level 6 is advanced research qualification.

#### *Two-circle model*

Figure 6.1 shows a two-circle model of the ICT labour market, where the ICT educated and the ICT-sector is shown separately and overlapping. It is important to note that the number of ICT-educated is low compared to national statistics, but this is due to comparability: The high ICT -educations are more easily compared between the countries. These include non-university tertiary level and university-level educations. Although the comparability is easier for the tertiary level, the ISCED nomenclature is still only a frame for each country's classification of ICT-educations, and there are therefore not totally comparable. Figure 6.1 aims primarily at giving an indication of the ICT labour market, but the countries are not comparable.

**Figure 6.1** Two circle model of persons with a tertiary ICT-education and persons on the ICT-labour market



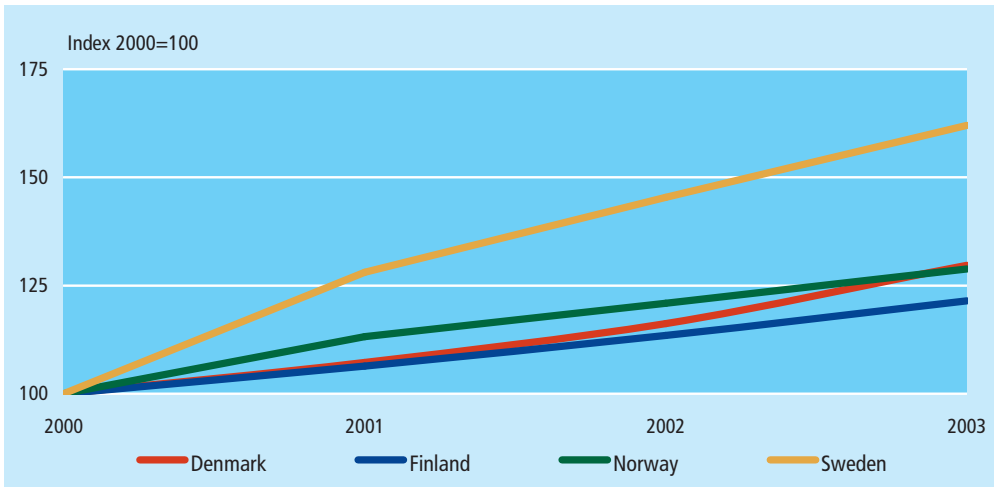
Data from Finland on ICT-educated are from 2002, but data on the ICT sector are from 2003.

*Flexibility on the ICT labour market* The figures give an indication of the flexibility on the ICT labour market – only a smaller fraction of the ICT-educated persons on the tertiary level is actually employed in the ICT sector, and only a small fraction of the persons employed in the ICT sector has a higher ICT education.

*Majority have non-formal e-skills* This point illustrates the non-formal e-skills acquired by the majority of the persons in the ICT sector. On-job-learning and courses have a cen-

tral importance in obtaining and maintaining the necessary e-skills, both in the ICT sector and outside.

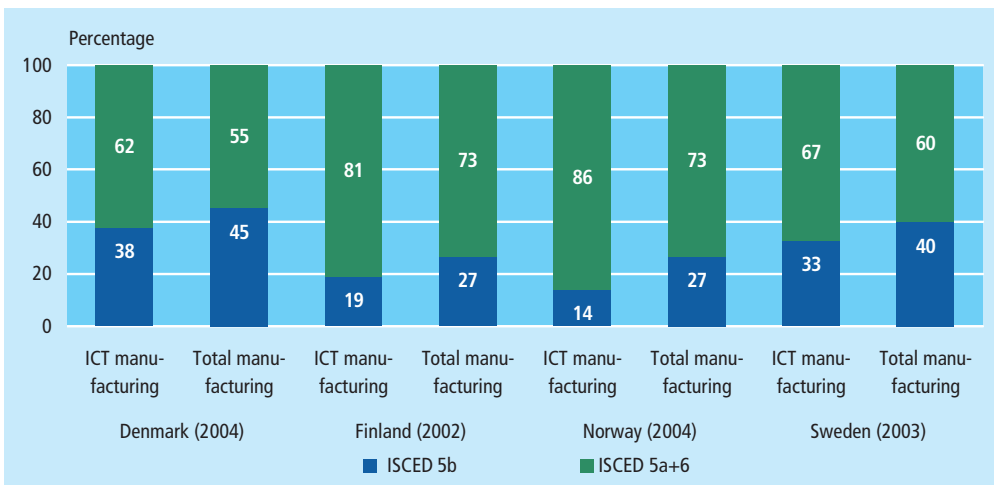
**Figure 6.2** Development in share of population between 16 and 74, with a tertiary ICT education



*Increasing share with formal e-skills*

Figure 6.2 depicts the development in the share of persons with a tertiary ICT education. It shows a uniform development in all of the four Nordic countries where the share of persons with higher formal ICT skills is growing. There are several reasons for this development, but an important aspect is the shift from non-formal e-skills to formal ICT qualifications - especially caused by the growing supply from the educational sector.

**Figure 6.3** Composition of ICT-educated persons on the tertiary level in manufacturing and ICT-manufacturing. 2004



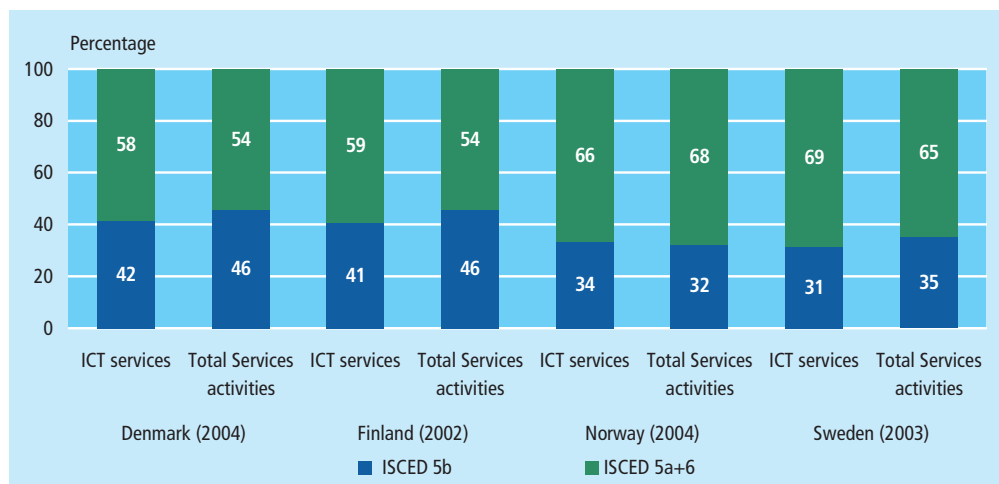
Data from Finland are from 2002, and data from Sweden are from 2003.

*ICT sector has many ICT-educated persons*

The use of persons with a higher formal ICT education is especially visible in the ICT sector. In all of the Nordic countries, the share of persons with a university-level education is higher in the ICT manufacturing than in non-ICT manufacturing.

The same picture is apparent when ICT service is compared to the non-ICT service, except for Norway where the share is lower in the ICT service than in non-ICT service.

**Figure 6.4** Composition of ICT-educated persons on the tertiary level in services and ICT service. 2004

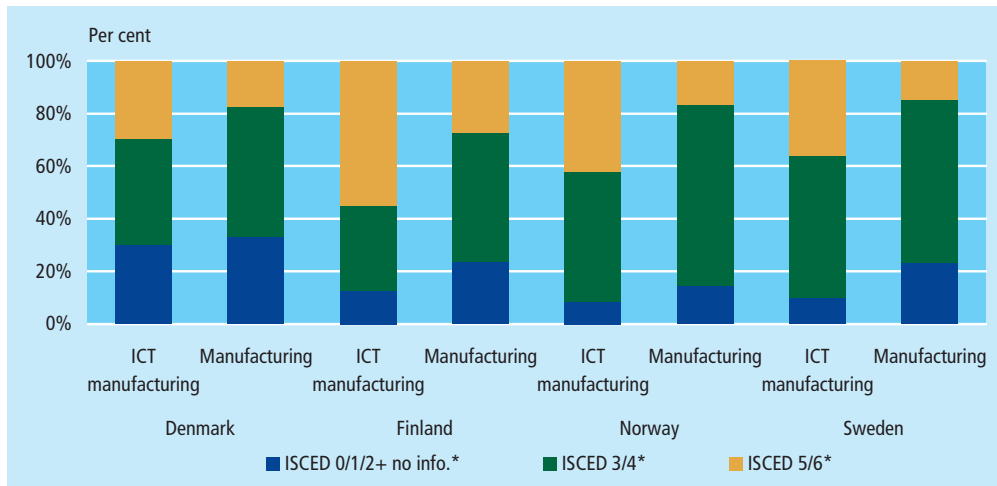


Data from Finland is from 2002. Data from Sweden is from 2003.

*Higher general educational level*

If the comparison is broadened to the educational level in general the same trend is visible: The average educational level is higher in the ICT sector than generally. Finland has a very high share of persons with a tertiary level of education (ISCED 5/6) in ICT manufacturing - as shown in figure 6.5. Denmark has the highest share of persons with the lowest level of education (ISCED 0/1/2), both in ICT manufacturing and non-ICT manufacturing.

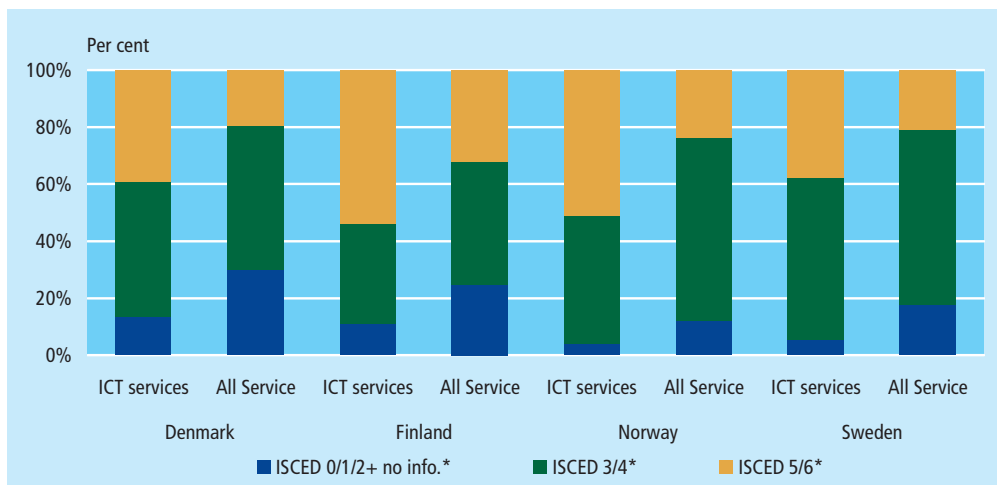
**Figure 6.5** Composition of persons by the general level of education in manufacturing and ICT-manufacturing, 2004



Data from Sweden is from 2003.

In ICT service the general educational level is also higher than in non-ICT service. Especially, Finland and Norway have high shares of persons with a tertiary education, respectively 55 and 51 per cent.

**Figure 6.6** Composition of persons by general education in service and ICT-service



Data from Sweden is from 2003

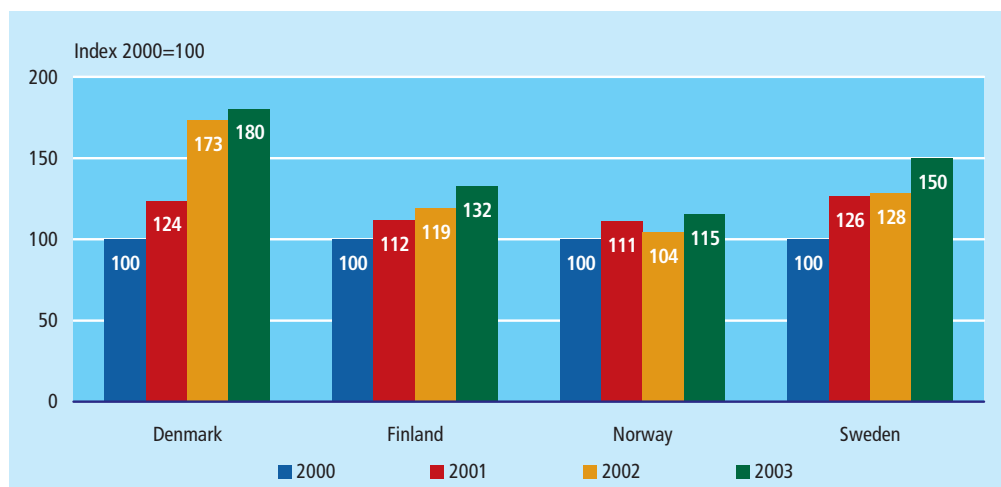
*Rise in newly ICT-educated persons*

The high general educational level and rising share of persons with a tertiary ICT-education is likely to continue in the future, because the education systems in the Nordic countries are educating even still more persons within ICT. Figure 6.7 shows the development in newly ICT-educated persons between 2000 and 2003. All the countries have a growing number of ICT-educated persons, and especially Denmark has



a high growing rate - 80 per cent more were educated in 2003 compared to 2000. This growth could be caused by the time lack in the educational systems. In the nineties, there was a dramatic rise in ICT-related jobs and the ICT-sector. It takes time to set up educations and educate the students and subsequently the educational system reacts with some delay.

**Figure 6.7** Development in newly ICT-educated persons at the tertiary level



*Different composition of newly educated*

Despite the common growth in the number of newly educated persons in all the Nordic countries, there is a difference in the composition of the newly educated. In Denmark, there is a very high share of newly educated with a tertiary but non university-level education, 71 per cent.

*Many new highly ICT-educated in Finland...*

The composition in Finland is special characterized by almost no non-university tertiary ICT-educated. The development has been significant in the period from 2000 to 2003: From 21 per cent in 2000 to 0.4 per cent in 2003.

*...and Norway*

Norway has a similar composition to that of Finland, with 95 per cent of the newly educated from university-level ICT educations. Sweden has a lower share of newly university-level ICT-educated, with 79 per cent.

*OECD analyses ICT occupations*

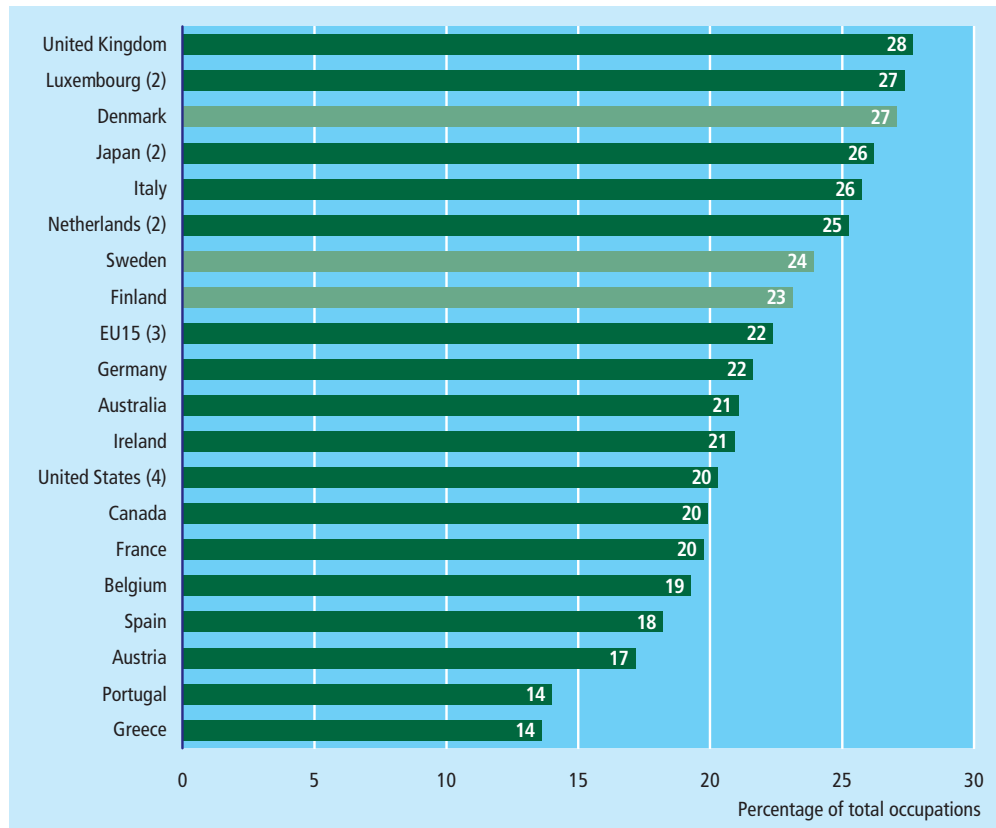
E-skills can also be analysed by focusing on the occupation persons holds. OECD has made an estimate of the amount of ICT occupations in the OECD countries. ICT occupations is delimited by the harmonised International Standard Classification of Occupations (ISCO), which gives some regulation of ICT occupations, but still have some national differences. In the analyse is used the broadest definition of an ICT-related occupation, and the numbers are therefore rather high.

*Nordic countries have many high skilled ICT-workers*

The results are depicted in figure 6.8, and shows that the Nordic countries in the comparison are at the top. United Kingdom has the highest share of ICT workers of the total working force. Denmark has the high-

est share of ICT occupants with 27 per cent. Finland and Sweden have shares of respectively 23 and 24 pct. The three Nordic countries in the comparison are over the EU-15 average.

**Figure 6.8** Share of ICT-related occupations in the total economy, 2003



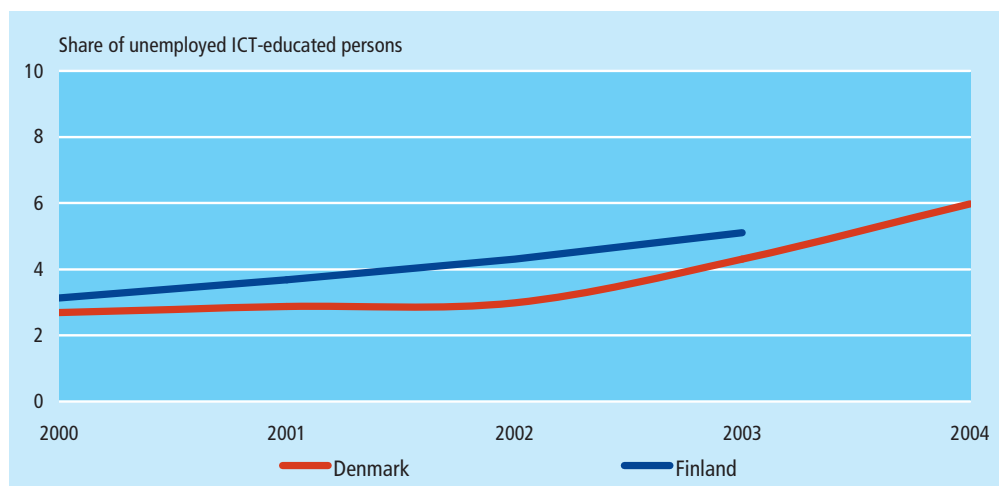
<sup>1</sup> A broad definition is used, based on methodology described in chapter 6 of Information Technology Outlook 2004. See also van Welsum, D., and G. Vickery (2005), "New perspectives on ICT skills and employment", Information Economy Working Paper DSTI/ICCP/IE(2004)10/FINAL, OECD. <sup>2</sup> 2002 instead of 2003. <sup>3</sup> Includes estimates where a complete dataset was not available. <sup>4</sup> OECD estimates for 2003.

Source: OECD, Information Technology Outlook 2004.

*Unique  
ICT-unemployment  
statistics*

Another aspect of the ICT labour market is the unemployment rate for ICT-educated persons. This type of unemployment statistics produced by combining register-based information on education and unemployment demands advanced statistical registers. It is only in a Nordic context that this comparison can be made. Figure 6.9 shows the rate of unemployment for ICT educated persons between 2000 and 2003/2004. The two countries in the figure have experienced an increase in the unemployment rate. The increasing number of newly ICT-educated could be one explanation for the rise, but also the slow development in the ICT sector could be attributed to the rise.

**Figure 6.9** Rate of unemployment for ICT-educated persons at tertiary level

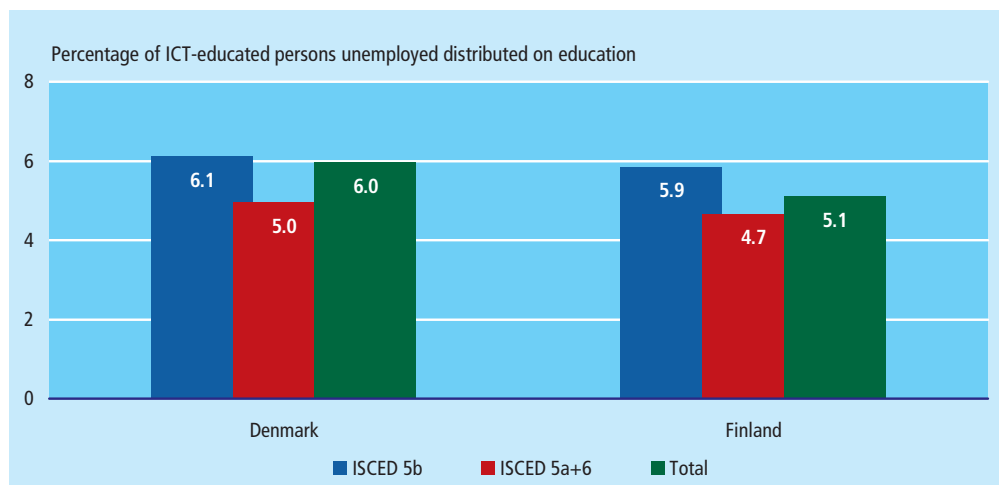


No data available from Iceland, Norway and Sweden.

*ICT-educated at university-level have lower unemployment rate*

ICT educated persons do not have an evenly distributed unemployment. Persons with a university-level ICT-education have a lower unemployment rate in both Denmark and Finland than persons with a tertiary, but non-university level education. If this tendency was prevalent, it would emphasise a movement towards formal and theoretically based ICT-qualifications being more important in the Nordic labour markets. Further harmonisation among the Nordic ICT statistics could give a possibility to produce more comprehensive and comparable unemployment statistics in the Nordic countries.

**Figure 6.10** Percentage of ICT-educated persons unemployed, distributed on educational level. 2003



No data available from Iceland, Norway and Sweden.

## 6.2 E-learning

*Non-formal e-skills* The last topic in this chapter is e-learning, which highlights the non-formal aspect of e-skills. E-learning is in this context education and training where the main part of the activity takes place on the Internet. E-learning is used in both enterprises and by individuals, e.g. for part of formal education.

*Students have highest use of e-learning* Figure 6.11 shows the general level of e-learning broken down by labour force status. It shows that students in all the Nordic countries have the highest use of e-learning - especially in Finland where 87 per cent of the students have used e-learning. But also the Danish students have a high use of e-learning with 56 per cent.

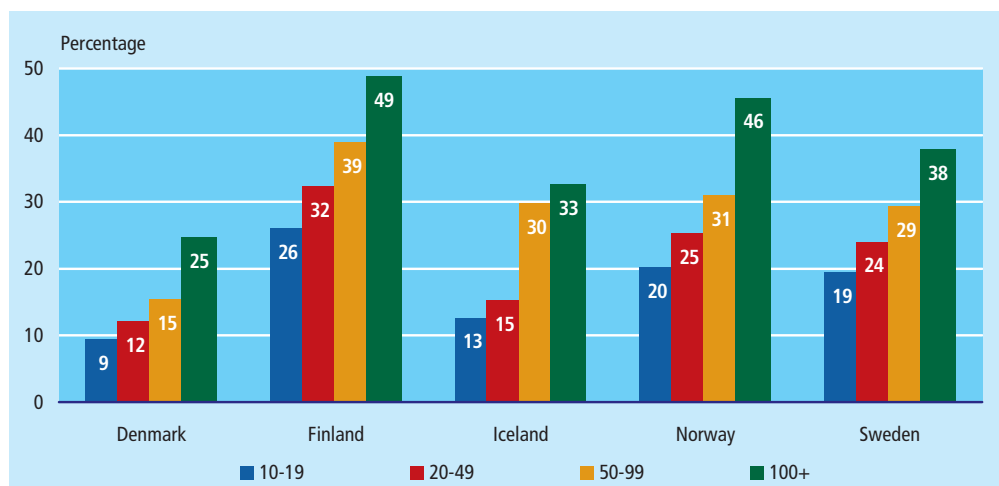
*Low use of e-learning among self-employed* The Nordic countries are also characterized by low use of e-learning among self-employed, who have a lower use than employees and unemployed persons. Retired persons and other outside the labour market, have the lowest use in all the countries.

**Figure 6.11** Percentage of individuals between 16 and 74 having used the Internet in relation to training or education purposes. 2005



*Large enterprises use e-learning most* Among the enterprises e-learning is mostly used by large enterprises, with more than 100 employees. In Finland, 49 per cent of enterprises, with more than 100 employees, use e-learning. Denmark has the lowest share with 25 per cent of the largest enterprises, using e-learning. The smallest enterprises have the lowest use, which is probably caused by a general lack of resources for additional education and training of the employees.

Figure 6.12 Enterprises' use of Internet for training and educational purposes. 2005



Data from Iceland from 2003.

### 6.3 Sources

The data source to describe formal e-skills - ICT educated and their employment - is register-based. Denmark has used the register Education and employment of the population. Finland has used Regional Employment Statistics and Education Statistics. Norway is the Employment Statistics, main place of work and Education statistics (population's highest level of education) used to provide the data. Finally, Sweden has used Labour Statistics based on administrative sources, except for newly educated where the Register of Education and the Higher Education Register has been used.

E-learning is based on data from the two surveys: ICT usage in households 2005 and Use of ICT in Enterprises 2005, which are collected based on the harmonised model questionnaire developed by Eurostat.

## 6.4 Annex

Table 6.1 Nordic ICT labour market, persons employed in the ICT sector and persons with tertiary ICT education

	Persons employed in the ICT-sector	ICT-educated persons employed in the ICT-sector	ICT-educated persons employed outside the ICT-sector
	persons		
Denmark (2004)	100,810	14,101	16,711
Finland (2002)	126,401	20,943	12,998
Iceland*	...	...	...
Norway (2004)	67,429	6,989	6,322
Sweden (2003)	186,736	20,029	36,327

\* No data available for Iceland, table 6.1-6.6.

Table 6.2 Distribution of ICT-educated as share of total population

	2000	2001	2002	2003	2004
	share of total population between 16-74				
<b>Denmark</b>					
<b>Total</b>	<b>0.7</b>	<b>0.8</b>	<b>0.9</b>	<b>1.0</b>	<b>1.1</b>
ISCED 5b	0.5	0.5	0.5	0.5	0.6
ISCED 5a & 6	0.3	0.3	0.4	0.4	0.5
<b>Finland</b>					
<b>Total</b>	<b>1.1</b>	<b>1.1</b>	<b>1.2</b>	<b>1.3</b>	...
ISCED 5b	0.5	0.5	0.5	0.5	...
ISCED 5a & 6	0.6	0.6	0.7	0.8	...
<b>Iceland*</b>					
<b>Total</b>	...	...	...	...	...
ISCED 5b	...	...	...	...	...
ISCED 5a & 6	...	...	...	...	...
<b>Norway</b>					
<b>Total</b>	<b>0.5</b>	<b>0.5</b>	<b>0.6</b>	<b>0.6</b>	<b>0.6</b>
ISCED 5b	0.2	0.2	0.2	0.2	0.2
ISCED 5a & 6	0.3	0.4	0.4	0.4	0.5
<b>Sweden</b>					
<b>Total</b>	<b>0.6</b>	<b>0.7</b>	<b>0.8</b>	<b>0.9</b>	...
ISCED 5b	0.2	0.3	0.3	0.4	...
ISCED 5a & 6	0.3	0.4	0.5	0.6	...

Table 6.3 Composition of ICT-educated persons in manufacturing and services

	Manufacturing	ICT-manufacturing	Services	ICT-services
	percentage of persons employed in the industry			
<b>Denmark</b>				
ISCED 5b	45	38	46	42
ISCED 5a & 6	55	62	54	58
<b>Finland</b>				
ISCED 5b	27	19	46	41
ISCED 5a & 6	73	81	54	59
<b>Iceland*</b>				
ISCED 5b	...	...	...	...
ISCED 5a & 6	...	...	...	...
<b>Norway</b>				
ISCED 5b	27	14	32	34
ISCED 5a & 6	73	86	68	66
<b>Sweden</b>				
ISCED 5b	40	33	35	31
ISCED 5a & 6	60	67	65	69

Table 6.4 Composition of ICT-educated persons in manufacturing and services

	Manufacturing	ICT-manufacturing	Services	ICT-services
	Number of persons employed in the industry			
<b>Denmark</b>				
ISCED 0 & 1 & 2	134,564	5,261	315,735	11,376
ISCED 3 & 4	200,305	7,068	537,123	39,320
ISCED 5 & 6	70,689	5,165	205,989	32,620
<b>Finland</b>				
ISCED 0 & 1 & 2	100,027	5,471	210,632	9,286
ISCED 3 & 4	209,022	14,267	369,748	28,729
ISCED 5 & 6	114,692	24,028	274,016	44,620
<b>Iceland*</b>				
ISCED 0 & 1 & 2	...	...	...	...
ISCED 3 & 4	...	...	...	...
ISCED 5 & 6	...	...	...	...
<b>Norway</b>				
ISCED 0 & 1 & 2	37,206	851	105,355	2,312
ISCED 3 & 4	177,641	5,038	554,860	25,698
ISCED 5 & 6	42,294	4,273	203,819	29,257
<b>Sweden</b>				
ISCED 0 & 1 & 2	168,540	4,908	273,382	7,566
ISCED 3 & 4	455,293	26,131	930,787	78,663
ISCED 5 & 6	106,995	17,527	317,996	51,941

Table 6.5 Newly ICT-educated persons distributed on educational level

	2000	2001	2002	2003	2004
	index 2000=100				
<b>Denmark</b>					
ISCED 5b	100	122	174	163	...
ISCED 5a & 6	100	130	171	247	...
<b>Finland</b>					
ISCED 5b	100	37	13	2	...
ISCED 5a & 6	100	132	147	167	...
<b>Iceland*</b>					
ISCED 5b	...	...	...	...	...
ISCED 5a & 6	...	...	...	...	...
<b>Norway</b>					
ISCED 5b	100	99	45	21	17
ISCED 5a & 6	100	117	131	158	153
<b>Sweden</b>					
ISCED 5b	100	161	106	146	...
ISCED 5a & 6	100	117	134	151	...

Table 6.6 Unemployed ICT-educated persons distributed on educational level

	2000	2001	2002	2003	2004
	percentage of ICT-educated persons				
<b>Denmark</b>					
<b>Total</b>	2.7	2.9	3.0	4.3	6.0
ISCED 5b	2.8	3.0	3.1	4.5	6.1
ISCED 5a & 6	1.7	1.8	1.7	3.0	5.0
<b>Finland</b>					
<b>Total</b>	3.1	3.7	4.3	5.1	...
ISCED 5b	5.0	5.3	5.4	5.9	...
ISCED 5a & 6	1.5	2.5	3.6	4.7	...
<b>Iceland*</b>					
<b>Total</b>	...	...	...	...	...
ISCED 5b	...	...	...	...	...
ISCED 5a & 6	...	...	...	...	...
<b>Norway</b>					
<b>Total</b>	...	...	...	...	...
ISCED 5b	...	...	...	...	...
ISCED 5a & 6	...	...	...	...	...
<b>Sweden</b>					
<b>Total</b>	...	6.9	9.7	12.6	11.5
ISCED 5b	...	...	...	...	...
ISCED 5a & 6	...	...	...	...	...





## 7. The ICT sector, ICT products and R&D

### 7.1 Introduction

*ICT sector supplies the information societies*

The Information and Communication Technology (ICT) sector plays a central role in the Nordic information societies. It supplies production, trade and services for the Nordic Information societies. Measuring the supply side of the information societies can therefore provide an important understanding of the total ICT-activity in the Nordic countries.

*Definition of the ICT sector*

But how is the ICT sector separated from the rest of the manufacturing and service industry? The OECD countries agreed on the following definition in 1998:

- In an ICT manufacturing industry, the products must be designed to fulfil the function of information processing and communication, including transmission and display. The product must use electronic processing to detect, measure and or record physical phenomena or control a physical process.
- In an ICT service industry, the products must be intended to enable the function of information processing and communication by electronic means.

On the basis of this general definition there are a certain number of specific economic activities based on the International Standard Industrial Classification (ISIC) and Statistical classification of Economic Activities in the EU (NACE) that fulfil the definition above. The economic activities are:

- ICT Manufacturing Industry
- ICT Services, which include
  - Wholesale trade
  - Telecommunication
  - Consultancy service.

This grouping of the economic activities will be used in the chapter, although it is important to note that there are national differences in the included NACE divisions, which is discussed in the annex. It is however very important to note that the NACE-divisions included in ICT wholesale were changed in connection with the NACE revision in 2002. Some of the changes in the performance of the ICT wholesale is due to this methodological change.

*Outline*

Firstly the economic performance and employment in the ICT sector is analysed. Then follows a description of production and import/export of ICT products. This is followed by a description of Research and development (R&D) and innovation in the ICT sector. Finally is presented a future statistical work regarding the content sector and the information sector is discussed.

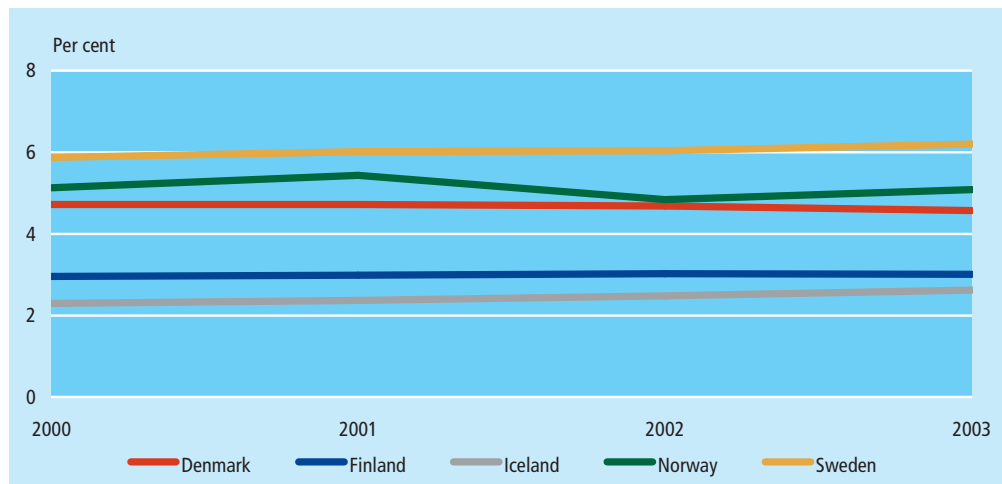
## 7.2 General economic information on the ICT sector

### Number of enterprises

*Constant number of enterprises since 2000*

Since 2000, the ICT sector has had a rather constant share of the total number of enterprises in the Nordic countries. Sweden has the largest share, just above 6 per cent, while Iceland has the lowest share with less than 3 per cent. Figure 7.1 shows the development between 2000 and 2003.

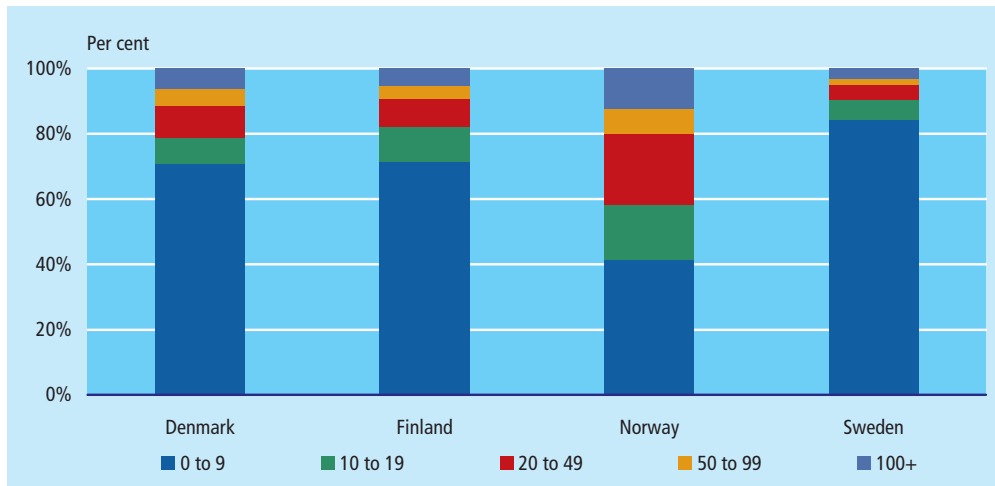
**Figure 7.1** Number of ICT-enterprises as share of total number of enterprises



*Majority of small enterprises*

Most of the enterprises are small, with less than 10 employees. In manufacturing the distribution of size groups is similar in Denmark and Finland. Sweden has a high share of enterprises with less than 10 employees - above 80 per cent. On the other hand, Norway has a rather large proportion of enterprises with more than 10 employees - almost 60 per cent.

**Figure 7.2** Number of enterprises in the ICT manufacturing industry distributed by numbers of employees. 2003 (2004)

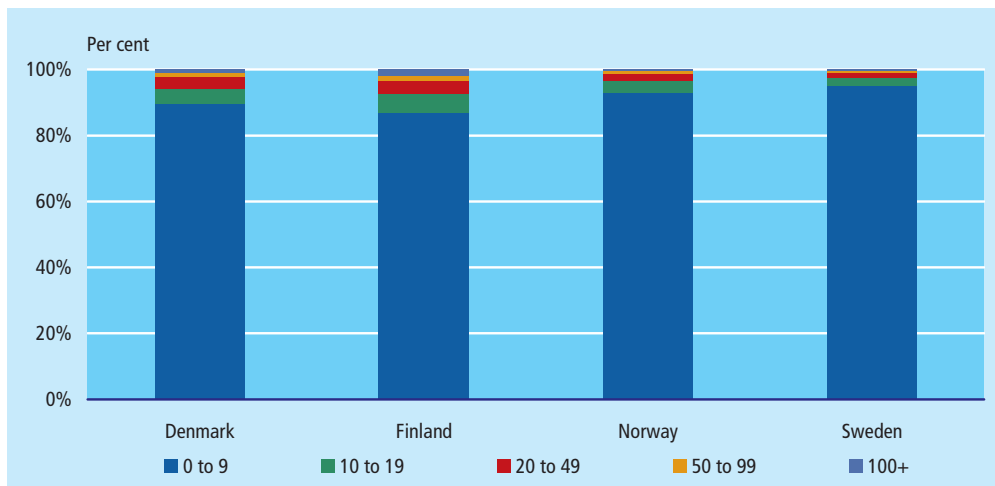


No breakdown by size class is available from Iceland. Data from Finland are from 2004.

*Many small ICT consultancy enterprises*

In ICT service the picture is more regular: In all the countries in figure 7.3, at least 85 per cent of ICT-service enterprises are enterprises with 10 or fewer employees. This is due to the fact that there are a large number of smaller ICT consultancy service enterprises.

**Figure 7.3** Number of enterprises in ICT-service distributed by size groups. 2003 (2004)



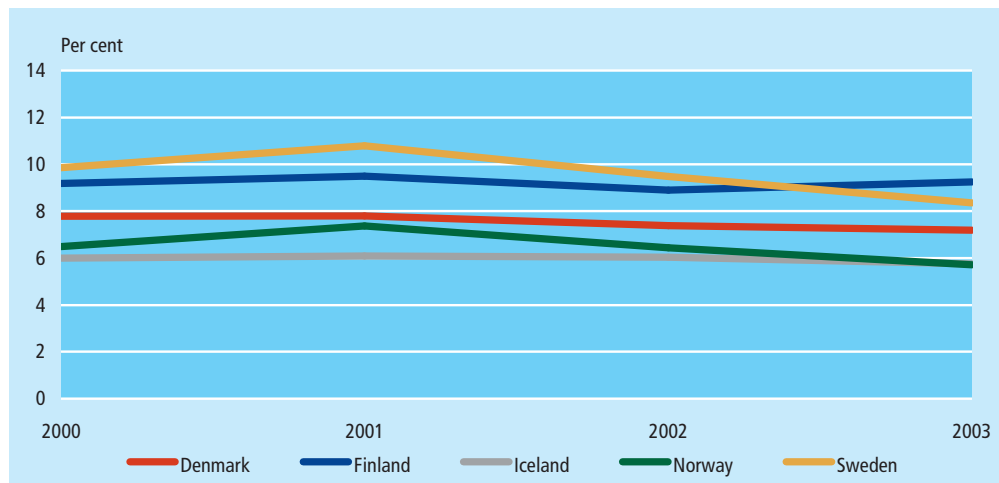
No breakdown by size class is available from Iceland. Data from Finland is from 2004.

### Number of employees in the ICT sector

*6 to 9 per cent employed in the ICT sector*

The ICT sector in the Nordic countries employs between 6 and 9 per cent of the total number of employees in the total private sector. In 2003, Finland had the highest share of employees in the ICT sector compared to the private sector, with 8.9 per cent. The remaining countries have experienced a downward trend since 2001. This is most apparent in Sweden, where the share has fallen from 10.8 per cent in 2001 to 8.4 per cent in 2003. Iceland has the lowest share of employees in the ICT sector as a share of the private sector with 5.6 per cent.

**Figure 7.4** Number of employees in the ICT sector as percentage of total number of employees in the private sector (in full-time equivalent)



The Icelandic number of employees is the number of persons employed.

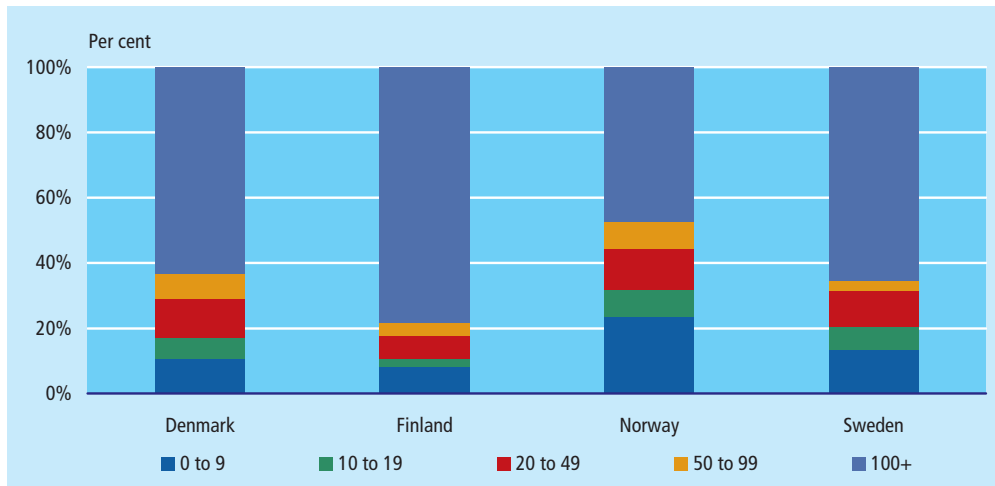
*Large enterprises dominates*

Figure 7.5 shows the distribution of the employees by size groups. The picture is almost the opposite of the distribution of enterprises by size groups: More than half of all the employees are working in enterprises with more than 100 employees. Especially in Finland and Sweden, the largest enterprises dominate the employment, with 78 and 64 per cent of all the employees employed in enterprises with more than 100 employees.

*Norway has a different structure*

Norway has a size structure that differs somewhat from the other Nordic countries, with a much larger share of persons employed in enterprises with 10 or less employees. Also the share of employees in enterprises with 11 to 19 and 20 to 49 is larger in Norway than in the other Nordic countries.

Figure 7.5 Number of employees distributed by size groups. 2003 (2004)

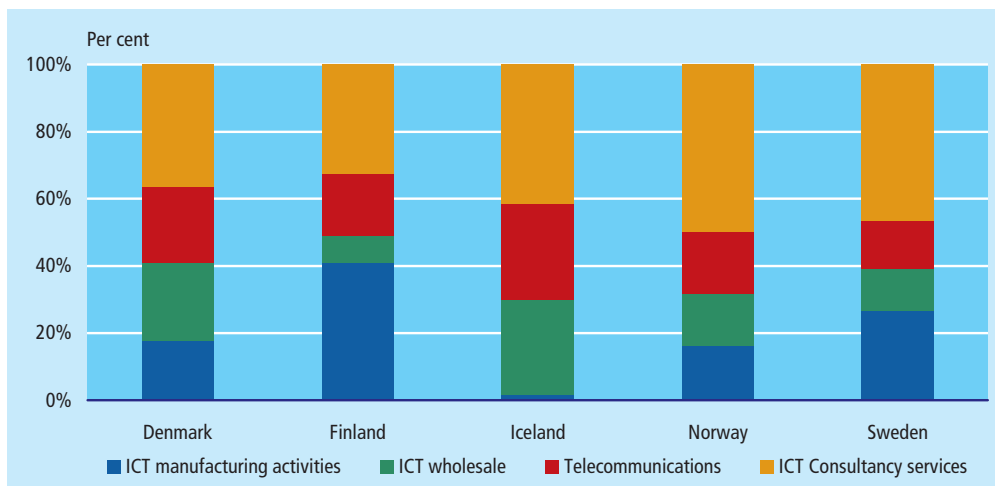


No breakdown by size class is available from Iceland.

*Most employees in ICT-manufacturing in Finland*

If focus is turned towards the distribution of employees by economic activities, figure 7.6 shows some differences between the Nordic countries. Finland has - by far - the largest ICT manufacturing industry, while Iceland has a very low employment in the ICT manufacturing. Norway has the largest proportion of employees in the ICT consultancy services, but also Sweden and Iceland account for rather large proportions.

Figure 7.6 Distribution of employees by economic activities. 2003 (2004)



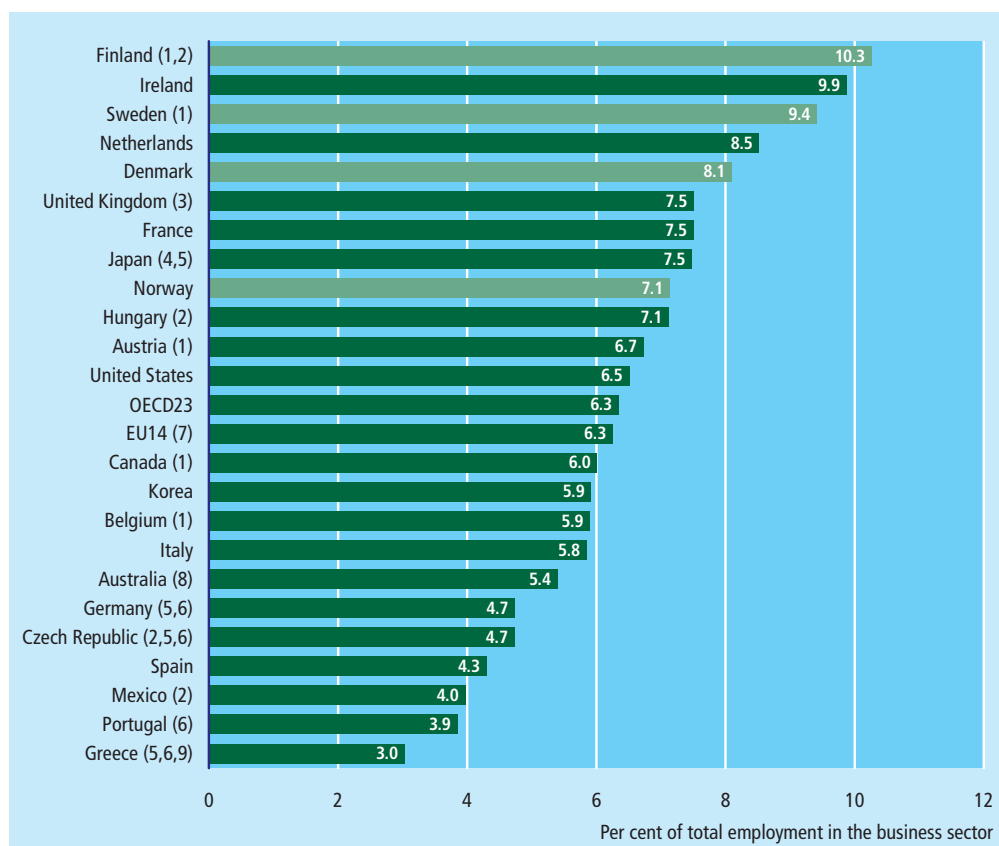
Data from Finland and Iceland is from 2004 and is preliminary.

*High share in the ICT sector in the Nordic countries*

In a broader perspective the share of total employment is high in the Nordic countries' ICT sectors. An OECD estimate of the employment rate in 2001, places the four Nordic countries (Iceland is not included)

is among the 9 highest ranked countries. The share of ICT sector employment differs from figure 7.7, because the OECD figures are estimated from other sources. However, the overall trend shows that the Nordic countries are well above both the OECD and EU-14 average (Luxembourg not included).

**Figure 7.7** Share of ICT employment in business sector employment. 2001



<sup>1</sup> 2002 <sup>2</sup> Based on employees figures only. <sup>3</sup> Excludes self-employees <sup>4</sup> ICT services include market research and public opinion polling. <sup>5</sup> ICT wholesale (5150) is not available. <sup>6</sup> Rental of ICT goods (7123) is not available. <sup>7</sup> Luxembourg not included. <sup>8</sup> 2000-2001. <sup>9</sup> ICT manufacturing include ISIC 30 and 32 only, and postal services are included with telecommunication services. <sup>10</sup> "Other ICT manufacturing" includes communication equipment, insulated wire and cable and precision instruments. "Other ICT service" includes wholesale and rental of ICT goods, except for Ireland, where telecommunication services are also included. Sources: OECD estimates, based on national sources; STAN and National Accounts databases, March 2004.

### Turnover in the ICT sector

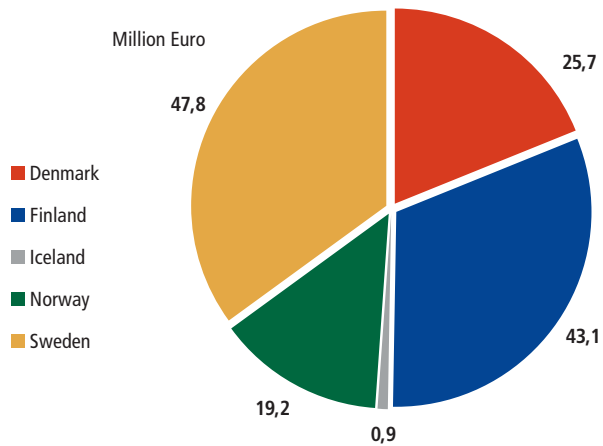
*Finland and Sweden have largest turnover*

As indicated in figure 7.8, Finland and Sweden have the main part of the total turnover in the ICT sectors in the Nordic countries. Together, the two countries contribute with 67 per cent of the total turnover in the region. Denmark and Norway have, respectively, 19 and 14 per cent

share of the total turnover, while Iceland accounts for less than 1 per cent.

Figure 7.8

**Distribution of turnover in the ICT sector among the Nordic countries. 2003**



Data from Finland and Iceland are from 2004. Data from Iceland is preliminary.

*Finland has markedly different distribution*

There are, however, also differences regarding the economic activities between the Nordic countries. Finland has a markedly different distribution, with more than 60 per cent of the turnover in ICT manufacturing. The country with the second highest activity within ICT manufacturing is Sweden, with 27 per cent of the turnover.

*ICT wholesale important in Denmark and Iceland*

ICT wholesale has a large share of the turnover in Denmark and Iceland, with 40 and 46 per cent, respectively, of the total turnover in the ICT sector. ICT wholesale has a much smaller share in the other countries - e.g. 25 per cent in Norway.

*Telecommunication important in Norway*

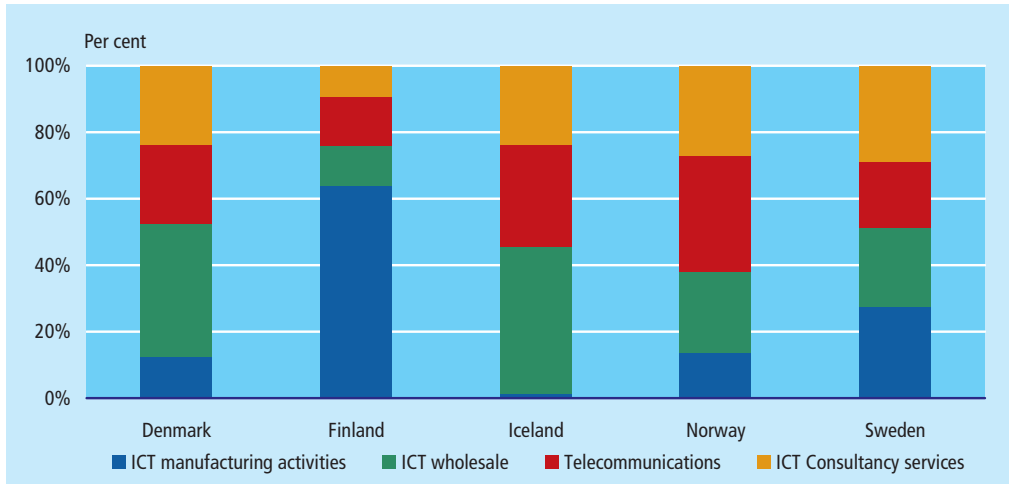
Telecommunication has a very large share of the total turnover in the Norwegian ICT sector with 36 per cent. Compared to Finland, where telecommunication only accounts for 15 per cent, the Norwegian share is very high. The Swedish share is at the same level as that of Finland, while the Danish and the Icelandic share is slightly lower than the Norwegian share - respectively 24 and 31 per cent.

*ICT consultancy constitutes around 25 per cent of ICT sector*

Finally, ICT consultancy service accounts for a share ranging between 24 and 29 per cent in four of the Nordic countries, but only 10 per cent in Finland. ICT consultancy services in Finland do, however, have a comparable share of the ICT services as in the other countries.



Figure 7.9 Turnover distributed by economic activities. 2003 (2004)

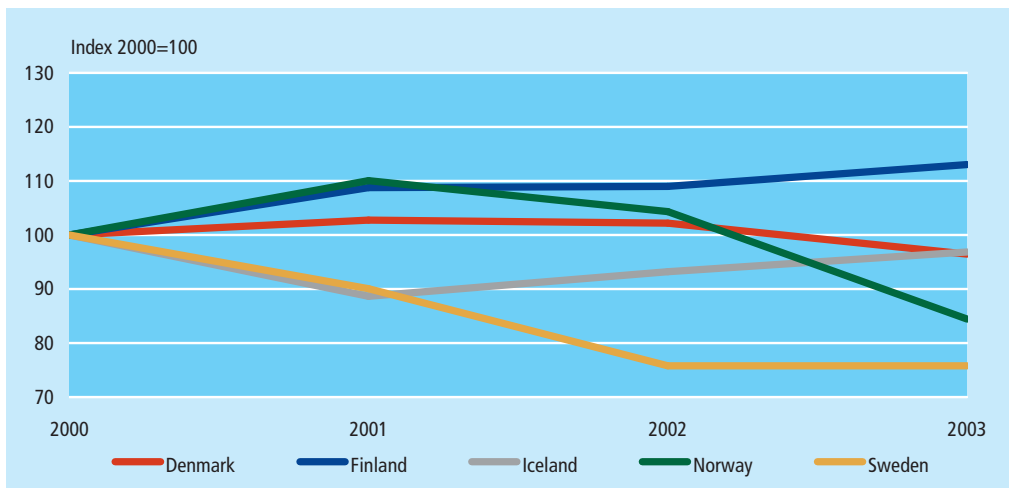


Data from Finland and Iceland is from 2004 and is preliminary.

*Finland is only country with growth*

The development in total turnover in the ICT sector differs widely in the Nordic countries since 2000. Finland is the only country having experienced growth between 2000 and 2003, with a 13 per cent growth rate. Preliminary data suggest that growth between 2000 and 2004 will reach 14 per cent in Finland.

Figure 7.10 Development in turnover in the ICT sector



*Sweden has negative growth of 24 per cent*

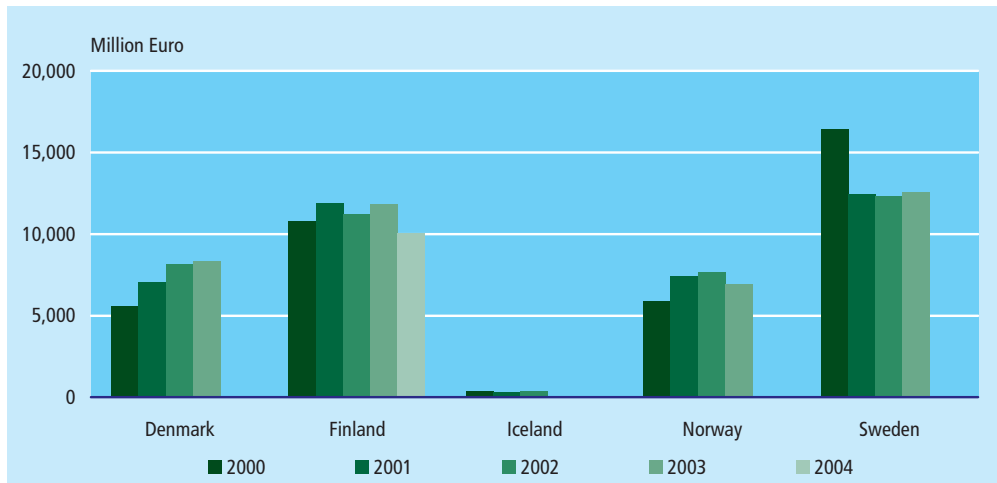
As figure 7.10 shows, Sweden has experienced a negative overall growth of 24 per cent. But also Norway has had a large negative growth - 16 per cent between 2000 and 2003. Denmark and Iceland have had a minor decrease, with respectively 4 and 3 per cent.

### Gross value added in the ICT sector

*Gross value gives indication of enterprises performances*

Another measure for the performance of the ICT sector is gross value added. This indicator may give a better indication of how the enterprises perform. Figure 7.11 shows the development in gross value added between 2000 and 2003 (2004 for Finland). Denmark is the only country with an unbroken growth in gross value added - from 5.6 billion euros in 2000 to 8.3 billion euros in 2003.

**Figure 7.11** Gross value added in the ICT sector. 2000-2004



Preliminary data for Iceland for year 2003.

*Fall and stabilisation in Sweden*

Sweden had a major fall in gross value added in the ICT sector from 2000 to 2001, but has since then stabilised and reached a gross value added at 12.5 billion euros in 2003. Finland, Norway and Iceland have all had a rather constant development, even though Norway had a drop from 7.7 billion euros in 2002 to 6.9 billion euros in 2003.

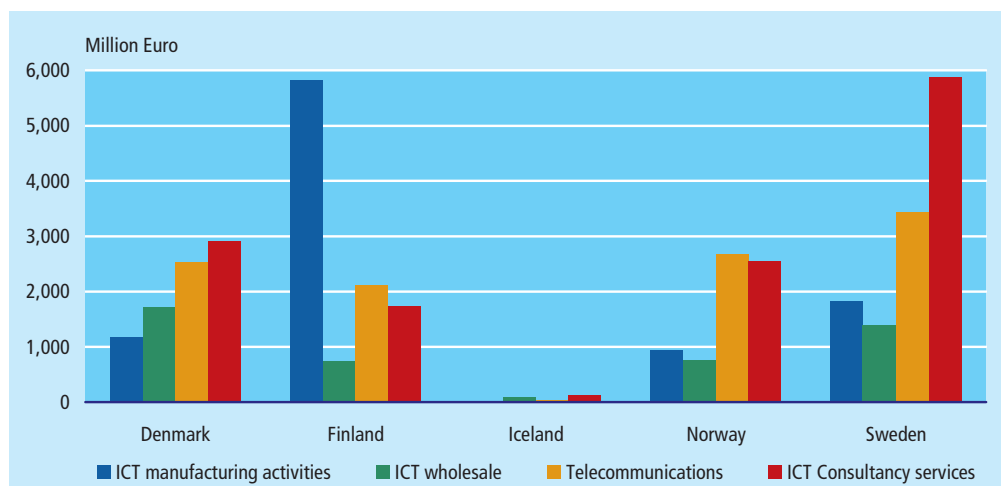
*ICT consultancy most important in Sweden*

The distribution of gross value added differs widely between the economic activities in the Nordic countries - as figure 7.12 shows. In Sweden the ICT consultancy services contribute with the majority of the gross value added - 47 per cent of Sweden's gross value added. However, Finland's ICT manufacturing accounts for 58 per cent of Finland's gross value added.

*Even distribution*

Denmark, Norway and Iceland have a more even distribution of the gross value added. In both Denmark and Norway, telecommunications and ICT consultancy services are the two most important economic activities, measured in gross value added.

Figure 7.12 Gross value added distributed by economic activity. 2003 (2004)

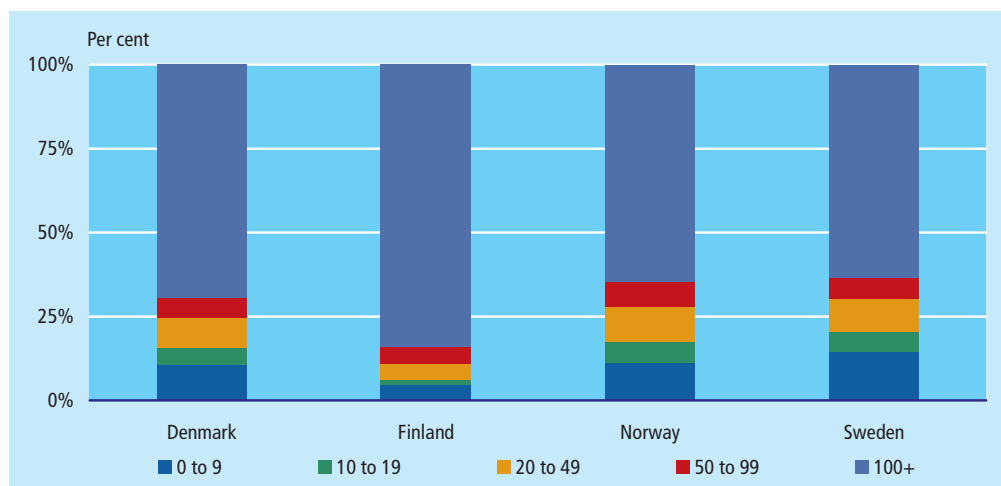


Data from Finland is from 2004. Data from Finland and Iceland and preliminary.

**Largest enterprises - largest contribution**

The largest enterprises provide, by far, the largest contributions to the gross value added in all of the Nordic countries. Especially in Finland where enterprises with more than 100 employees contribute with 84 per cent of the gross value added. In the remaining countries, the largest group of enterprises accounts for 63 to 69 per cent of the gross value added.

Figure 7.13 Gross value added distributed by size groups. 2003 (2004)



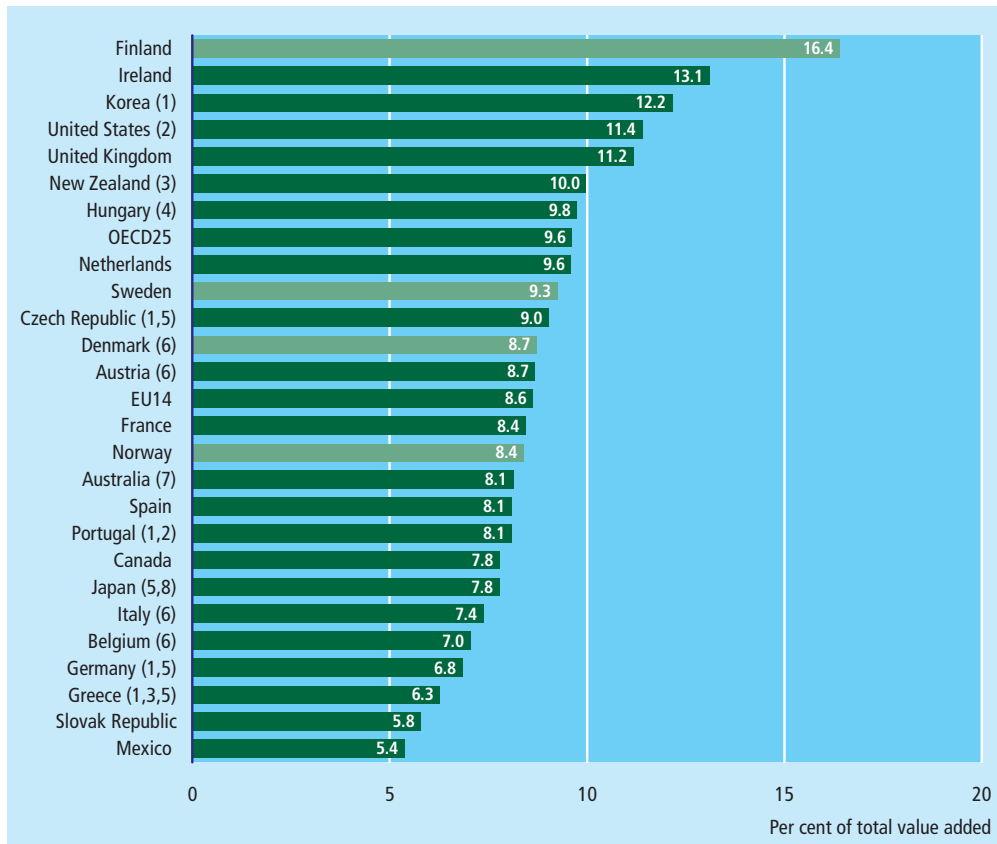
No breakdowns by size groups are available from Iceland. Data from Finland is from 2004 is preliminary.

**OECD estimate**

Finally, the gross value added in the ICT sector can be analysed in an international perspective. OECD has estimated the value added in the ICT sector in 2001. The results are illustrated in figure 7.14. It shows

that Finland is the OECD country with the highest share of value added, with 16.4 per cent. The other Nordic countries are below the OECD 25 average and Norway is below the EU 14 average (Luxembourg not included).

Figure 7.14 Share of ICT value added in business sector value added. 2001



<sup>1</sup> Rental of ICT goods (7123) is not available. <sup>2</sup> 1996 instead of 1995. <sup>3</sup> Postal services included with telecommunication services. <sup>4</sup> 1998 instead of 1995. <sup>5</sup> ICT wholesale is not available. <sup>6</sup> 2002. <sup>7</sup> 1998/99 and 2000/01 instead of 1995 and 2001 respectively. <sup>8</sup> Includes only part of computer-related activities (72).

Source: OECD estimates, based on national sources; STAN and National Accounts databases, March 2004.

### 7.3 ICT production

#### ICT goods

*ICT goods is manufactured across the industries*

The production of ICT goods is not restricted to the ICT sector, but takes place across industries. Much of the production of ICT goods is placed in the ICT sector, and it is therefore relevant to analyse the ICT production in conjunction with the ICT sector.

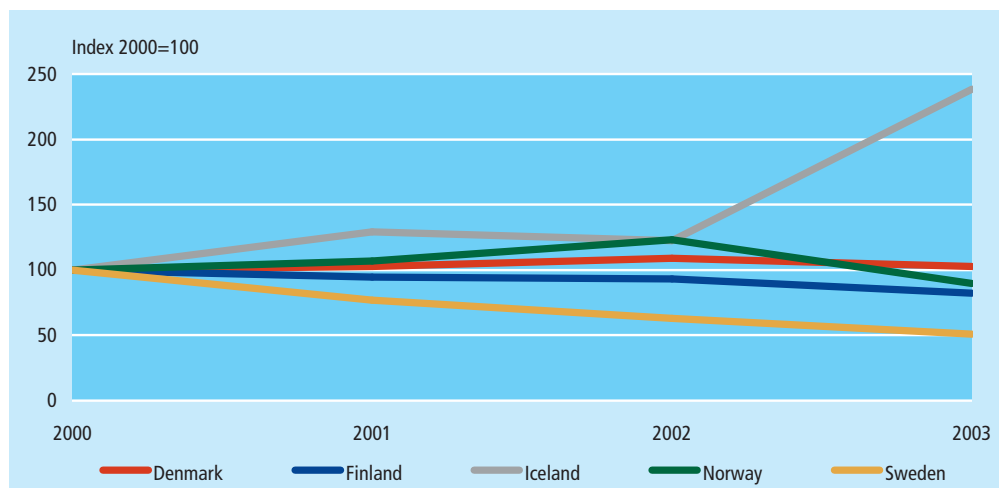
*OECD defined ICT products*

ICT products are defined in the OECD. The definition was made in 2002. From the full list there are five categories comprising all ICT products: *Audio and video equipment, computers and related equipment, electronic components, telecommunication equipment and other ICT goods.*

*Fall in ICT production since 2000*

Figure 7.15 shows the development in ICT production from 2000 to 2004. Most of the countries have experienced a fall in the production measured in monetary value. Most significant is the fall in the Swedish production - it has fallen 49 per cent since 2000. But also the Finnish and Norwegian ICT production has fallen by 18 and 10 per cent, respectively. Iceland's ICT production has risen by 138 per cent - most of the rise is from 2002 to 2003.

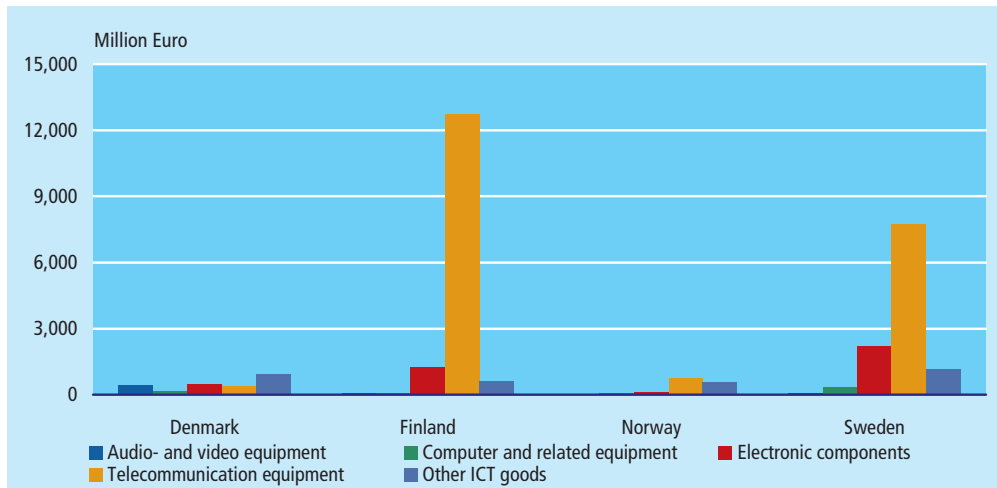
**Figure 7.15** Production of ICT-goods



*Telecommunication is important in Finland and Sweden*

The production in Denmark and Norway is relatively evenly distributed across the five major product categories. However in Finland and Sweden the production of telecommunication equipment plays a major role. Telecommunication equipment contributes with respectively 86 and 67 per cent in Finland and Sweden. For Iceland, there are no breakdowns into the five categories.

Figure 7.16 Production of ICT goods distributed by main groups. 2004



Data for Norway are from 2003. Finnish data are provisional. Breakdowns for the main groups not available for Iceland.

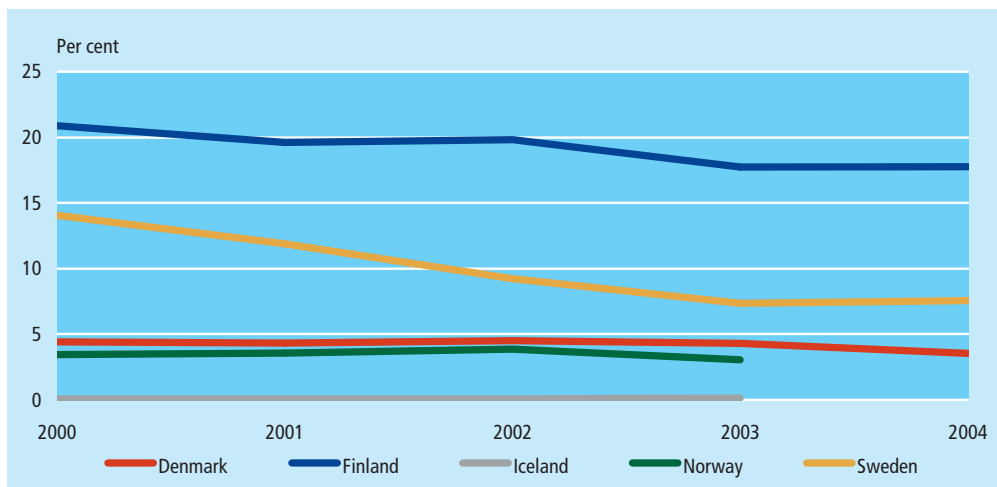
*ICT production most important in Finland*

The importance of ICT production compared to the total production varies a lot between the countries. As figure 7.17 shows the ICT production has a very large importance for Finland - contributing with 18 per cent of the total production.

*ICT production least important in Iceland*

On the other hand, ICT production has a minor importance in the general Icelandic production. The ICT production has only a share of 0.1 per cent of the total production in 2003. The remaining countries have a share between 3 and 8 per cent.

Figure 7.17 ICT production as share of total production



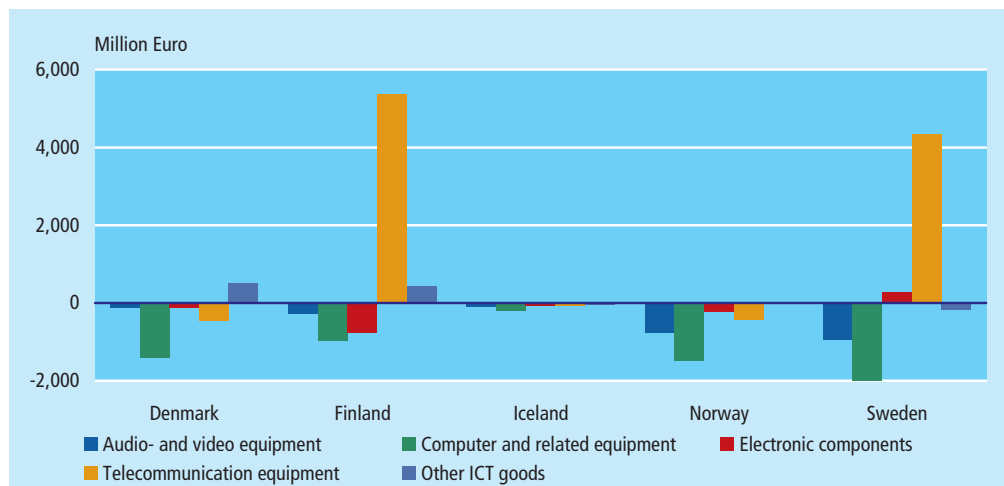
No available data for the year 2004 from Iceland and Norway.

*Share has decreased* The overall share has been decreasing since 2000 for all the Nordic countries, most of all for Sweden where the share has fallen from 14 to 7. But the fall in the ICT products' share of the total production is not readable in the export of ICT goods.

**Export and import of ICT goods**

*Telecommunication central in trade balance* The importance of telecommunication equipment is very obvious in figure 7.18 showing the trade balance of the main ICT products. Both Finland and Sweden have a very high surplus on telecommunication - respectively 7.7 billion and 8.8 billion euros. The other Nordic countries, in general, have a negative trade balance, mostly because of a deficit on computers and related equipment.

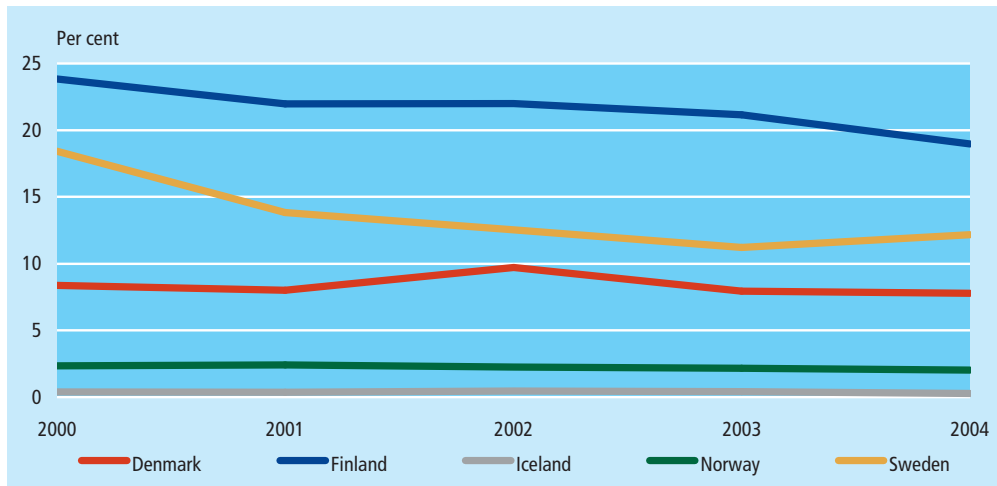
**Figure 7.18 Trade balance distributed by main ICT products. 2004**



*Decreasing share of total exports* The large export of telecommunication equipment gives the Finnish and Swedish ICT exports an important share of the total export. However, from 2000 to 2004 the share in the two countries has declined - In Finland from 24 per cent to 19 and in Sweden from 18 to 12 per cent.

*Stable development in the other countries* Denmark, Iceland and Norway have had a stable development, as shown in figure 7.19. The three countries have a marginal lower ICT share of the total export in 2003/2004 than in 2000. In Iceland the same applies for the ICT export as for the ICT production, it is very small compared to the total export - only 0.3 per cent.

Figure 7.19 ICT export as share of total export



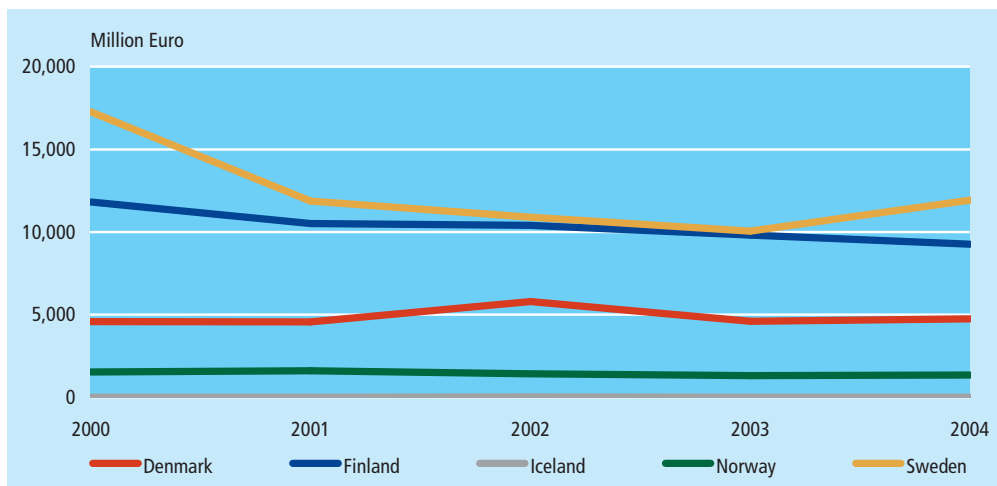
*Larger total exports and declining ICT exports*

The fall in ICT export's share of total export is explained by a larger total export and by an actual decline in ICT export. Both Denmark and Sweden have, however, experienced a rise in ICT export between 2003 and 2004. This development is shown in figure 7.20, which also shows that Finland has had a steady fall in ICT export, while Norway has experienced a more stable development.

*Falling prices on ICT goods*

The value of ICT exports is closely related to the development of prices. ICT goods have seen falling prices in the period, and the downward trend in exports is mainly explained by this.

Figure 7.20 ICT export

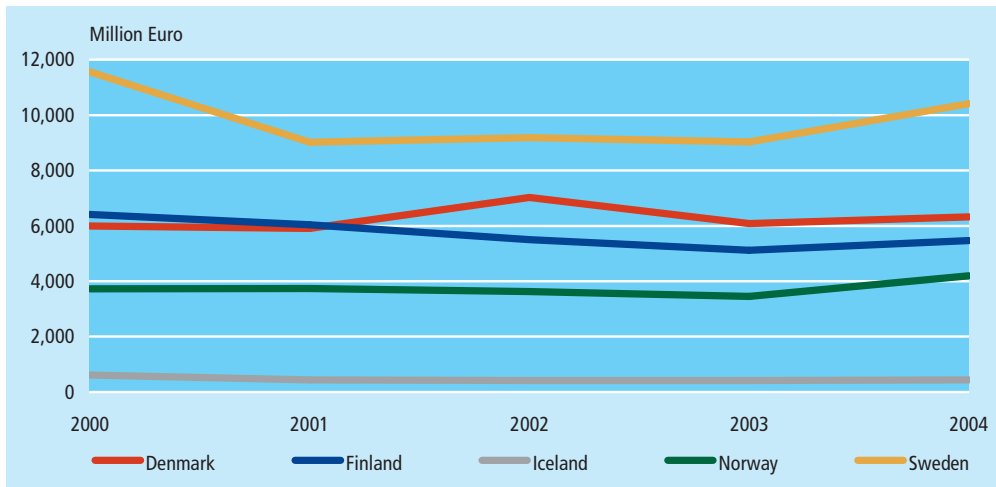




*ICT imports has not fallen like ICT export*

ICT imports have not fallen in the same way as ICT exports. The level in 2004 is for most of the Nordic countries identical to the level in 2000. Imports have risen from 2003 to 2004, which has levelled out the drop in import from 2000 to 2003. Sweden has the highest level, with an ICT import at 10.4 billion euros in 2004.

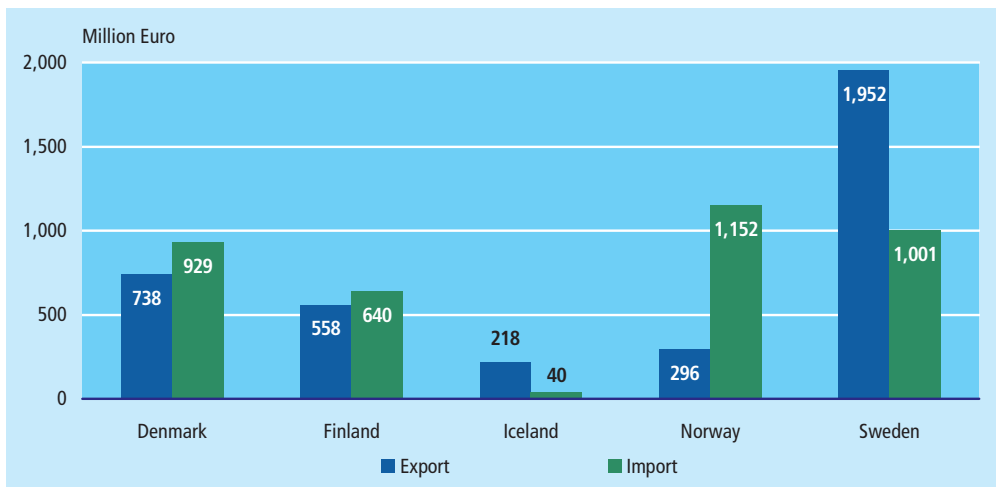
**Figure 7.21** ICT import



*Sweden dominates Nordic intra-trade*

Among the Nordic countries it is Sweden that dominates the intra-trade both in total trade and in export surplus. The Swedish exports of 1,952 million euros to the other Nordic countries, while only importing 1,001 million euros from the same countries. Norway, Denmark and Finland had a deficit in trade with the other Nordic countries - most visible in Norway with a deficit of 765 million euros.

**Figure 7.22** Nordic intra-trade 2004



*Iceland has very little Nordic export*

In table 7.1 the value intra trade is shown. Sweden is the most important Nordic trading partner for Denmark, Finland and Norway. Iceland has a very little export to the other Nordic countries, but imports for 40 million euros and 23 million euros from Denmark alone.

**Table 7.1 Nordic intra-trade of ICT goods 2004**

Export from Import to	Nordic intra-trade of ICT-goods*					
	million Euro					
	Denmark	Finland	Iceland	Norway	Sweden	Total import
Denmark	•	64	0	63	692	<b>929</b>
Finland	114	•	0	20	494	<b>640</b>
Iceland	23	3	•	4	10	<b>40</b>
Norway	198	128	0	•	756	<b>1,152</b>
Sweden	403	364	0	208	•	<b>1,001</b>
<b>Total export</b>	<b>738</b>	<b>558</b>	<b>0</b>	<b>296</b>	<b>1,952</b>	<b>•</b>

*How important is Nordic intra-trade?*

Compared to total ICT exports, the ICT exports to the Nordic countries constitute a varied share. In Norway, the Nordic intra-trade constitutes 22 per cent of the ICT exports and 40 per cent of the ICT imports. On the other hand it is only 6 per cent of Finland's exports that is destined for the Nordic countries, and 12 per cent of the Finnish ICT imports originates from the Nordic countries.

### ICT service products

*ICT consultancy services is increasingly more important*

In recent years, the ICT consultancy services have had a large impact on the total ICT production. The traditional product statistics do not, however, cover services. To cover this aspect, special statistics for services are compiled, which have been implemented in the latest years.

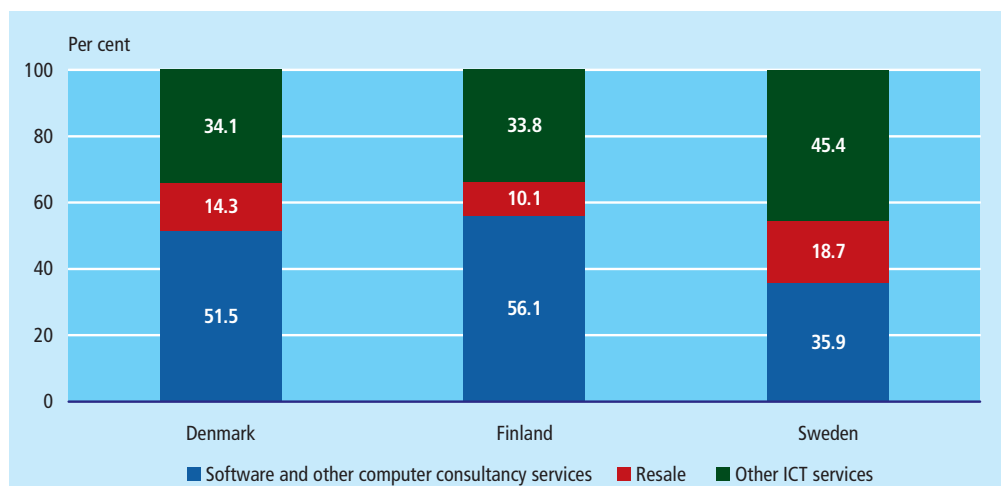
*Establishing of product statistics*

The statistics for ICT consultancy services have been established in Denmark and Sweden and piloted in Finland. Figure 7.23 shows the distribution of ICT service products in the three countries. The development of software (both standard and customized) is the most dominant single activity in the three countries. In the figure, the category also includes hardware consultancy, but it is a minor activity compared to software.

*Retail service central in Sweden*

Retail services play a more central role in Sweden than in the other countries, whereas software consultancy constitutes 36 per cent compared to 52 and 56 per cent in Denmark and Finland.

**Figure 7.23** Turnover in ICT consultancy products distributed by main products in per cent

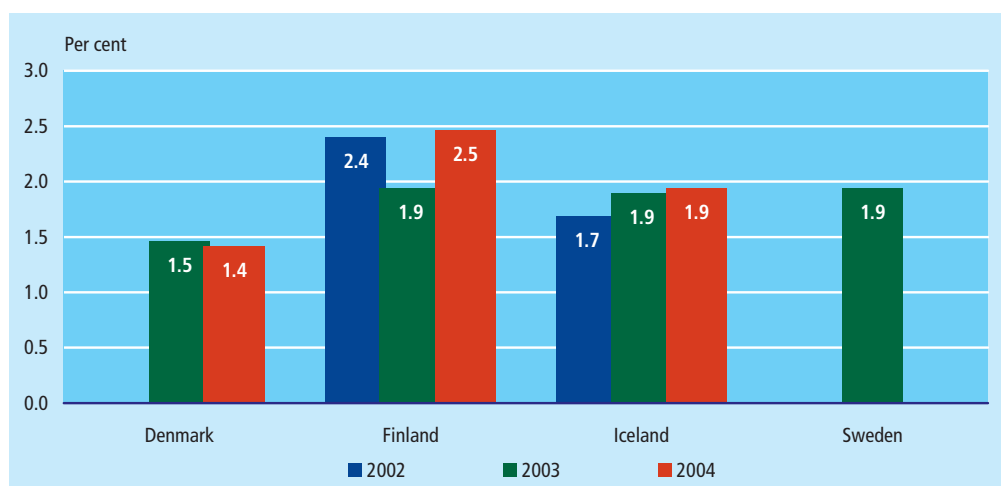


No data available for Iceland and Norway.

*Export of ICT services*

Export of ICT services is also difficult to measure, and the countries have used different methodology for collecting data. In figure 7.24, the export of ICT services is shown as share of the total export. Despite differences in methodology the general level is almost the same. Finland has the largest share with 2.5 per cent of the total export. Denmark has the lowest share with 1.4, which is a small reduction from 1.5 in 2003.

**Figure 7.24** Export of ICT consultancy services as share of total export



No data available for Norway. No Danish data for 2002 and no Swedish data from 2002 and 2004.

## 7.4 Research and development in the ICT sector

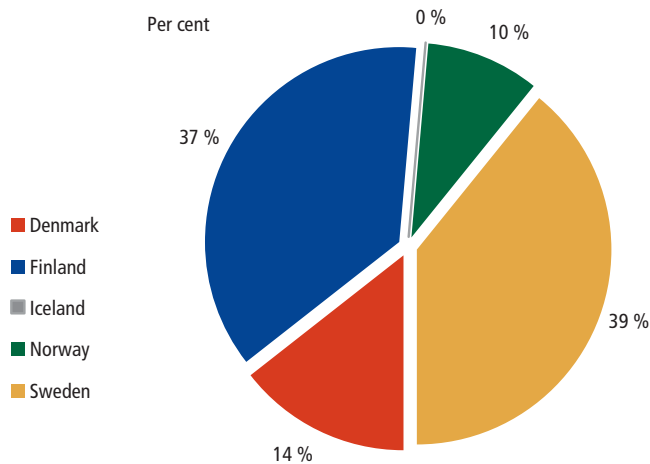
*ICT sector is R&D intensive*

The last topic concerning the ICT sector is Research and Development (R&D) and innovation activities in the ICT sector in the Nordic countries. The ICT sector normally has a very intensive R&D and innovation activity, due to the rapid technological advances in ICT in general.

*Finland and Sweden dominates Nordic ICT R&D*

Figure 7.25 shows that especially Finland and Sweden dominate the total Nordic investments in ICT R&D. Sweden has the largest share with 39 per cent and Finland has a share of 37 per cent. Denmark and Norway have a share of, respectively, 14 and 10 per cent.

**Figure 7.25** Share of ICT R&D in the Nordic countries. 2004

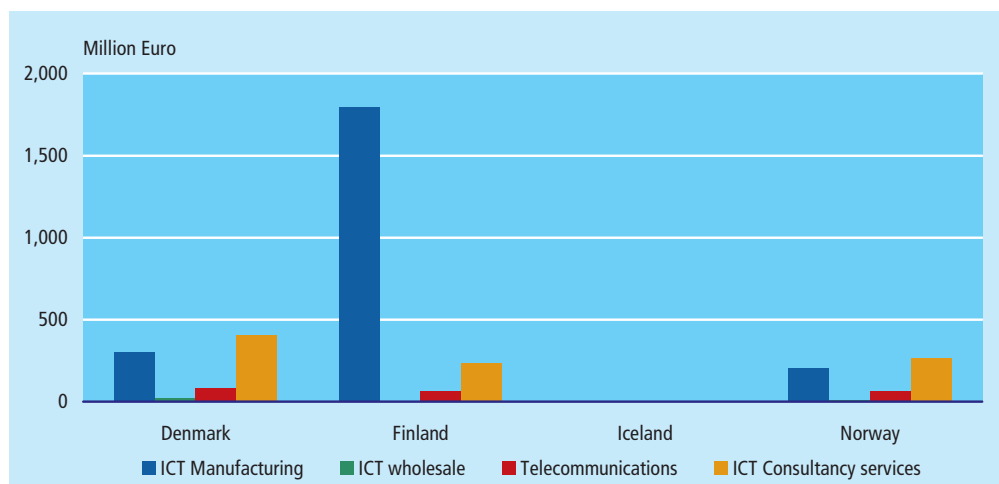


Data from Denmark and Sweden are from 2003.

*86 per cent of Finnish ICT R&D is in manufacturing*

The large Finnish share of the total R&D in the Nordic countries is mainly due to the ICT manufacturing, where 86 per cent of the Finnish ICT R&D is conducted. In the other areas of economic activities Denmark, Finland and Norway have more similar levels. Denmark has the largest expenditures in ICT consultancy services - 406 million euros - as shown in figure 7.26.

**Figure 7.26** R&D expenditures distributed by economic activities in the ICT sector. 2003



Data from Sweden cannot be broken down by economic activity due to confidentiality. ICT wholesale is included in other sectors in Finland.

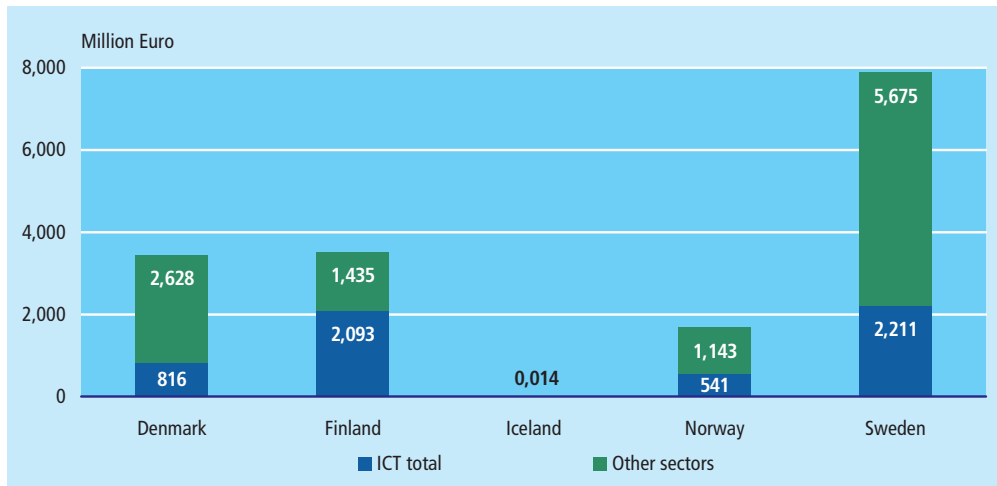
*ICT sector important in total R&D activities*

The importance of the ICT sector in R&D is visible, if expenditure is compared to the total level of expenditure for R&D in the private sector. Figure 7.27 shows the general level of R&D investments. The figure shows that the ICT sector's R&D constitutes a larger share of the total R&D, than the ICT sector's share in, e.g. turnover summons. It is most apparent in Finland where the ICT sector's R&D constitutes 59 per cent of the total R&D in the private sector, but the ICT sector does only constitute 15 per cent of the turnover in the private sector.

*Lowest importance in Denmark*

In Denmark the ICT sector has the lowest importance of total R&D compared to the sector's share of turnover. The ICT sector has 8.5 per cent of the total turnover in the private sector, but 24 per cent of the expenditure for R&D.

Figure 7.27 R&amp;D expenditure in the ICT sector and other sectors. 2003



### Innovation in the ICT sector

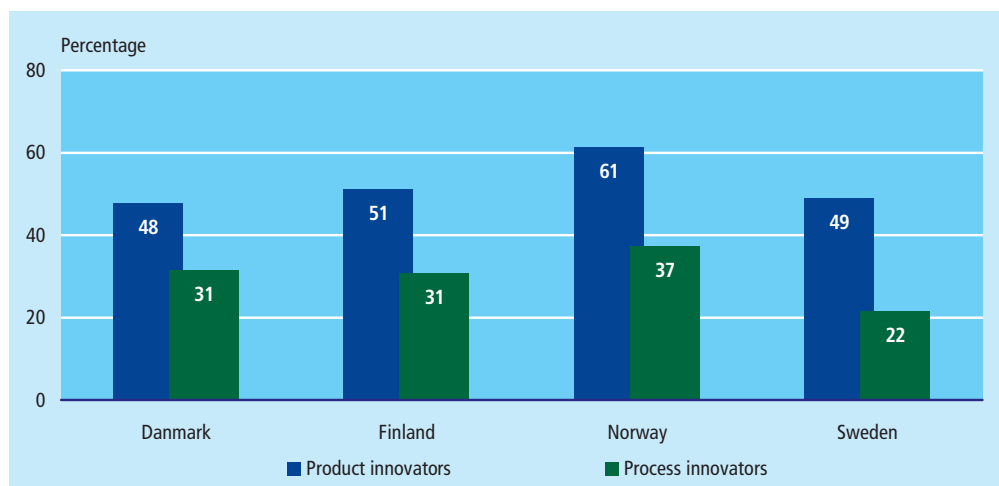
*Around 50 per cent of Nordic ICT enterprises have made innovations*

The importance of continuous development in ICT is also apparent in the share of innovative enterprises. As seen in figure 7.28, around 50 per cent of the Nordic enterprises have made one or several product innovations in the last year. The share for the private sector as a whole ranged from 24 per cent in Finland to 32 per cent in Sweden.

*Share of process innovations is also high*

But also process innovations - new ways of organizing, producing a product or a service or a new way of delivering it - is higher in the ICT sector than in the private sector as a whole. Process innovation is highest in Norway, where 37 per cent of the ICT enterprises have conducted process innovation in the last year. The corresponding numbers for the private sector in Norway are 19 per cent. There is a similar difference between the ICT sector and the private sector in the other countries. Only in Sweden the process innovation in the private sector is at a similar level as in the ICT sector - 20 per cent compared to 22 per cent.

Figure 7.28 Share of ICT sector enterprises with innovation. 2001

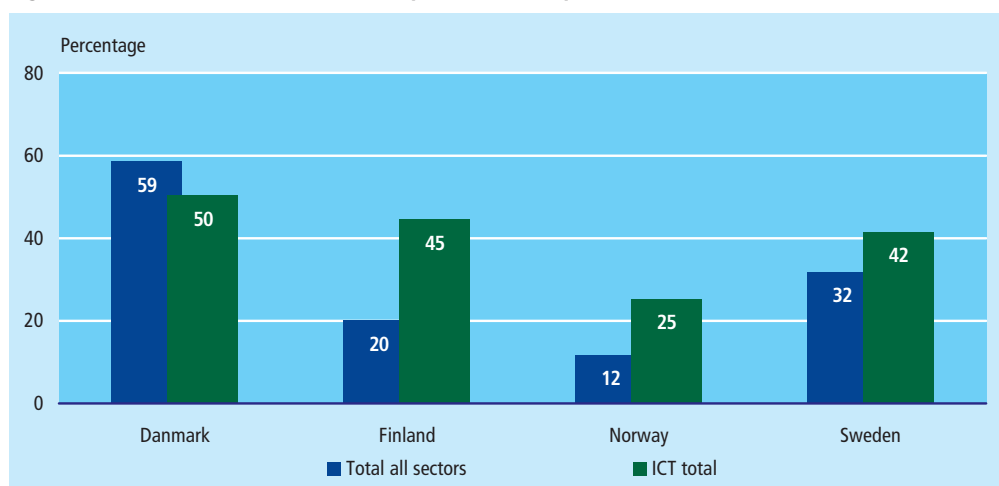


The reference period is from 1998 to 2000. No available data from Iceland.

*Cooperation is much used in the ICT sector*

Cooperation on innovation is another point where the ICT sector differs from the private sector as a whole. In most Nordic countries, the ICT enterprises cooperate more on innovation than in the private sector. Only in Denmark the private sector as a whole co-operates more on innovations, than the ICT sector. In Finland 42 per cent of the ICT sector enterprises have cooperation, while the corresponding figure is 25 per cent for the private sector in Finland.

Figure 7.29 Share of enterprises with cooperation on innovation. 2001



The reference period is from 1998 to 2000. No available data from Iceland.

## 7.5 The information and content sector

*How to define the content sector in the future?*

The definition of the ICT sector does not include industries working with information in the traditional media, such as newspapers or publishers. In the future, this split-up can be changed due to the technological development. If or when TV, papers and books change to a digital media, then it could be relevant to analyse the ICT sector and the content sector as a joint information sector. The content sector is not yet internationally defined in OECD or EU.

*Finnish and Norwegian studies of the content sector*

Norway and Finland have both conducted studies of the content sector giving a preliminary definition of the sector and a picture of the importance of this sector. In Norway, the content sector is defined as the publishing and distribution of content, defined as text, sound or movie or a combination. Finland has a similar narrow definition - which is included in the text box below. However, Finland also applies a broader definition including e.g. printing and service activities and reproduction of recorded media.

### Finnish and Norwegian definition of the content sector:

There is no harmonised international definition in OECD or EU, but Finland and Norway have both made a national definition containing the following branches:

#### Finland:

- Publishing
- Market research and public opinion polling
- Business and management consultancy activities
- Advertising
- Motion picture and video activities
- Radio and television activities
- News agency activities

#### Norway:

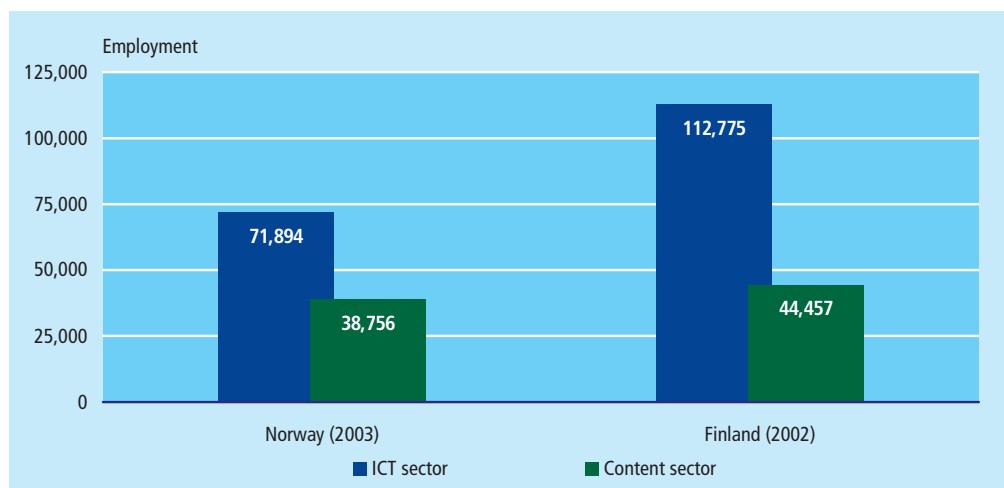
- Publishing
- Advertising
- News agency activities
- Radio and television activities
- Motion picture and video activity

*Employment in the content sector amounts to 39 and 53 percent of the ICT sectors*

Despite the differences in the definition in Finland and Norway, the size of the respective content sectors in the two countries is illustrated in figure 7.30. It shows that employment in the content sector amounts to, respectively, 39 and 53 per cent of employment in the ICT sector. If the ICT sector and the content sector are analysed as a whole - as an information sector - then it would comprise a substantial larger part of the economy.



Figure 7.30 Employment in the ICT sector and the content sector



### 7.6 Sources

Economic and employment data are from the structural business statistics (in Denmark named General enterprise statistics, in Iceland PAYE register, Sweden’s employment statistics is based on administrative sources). Data on production come from various sources. In Finland is the source the structural business statistics, whereas Denmark, Norway and Sweden use the Industrial Commodity Statistics. Data on foreign trade is in Denmark and Sweden covered by the External trade statistics, while Finland uses data from National Board of Customs, ULTIKA database. Iceland Statistics is the Icelandic source.

Statistics on ICT services is from the Business service statistics, especially the survey on computer services.

All countries use the survey “Research and development” from 2003 as the source for R&D data, and the Community Innovation Survey, 2002, is the common source for innovation data.

## 7.7 Annex

The delimitation of the ICT sector has been changed, because the nomenclature has been revised (both NACE and ISIC), with effect from 2003. Iceland is still using NACE rev. 1.

NACE rev 1. Definition of ICT sector 1993 to 2003.

### ICT Manufacturing:

3001 Manufacture of office machinery  
 3002 Manufacture of computers and other information processing equipment  
 3130 Manufacture of insulated wire and cable  
 3210 Manufacture of electronic valves and tubes and other electronic components  
 3220 Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy  
 3230 Manufacture of radio and television receivers, loudspeakers and aerials et cetera  
 3320 Manufacture of navigation and measuring equipment  
 3330 Manufacture of industrial process control equipment

### ICT Services

ICT Wholesale (only countries in brackets includes the subject in there definition of ICT wholesale)  
 5143 Wholesale of 1) electrical household appliances (No countries), 2) Radio and television equipment (all countries)  
 5164 Wholesale of office machinery and equipment (All countries but Sweden leave out office furniture)  
 5165 Wholesale of other machinery for use in industry, trade and navigation (DK, FI and SE incl. electrical materials and electronic components; FI and SE includes wholesale of telecommunication; IS leaves out fishing gear and fishprocessing industry; NO leaves out machinery for power production, equipment for ships and fishing gear and machinery for oil, gas, quarrying; SE includes computerized materials handling equipment)

### Telecommunication

6420 Telecommunication

### ICT Consultancy services

7133 Renting of computers and office machinery  
 7210 Hardware consultancy  
 7220 Software consultancy and supply  
 7230 Data processing  
 7240 Data base activities  
 7250 Maintenance and repair of office, accounting and computing machinery  
 7260 Other computer related activities

## NACE rev. 1.1 Definition of ICT sector and ICT wholesale activities. In force from 2003

**ICT manufacturing (NACE codes):**

3001 Manufacture of office machinery  
 3002 Manufacture of computers and other information processing equipment  
 3130 Manufacture of insulated wire and cable  
 3210 Manufacture of electronic valves and tubes and other electronic components  
 3220 Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy  
 3230 Manufacture of radio and television receivers, loudspeakers and aerials et cetera  
 3320 Manufacture of navigation and measuring equipment  
 3330 Manufacture of industrial process control equipment

**ICT Services:**

Wholesale (only countries in brackets includes the subject in there definition of ICT wholesale)

5143

1) Wholesale of white goods (No countries), 2) radio and television (DK, FI, NO, Finland: Consumer electronics, SE), 3) videos, CDs, DVDs (NO), 4) electrical household appliances (No countries)

5184 Wholesale of computers and telecommunication equipment (All countries)

5186 Wholesale of electronic components (DK, NO, SE) (Finland categorize telecommunication equipment as 5186)

5187 Wholesale of electrical material and other machinery (DK includes electrical material and S includes computerized materials handling equipment and wholesale of telecommunication equipment)

5248 Retail trade with computers, office machines and telecommunication (NO)

**Telecommunication**

6420 Telecommunication

**Consultancy services**

7133 Renting of computers and office machinery

7210 Hardware consultancy

7221 Publishing of standard software

7222 Software consultancy and supply

7230 Data processing

7240 Data base activities

7250 Maintenance and repair of office, accounting and computing machinery

7260 Other computer related activities

Table 7.2 Number of enterprises in the ICT sector. 2003 (2004)

	Denmark	Finland*	Iceland*	Norway	Sweden
	number of enterprises				
<b>Total</b>	<b>8,925</b>	<b>6,004</b>	<b>426</b>	<b>11,715</b>	<b>33,903</b>
ICT manufacturing	597	662	20	201	1,772
ICT wholesale	1,639	881	128	2,182	3,763
Telecommunication	244	269	16	480	543
ICT consultancy	6,445	4,192	262	8,852	27,825

\*Data from Finland and Iceland is from 2004.

Table 7.3 Number of employees in the ICT sector.

	2000	2001	2002	2003	2004
	persons in full time equivalent				
<b>Denmark</b>					
<b>Total</b>	<b>104,011</b>	<b>104,839</b>	<b>97,297</b>	<b>93,056</b>	...
ICT manufacturing	21,486	19,989	17,732	16,521	...
ICT wholesale	27,657	26,350	24,449	21,679	...
Telecommunication	20,792	21,290	20,789	20,834	...
ICT consultancy	34,076	37,210	34,327	34,022	...
<b>Finland</b>					
<b>Total</b>	<b>108,996</b>	<b>116,682</b>	<b>107,598</b>	<b>109,089</b>	<b>82,134</b>
ICT manufacturing	47,449	47,751	43,631	43,815	39,767
ICT wholesale	10,907	11,606	10,671	9,545	4,758
Telecommunication	18,917	20,555	15,617	19,563	17,605
ICT consultancy	31,723	36,770	37,679	36,166	20,004
<b>Iceland*</b>					
<b>Total</b>	<b>5,865</b>	<b>5,931</b>	<b>5,709</b>	<b>5,433</b>	<b>5,534</b>
ICT manufacturing	128	121	116	92	81
ICT wholesale	1,601	1,552	1,557	1,537	1,620
Telecommunication	1,629	1,642	1,671	1,555	1,514
ICT consultancy	2,507	2,616	2,365	2,249	2,319
<b>Norway</b>					
<b>Total</b>	<b>85,045</b>	<b>96,866</b>	<b>84,773</b>	<b>71,894</b>	...
ICT manufacturing	11,381	20,530	19,212	11,674	...
ICT wholesale	24,094	23,477	12,822	11,220	...
Telecommunication	12,912	14,237	13,555	13,176	...
ICT consultancy	36,658	38,622	39,184	35,824	...
<b>Sweden</b>					
<b>Total</b>	<b>207,632</b>	<b>229,761</b>	<b>199,551</b>	<b>178,959</b>	...
ICT manufacturing	60,267	73,354	53,671	47,716	...
ICT wholesale	31,423	30,197	28,428	22,093	...
Telecommunication	32,909	30,746	28,595	25,911	...
ICT consultancy	83,033	95,464	88,857	83,239	...

Data from 2004 is preliminary. \*Icelandic numbers are based on persons employed, not the full-time equivalent. ICT wholesale has a new delimitation from 2003, and data is therefore not totally comparable.

Table 7.4 Turnover in the ICT sector.

	2000	2001	2002	2003	2004
	million Euro				
<b>Denmark</b>					
<b>Total</b>	<b>26,622</b>	<b>27,358</b>	<b>27,201</b>	<b>25,688</b>	...
ICT manufacturing	3,418	3,523	3,435	3,207	...
ICT wholesale	12,382	12,033	11,442	10,280	...
Telecommunication	5,197	5,832	6,091	6,112	...
ICT consultancy	5,625	5,970	3,312	6,089	...
<b>Finland</b>					
<b>Total</b>	<b>24,802</b>	<b>26,651</b>	<b>26,221</b>	<b>27,357</b>	<b>28,351</b>
ICT manufacturing	13,330	14,808	15,322	15,748	15,080
ICT wholesale	4,803	5,328	4,980	4,885	5,410
Telecommunication	5,039	5,569	6,298	6,746	6,533
ICT consultancy	3,488	3,910	4,045	4,117	4,417
<b>Iceland</b>					
<b>Total</b>	<b>926</b>	<b>821</b>	<b>863</b>	<b>897</b>	<b>1,022</b>
ICT manufacturing	16	15	14	11	11
ICT wholesale	420	350	378	398	467
Telecommunication	271	240	261	276	300
ICT consultancy	219	216	210	212	244
<b>Norway</b>					
<b>Total</b>	<b>22,707</b>	<b>24,987</b>	<b>23,682</b>	<b>19,879</b>	...
ICT manufacturing	2,816	4,507	4,296	2,706	...
ICT wholesale	8,062	8,274	6,258	4,861	...
Telecommunication	6,681	6,193	6,971	6,945	...
ICT consultancy	5,148	6,013	6,157	5,367	...
<b>Sweden</b>					
<b>Total</b>	<b>63,100</b>	<b>56,832</b>	<b>51,973</b>	<b>47,821</b>	...
ICT manufacturing	24,830	18,832	15,221	13,057	...
ICT wholesale	16,510	14,671	14,573	11,470	...
Telecommunication	8,637	9,233	9,209	9,500	...
ICT consultancy	13,123	14,097	12,969	13,794	...

Data from 2004 is preliminary. The revision of NACE from 2003 means that data is not totally comparable.

Table 7.5 Gross value added in the ICT sector.

	2000	2001	2002	2003	2004
	million Euro				
<b>Denmark</b>					
<b>Total</b>	<b>5,568</b>	<b>7,025</b>	<b>8,177</b>	<b>8,316</b>	...
ICT manufacturing	1,133	1,194	1,155	1,164	...
ICT wholesale	2,035	1,885	1,863	1,714	...
Telecommunication	...	2,422	2,389	2,527	...
ICT consultancy	2,400	2,718	2,770	2,911	...
<b>Finland</b>					
<b>Total</b>	<b>10,784</b>	<b>11,860</b>	<b>11,182</b>	<b>11,818</b>	<b>10,025</b>
ICT manufacturing	6,649	7,246	6,341	6,741	5,813
ICT wholesale	746	822	802	759	736
Telecommunication	1,866	1,968	2,044	2,151	2,112
ICT consultancy	1,522	1,824	1,995	2,167	1,727
<b>Iceland</b>					
<b>Total</b>	<b>327</b>	<b>302</b>	<b>330</b>	<b>220</b>	...
ICT manufacturing	3	5	4	4	...
ICT wholesale	77	57	69	75	...
Telecommunication	154	135	149	28	...
ICT consultancy	93	105	108	113	...
<b>Norway</b>					
<b>Total</b>	<b>5,864</b>	<b>7,418</b>	<b>7,650</b>	<b>6,908</b>	...
ICT manufacturing	805	1,390	1,369	924	...
ICT wholesale	944	1,396	932	761	...
Telecommunication	1,802	2,111	2,631	2,675	...
ICT consultancy	2,314	2,521	2,717	2,549	...
<b>Sweden</b>					
<b>Total</b>	<b>16,417</b>	<b>12,405</b>	<b>12,277</b>	<b>12,536</b>	...
ICT manufacturing	4,045	808	1,440	1,832	...
ICT wholesale	2,403	1,832	1,741	1,396	...
Telecommunication	4,549	3,734	3,360	3,433	...
ICT consultancy	5,420	6,031	5,737	5,876	...

Data from 2004 is preliminary. Iceland: Data from 2003 is preliminary. The revision of NACE from 2003 means that data is not totally comparable.

Table 7.6 Production of ICT goods.

	2000	2001	2002	2003	2004
	million Euro				
<b>Denmark</b>					
<b>Total</b>	<b>2,665</b>	<b>2,740</b>	<b>2,903</b>	<b>2,736</b>	<b>2,345</b>
Audio and video equipment	470	473	481	412	446
Computer and related equipment	174	182	186	175	171
Electronic components	439	476	444	425	448
Telecommunication equipment	863	842	968	864	377
Other ICT goods	720	766	824	860	904
<b>Finland</b>					
<b>Total</b>	<b>17,294</b>	<b>16,366</b>	<b>16,118</b>	<b>14,237</b>	<b>14,750</b>
Audio and video equipment	103	95	89	77	76
Computer and related equipment	112	70	68	66	71
Electronic components	2,110	1,562	1,303	1,143	1,240
Telecommunication equipment	14,332	13,941	13,905	12,246	12,741
Other ICT goods	637	698	752	705	622
<b>Iceland</b>					
<b>Total</b>	<b>1.9</b>	<b>2.5</b>	<b>2.4</b>	<b>4.6</b>	<b>1.9</b>
Audio and video equipment	...	...	...	...	...
Computer and related equipment	...	...	...	...	...
Electronic components	...	...	...	...	...
Telecommunication equipment	...	...	...	...	...
Other ICT goods	...	...	...	...	...
<b>Norway</b>					
<b>Total</b>	<b>1,650</b>	<b>1,764</b>	<b>2,032</b>	<b>1,481</b>	...
Audio and video equipment	213	178	78	15	...
Computer and related equipment	167	136	102	51	...
Electronic components	271	298	371	96	...
Telecommunication equipment	580	643	829	740	...
Other ICT goods	420	510	653	579	...
<b>Sweden</b>					
<b>Total</b>	<b>490</b>	<b>255</b>	<b>105</b>	<b>57</b>	<b>60</b>
Audio and video equipment	257	298	358	333	359
Computer and related equipment	3,218	2,402	2,620	2,259	2,206
Electronic components	15,692	11,955	8,792	6,735	7,741
Telecommunication equipment	945	939	1,104	1,109	1,138
Other ICT goods	20,600	15,849	12,979	10,492	11,504

For Iceland, there are no breakdowns into the five categories. New definition of ICT goods from 2002, means that data are not totally comparable.

**Table 7.7** Export and import of ICT goods.

	2000	2001	2002	2003	2004
	million Euro				
<b>Denmark</b>					
Import	5,999	5,906	7,028	6,082	6,328
Export	4,587	4,573	5,796	4,594	4,739
<b>Finland</b>					
Import	6,414	6,036	5,500	5,121	5,468
Export	11,802	10,505	10,392	9,815	9,264
<b>Iceland</b>					
Import	613	436	420	415	441
Export	7.8	8.1	10.6	8.8	6.4
<b>Norway</b>					
Import	3,725	3,736	3,631	3,460	4,196
Export	1,524	1,595	1,418	1,296	1,335
<b>Sweden</b>					
Import	11,567	9,026	9,191	9,040	10,416
Export	17,273	11,869	10,882	10,053	11,911

New definition of ICT goods from 2002, means that data are not totally comparable.





## 8. ICT and productivity

### 8.1 Introduction

*Productivity effects of ICT* Analyses conducted by Denmark, Finland and Sweden form the basis of this chapter which will focus on Nordic approaches to the connection between ICT and productivity. The research undertaken by Denmark focuses on macro level impacts of ICT capital, and the approach from Finland is centred on analyses concerning micro data. A new Swedish study also focuses on micro data and productivity effects.

*Results from Danish survey of ICT investments* The chapter ends with the results of a Danish survey of ICT expenditures and investments, which was carried out in autumn 2004. The Danish survey was based on recommendations from Nordic guidelines to the measurement of ICT investments in enterprises from autumn 2004. Micro level data on ICT investment is an important contribution to future analyses, which will seek to better explain and understand the connection between ICT and productivity.

### 8.2 Nordic approaches to ICT and productivity

*Development in productivity is decisive for the societies* Productivity is defined by the output that is created by a certain amount of capital and labour. The development in productivity is decisive for the welfare of the society, and a rise in productivity either results in 1) the possibility of keeping the same level of production by using fewer raw materials, machines and labour or 2) increase production by using the same amount of raw materials, machines and labour.

*Analyses made by the National Accounts in Denmark* The National Accounts in Denmark have in a set of publications on the development of productivity in Denmark, described the factors, which have an important impact on production, including ICT. The analyses are focused not only on macro level impacts, but also on productivity effects on a more disaggregated level, i.e. on industry level. However, the following only deals with development of productivity on the macro level, thus leaving out industry analyses<sup>1</sup>.

*Reasons to growth in productivity* The following factors are used by the National Accounts in Denmark to calculate the average growth in labour productivity:

1. ICT capital, i.e. ICT equipment and software
2. Non-ICT capital such as plants, buildings and means of transport etc.
3. Level of education
4. Total factor productivity (TFP), which is an expression of changes in labour productivity that cannot be explained by changes in ICT capital, non-ICT capital and level of education. TFP is calculated as a residual.

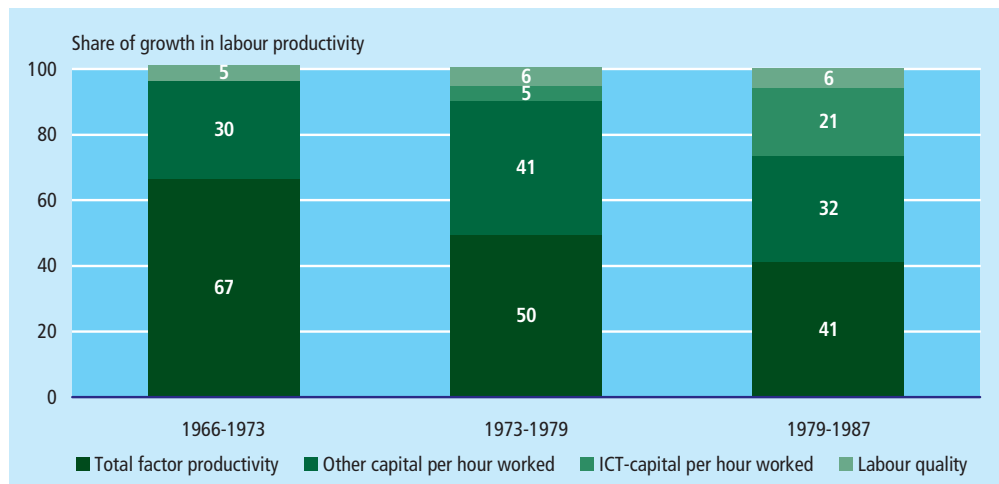
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<sup>1</sup> For further details see Bonde og Sejerbo Sørensen: "Produktivitetens udviklingen i Danmark 1966-2003". Statistics Denmark 2005.

*14 per cent of average growth explained by ICT capital*

Approx. 14 per cent of the average growth in labour productivity in the period from 1966 to 2003 is explained by ICT capital per hour worked. Overall, the contribution from ICT capital is increasing over time from 0 per cent in the period 1966-1973 to over 30 per cent in the period 2000-2003. In figure 8.1, the shares of growth in labour productivity are illustrated for the four components described above for three sub-periods in the years 1966 to 1987.

**Figure 8.1** Distribution of average growth in labour productivity. Denmark 1966-1987



Source: Bonde og Sejerbo Sørensen: "Produktivtetsudviklingen i Danmark 1966-2003". Statistics Denmark 2005.

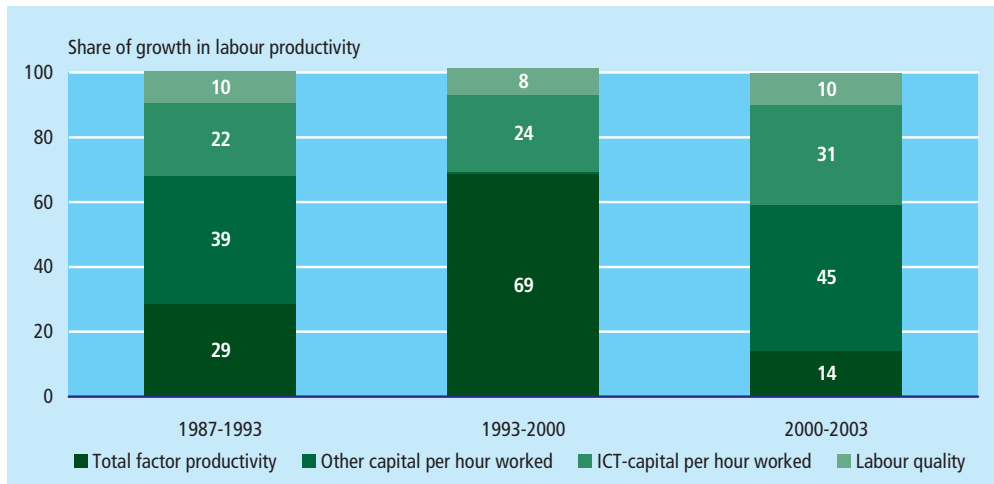
*ICT capital growing in importance*

From having almost no impact on labour productivity in the first period, ICT capital's contribution rises over the years and accounts for 21 per cent of growth in labour productivity in the sub-period 1979-1987. Although, total factor productivity and other capital make up much larger shares, the ICT capital is growing in importance.

*32 per cent of average growth, 2000-2003*

Looking at three sub-periods from 1987 up until 2003, the positive impact from ICT capital continues. As such, ICT capital account for 31 per cent of growth in labour productivity in the period 2000-2003. Apart from other capital, ICT capital had an impact on labour productivity in the period 1993-2000, see figure 8.2.

**Figure 8.2** Distribution of average growth in labour productivity. Denmark 1987-2003



Source: Bonde og Sejerbo Sørensen: "Produktivtetsudviklingen i Danmark 1966-2003". Statistics Denmark 2005.

*Productivity effects in Finland* Another approach on ICT and productivity has been carried out in Finland, where the lack of microeconomic work resulted in a project<sup>2</sup> whose aim, among others, was to see if there were measurable ICT productivity effects at the micro level.

*Methods* A range of statistical and econometric methods were used to analyze data on a sample covering two thousand firms in the period 1998-2001. The specification of the model used effectively removed all industry and time effects thus capturing the 'pure' productivity effect of ICT to the greatest possible extent.

*Productivity higher for ICT-equipped labour* One of the main findings of the Finnish study was that the productivity of ICT-equipped labour is, on average, between 8 and 19 per cent higher than for other workers. With regard to firm age, the productivity effect is often much higher in younger firms and in ICT-providing branches. The study found that in old firms the immediate effect could be negative, thus consistent with the need for ICT-complementing organizational changes.

*Effects higher in services than in manufacturing* Productivity effects of ICT usage seem overall to be higher in services than in manufacturing. Where manufacturing firms particularly benefit from ICT-induced efficiency internally (LAN), service firms benefit from efficiency in external (Internet) communication. Weak evidence of complementarities for ICT and human capital were also found in the Finnish study.

*The importance of micro data* Finally, a comparison of the productivity effects of ICT and related expenses revealed that, on average, the two are roughly equal. Thus,

<sup>2</sup> See Maliranta and Rouvinen: ICT Boosts Productivity But Is Not a Panacea. Finland 2003.

ICT capital did not seem to earn excess returns in the businesses. Overall, like the Danish study, the results from Finland show that ICT is important and does have productivity effects. Still, lack of micro level data sets a boundary to what can be achieved, thus making data collections on ICT expenses/investments in great demand.

*ICT and productivity in Swedish enterprises*

Yet another approach on measuring the impact of ICT on productivity has been carried out at Statistics Sweden<sup>3</sup>. The objective of the study was to test the hypothesis that enterprises' use of ICT has a positive impact on the enterprises' productivity. The purpose of the study was, however, not to measure the size of this effect, if any, but to see if it existed at all.

*Data*

The data used emanates from the survey Use of ICT in Swedish Enterprises 2003, Structural Business Statistics 2002 and longitudinal data on the population's education, income and occupation.

*Method*

A Cobb-Douglas function was defined, with value added, capital and labour respectively. The explanatory variables were percentage of computer user, ICT-usage level as well as controlling for capital intensity, education, industry and size<sup>4</sup>. This means that the effect of ICT-use on total factor productivity was tested. The variable ICT-usage level was created from the responses to the Use of ICT in Swedish Enterprises-survey as a composite indicator according to how extensively an enterprise uses ICT. The skill variables were in the form of shares of employees in the enterprise having a certain level of education or a degree in a certain field, e.g. engineering or data.

*Results of the study*

As expected the result show that computer use is an important factor that affects productivity positively. Further, one main result of the study is the conclusion that enterprises with a more advanced use of ICT, controlling for capital intensity, education, industry and size, are significantly more productive than enterprises with a less advanced ICT usage. The explanatory assumptions behind this positive relationship is that use of ICT in enterprises is enhancing process control, improving coordination and reducing transaction costs, just to mention a few explanations.

*Complemented by another approach*

These results were complemented by another approach. A test was carried out to find out if the efficiency difference that came out from a front production estimation could be explained by difference in ICT-use. The result was parallel and thus confirmed the earlier findings.

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<sup>3</sup> See Zeed and Hagén: Does ICT matter for firm productivity? Statistics Sweden 2005.

<sup>4</sup> Other explanatory variables have been accounted for.

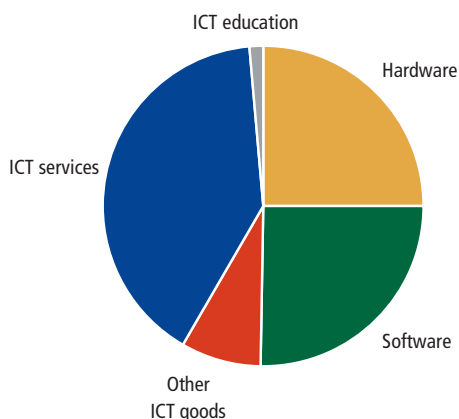
### 8.3 ICT expenditures/investments in Danish enterprises

<i>Danish data collection based on Nordic guidelines</i>	A new Danish survey of ICT expenditures and investments was introduced in late autumn 2004. Before this, a fruitful Nordic work had been going on with the aim of providing methodological guidelines and to propose indicators to be collected in business surveys <sup>5</sup> . The Danish data collection is based on these guidelines and supposed to be carried out on an annual basis.
<i>Better knowledge of ICT expenditures incurred in enterprises</i>	The purpose of the Danish survey is to collect data on enterprises expenditures and investments in ICT thereby improving National Accounts estimates. Furthermore, gaining better knowledge of which industries that actually have significant ICT expenditures has been requested for some time. In the following, ICT expenditures refer to the actual ICT expenditures incurred in the enterprises and ICT investments refer to what the enterprises have capitalised in their financial statements.
<i>Comparability with SBS</i>	The first results of the Danish data collection were published in autumn 2005. The results are based on the accounting year in which the closing of the accounts takes place between 1 May 2003 and 30 April 2004. This ensures comparability with the Structural Business Statistics (SBS). The sample size is approx. 3000 enterprises with at least 10 employees.
<i>NACE sections covered</i>	The survey is mandatory and covers NACE sections D (Manufacturing), F (Construction), G (Wholesale and retail trade), H (Hotels and restaurants), I (Transport, storage and communication), J (Financial intermediation), K (Real estate, renting and business activities) and parts of O (Other community, social and personal service activities), i.e. 92.1, 92.2 and 93.
<i>Half of total ICT expenditure made up of hardware and software</i>	Figure 8.3 shows the distribution of ICT expenditure by product in Danish enterprises 2003. Only half of the total ICT expenditures are made up of hardware and software (i.e. standard and customised software). Expenditures on ICT services constituted 40 per cent of the total or approx. 11 billion DKK. 8 per cent of the expenditures went to other ICT goods (i.e. telecommunication equipment, audio and video equipment etc.). Expenditures for external ICT education made up 2 per cent of total ICT expenditures.

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<sup>5</sup> See ICT Investments in Enterprises - Nordic Guidelines. Copenhagen 2004.

Figure 8.3 Distribution of ICT expenditure in Danish enterprises. 2003



Source: ICT expenditure in Danish enterprises. Statistics Denmark 2005.

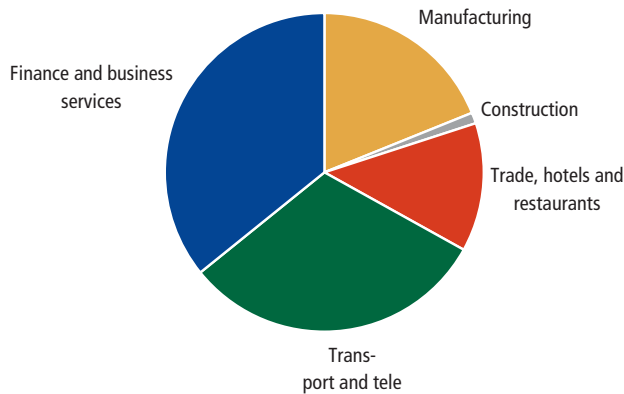
*ICT expenditure in industry groups* The industry group, Finance and business activities had the highest level of ICT expenditures with 11.6 billion DKK or 42 per cent of the total. Transport, post and telecommunication also had significant ICT expenditures of 6.3 billion DKK or 23 per cent of the total. Manufacturing had the third highest level with approx. 5.4 billion DKK (20 per cent of total ICT expenditures), see annex table 8.1.

*ICT expenditure by size* Not surprisingly, the largest enterprises account for the majority of the ICT expenditures. Enterprises with at least a 100 employees had ICT expenditures of approx. 21 billion DKK corresponding to 78 per cent of the total. Enterprises in the groups of 10-49 and 50-99 had ICT expenditures of approx. 4 billion DKK and 2 billion DKK, respectively, in 2003.

*Capitalised ICT expenditure* In annex table 8.3, the corresponding ICT investments are shown. It can be seen from the table that the enterprises capitalised approx. 30 per cent of their total expenditures in 2003. Approx. 3.5 billion DKK of hardware expenditures were capitalised and approx. 2.7 billion DKK of software were capitalised. This corresponds, respectively, to 51 per cent and 39 per cent of total hardware and software expenditures.

*The highest share of ICT investment in Finance and business activities* In figure 8.4, the distribution of ICT investment is illustrated for the different industry groups. With respectively 36 per cent and 31 per cent Finance and business activities and Transport, post and telecommunication account for the majority of ICT investments. 19 per cent of total ICT investment is made of by manufacturing, while Trade, hotels and restaurants have a share of 13 per cent.

Figure 8.4 Distribution of ICT investments in Danish enterprises. 2003



Source: ICT expenditure in Danish enterprises. Statistics Denmark 2005.

*ICT investment by size group* Enterprises with at least 100 employees had ICT investments of approx. 6 billion DKK corresponding to 76 per cent of the total. Enterprises in the groups of 10-49 and 50-99 had ICT investments of approx. 1.2 billion DKK and 0.7 billion DKK, respectively, in 2003.

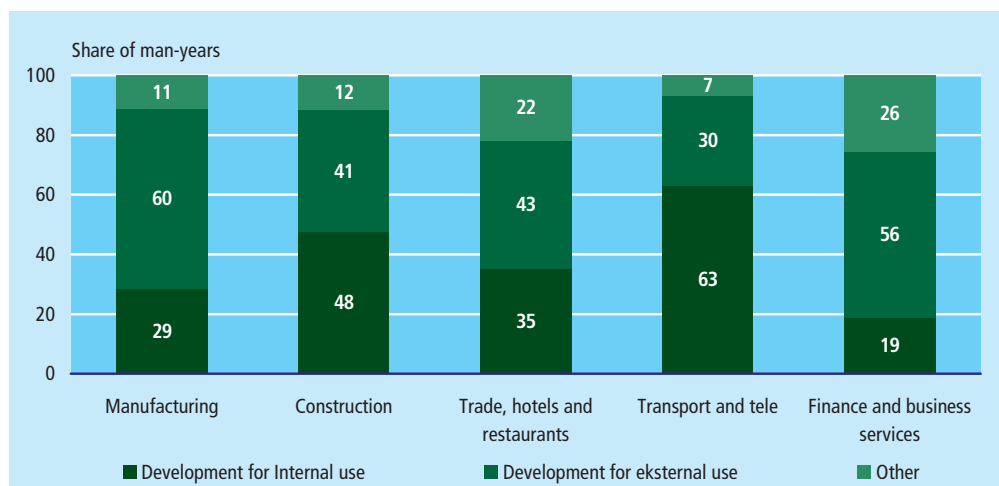
*Man-years spent on own account software development* Finally, some questions on own account software development were included in the Danish survey. This kind of ICT expenditure is interesting since own account software produced in-house is seen as Gross Fixed Capital Formation (GFCF), i.e. as investment, by the National Accounts. In annex, table 8.4, the own account software development has been estimated by use of questions related to full-time equivalents in the questionnaire.

*24 per cent of development goes to internal use* In 2003, the enterprises, which developed software on own account, estimated that 54 per cent of own account software development was for external use, i.e. development of software for the purpose of selling licenses or software for incorporation into the enterprise's products. Correspondingly, 24 per cent of own account software development were for internal use. The last 22 per cent were development destined for maintenance, support and repair etc.

*Own account software by industry group* In figure 8.5, the distribution is illustrated for the different industry groups. The data shows that Construction and Transport, post and telecommunication primarily develop software for internal use. The opposite goes for the other industry groups.



**Figure 8.5** Distribution of man-years for own account software development in Danish enterprises. 2003



Source: ICT expenditure in Danish enterprises. Statistics Denmark 2005.

### 8.4 Sources

Bonde og Sejerbo Sørensen: “Produktivtetsudviklingen i Danmark 1966-2003”. Statistics Denmark 2005

“ICT expenditure in Danish enterprises”. Statistics Denmark 2005  
<http://www.dst.dk/it>

“ICT Investments in Enterprises - Nordic Guidelines”. Nordic Council of Ministers, Statistics Denmark, Statistics Finland, Statistics Iceland Statistics Norway and Statistics Sweden. Copenhagen 2004  
<http://www.dst.dk/ict>

Maliranta and Rouvinen: “ICT Boosts Productivity But Is Not a Panacea” Finland 2003  
[http://www.etla.fi/files/891\\_FES\\_03\\_2\\_ict.pdf](http://www.etla.fi/files/891_FES_03_2_ict.pdf)

Zeed and Hagén: “Does ICT matter for firm productivity?” Statistics Sweden 2005

## 8.5 Annex

Table 8.1 Growth rates for aggregated labour and total factor productivity

	1966- 1973	1973- 1979	1979- 1987	1987- 1993	1993- 2000	2000- 2003	1966- 2003
	average annual growth in per cent						
<b>1 Labour productivity (2+3+4)</b>	<b>6.2</b>	<b>4.2</b>	<b>3.1</b>	<b>2.7</b>	<b>2.9</b>	<b>1.9</b>	<b>3.7</b>
<b>2 Capital per hour worked (2a+2b)</b>	<b>1.9</b>	<b>1.9</b>	<b>1.6</b>	<b>1.7</b>	<b>0.7</b>	<b>1.4</b>	<b>1.5</b>
2a It-capital per hour worked	0.0	0.2	0.6	0.6	0.7	0.6	0.5
2b Other capital per hour worked	1.8	1.7	1.0	1.1	0.0	0.8	1.1
<b>3 Labour quality</b>	<b>0.3</b>	<b>0.2</b>	<b>0.2</b>	<b>0.3</b>	<b>0.2</b>	<b>0.2</b>	<b>0.2</b>
<b>4 Total factor productivity</b>	<b>4.1</b>	<b>2.1</b>	<b>1.3</b>	<b>0.8</b>	<b>2.0</b>	<b>0.3</b>	<b>1.9</b>

The sum of the components is not necessarily equal to the total as a consequence of using Laspeyres' chain index.

Source: Bonde og Sejerbo Sørensen: "Produktivtetsudviklingen i Danmark 1966-2003". Statistics Denmark 2005.

Table 8.2 ICT expenditure in Danish enterprises. 2003

	All enter- prises (10+)	By number of employees			By industry group				
		10-49	50-99	100+	Manu- factu- ring	Con- struc- tion	Trade, hotels and restau- rants	Trans- port, post and tele	Finance and busi- ness services
	million DKK								
<b>ICT expenditure, total</b>	<b>27,372</b>	<b>4,011</b>	<b>2,072</b>	<b>21,289</b>	<b>5,408</b>	<b>345</b>	<b>3,729</b>	<b>6,269</b>	<b>11,621</b>
Hardware	6,806	1,265	471	5,070	1,294	123	1,215	1,420	2,754
Software	6,960	1,266	497	5,197	1,654	85	815	1,034	3,372
ICT goods	2,239	270	188	1,781	260	38	298	998	646
ICT services	10,954	1,135	891	8,928	2,116	89	1,358	2,754	4,637
ICT education	413	76	26	312	84	11	44	63	212

Source: ICT expenditure in Danish enterprises. Statistics Denmark 2005.

**Table 8.3** ICT investment in Danish enterprises. 2003

	All enterprises (10+)	By number of employees			By industry group				
		10-49	50-99	100+	Manufacturing	Construction	Trade, hotels and restaurants	Transport, post and tele services	Finance and business services
		million DKK							
<b>ICT investment, total</b>	<b>8,313</b>	<b>1,278</b>	<b>715</b>	<b>6,320</b>	<b>1,570</b>	<b>101</b>	<b>1,075</b>	<b>2,579</b>	<b>2,989</b>
Hardware	3,499	634	259	2,607	637	51	636	781	1,395
Software	2,721	520	256	1,944	716	25	295	586	1,099
ICT goods	1,068	77	87	904	64	8	93	681	221
ICT services	1,025	47	113	865	153	16	52	531	273

Source: ICT expenditure in Danish enterprises. Statistics Denmark 2005.

**Table 8.4** Man-years spent on own account software development in Danish enterprises. 2003

	All enterprises (10+)	By number of employees			By industry group				
		10-49	50-99	100+	Manufacturing	Construction	Trade, hotels and restaurants	Transport, post and tele services	Finance and business services
		percentage of total man-years							
<b>Man-years, total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>
Development of software for internal use	24	7	27	30	29	48	35	63	19
Development of software for external use	54	79	59	44	60	41	43	30	56
Other	22	14	15	26	11	12	22	7	26

External use means development of software for 1) the purpose of selling licenses or 2) software for incorporation into the enterprise's products.

Source: ICT expenditure in Danish enterprises. Statistics Denmark 2005.