



**Analyseinstitut for Forskning**

**Nordic Research Personnel  
- Gender and discipline**



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# Nordic Research Personnel - Gender and discipline<sup>1</sup>

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<sup>1</sup> The statistical data for this chapter derives from national sources, kindly provided by Iceland's Statistics, Statistiska Centralbyrån (Sweden) Statistikcentralen (Finland), NIFU (Norway) and, the statistical department at the Danish Institute for Studies in Research and Research Policy. Stud. oecon. Majken Fejerskov Pedersen has assisted in database establishment. Unless otherwise stated the presented data derives from this database. Due to limitation of space only part of the material can be presented here.

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## **Abstrakt**

*Undersøgelsen af det nordiske forskerpersonale bygger på tidsserier og er i hovedsagen begrænset til forskere på universiteter og de øvrige højere læreanstalter. Undersøgelsen har som hovedvariabel køn, dvs. andelen af kvindelige og mandlige forskere over tid og deres fordeling indenfor fagområder i de nordiske lande.*

*Hovedkonklusionen er, at trods forskelle landene indbyrdes, så følger udviklingen indenfor de undersøgte kategorier samme linier i alle de nordiske lande. Tendensen er, at skønt der stadig er flere mandlige end kvindelige forskere indenfor dette område, så er andelen af mandlige forskere langsomt, men støt stigende og kvindeandelen langsomt, men støt stigende.*

## **Summary**

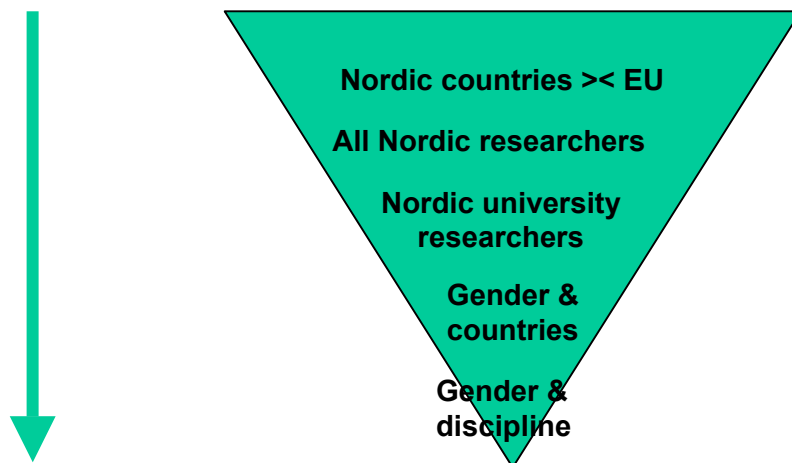
The study of Nordic research personnel is based on time series. It is mainly limited to researchers at universities and other institutes of higher education. The main variable is gender, that is, the share of female and male researchers over a certain period of time and distributed on scientific areas.

The main conclusion is that despite differences the Nordic countries all follow the same line of development. Though men still constitute the majority of researchers, there is the same slow, but steady increase in the proportion of female to male researchers in all the Nordic countries.

## Introduction

The world of research changed drastically in the twentieth Century. The stock of researchers was multiplied immensely and so was the number of universities and other institutions for higher education. The rise in numbers is not the only change. In modern society basic research is not restricted to take place in research institutions and the former divide between business enterprises and research institutions appears more and more blurred. The increasingly vague borderline between research carried out at public research institutions and at business enterprises is making its impact on the hitherto important distinction between *basic research*, *applied research* and *development*. These distinctions are becoming less relevant now, bordering on irrelevance in some circumstances.

This working paper on Nordic research personnel is structured like an excavation. Starting with the broad top-level layer where the Nordic countries are positioned in relation to a broader European context, each succeeding paragraph, table and figure will narrow the focus, peeling off one layer after the other. Gender has been chosen as main variable being a much-discussed topic in relation to the course of development in higher education; besides, gender is suitable for comparative analyses. The “excavation” will be directed towards *researchers* in universities and other institutions, only, as the space does not allow for an analysis of all three main sectors<sup>2</sup>.



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<sup>2</sup> That is, researchers in Business enterprises, researchers in Government institutions, and researchers in Universities and other Higher Institutes of Education.

The study will be confined to the Nordic countries, but begins with a comparison between the Nordic countries and the EU *en bloc* of the number of persons involved in research – R&D personnel and the more restricted group labelled RSE personnel. The RSE personnel category contains only academically trained research personnel.

The comparison shows that the Nordic countries have a higher share of researchers in the labour force than the EU average. With regard to total R&D the Nordic countries muster 13,8 researcher *per thousand* persons in the labour force *versus* EU's 9,4 researcher *per thousand*<sup>3</sup>, according to OECD data (table 1). The difference is less obvious when comparing RSE personnel. – Here the Nordic countries have 7,8 researcher *per thousand* as against EU's 5 researchers *per thousand* persons.

However, the Nordic countries should not be seen as one homogeneous cluster of countries. – It will be shown that in some areas there are distinct differences.

**Table 1: Total R&D personnel and RSE personnel 1997 in relation to total national Labour Force<sup>4</sup>; per thousand**

|                         | <i>Total R&amp;D personnel</i> | <i>RSE personnel</i> |
|-------------------------|--------------------------------|----------------------|
| <b>Denmark</b>          | 11,9                           | 6,1                  |
| <b>Finland</b>          | 16,4                           | 8,4                  |
| <b>Iceland</b>          | 14,5                           | 9,1                  |
| <b>Norway</b>           | 10,9                           | 7,6                  |
| <b>Sweden</b>           | 15                             | 8,4                  |
| <b>Nordic Countries</b> | 13,8                           | 7,8                  |
| <b>EU</b>               | 9,4                            | 5                    |

*Source: OECD Main Science and Technology indicators database (STI/EAS Division).  
OECD 2000 no. 2., Tables 09 & 12.*

<sup>3</sup> It should be noted, however, that Denmark, Finland and Sweden as members of EU also are part of the numbers constituting the EU average.

<sup>4</sup> RSE personnel: academically trained research personnel. R&D personnel: all persons involved in research.

Finland has more persons in R&D than any other Nordic country, - 16,4 person *per thousand persons* in the labour force -, and Norway has the lowest number though still higher than the EU average. If only academically trained persons (RSE) are considered Iceland occupies the top position followed by Finland. Denmark holds the bottom position which is below the Nordic average, but above EU average.

**Table 2: Total R&D expenses 1997as a percentage of GDP**

| Country          | Business Sector | Higher Education Sector | Government Sector | Total R&D expenses |
|------------------|-----------------|-------------------------|-------------------|--------------------|
| Denmark          | 1,20            | 0,43                    | 0,30              | 1,95               |
| Finland          | 1,79            | 0,54                    | 0,37              | 2,72               |
| Iceland          | 0,75            | 0,52                    | 0,55              | 1,84               |
| Norway           | 0,94            | 0,44                    | 0,27              | 1,66               |
| Sweden           | 2,77            | 0,80                    | 0,13              | 3,70               |
| Nordic Countries | 1,79            | 0,56                    | 0,25              | 2,63               |
| EU               | 1,14            | 0,37                    | 0,25              | 1,80               |

*Source: OECD Main Science and Technology indicators database (STI/EAS Division). OECD 2000 no. 2., Tables 05, 25, 47 & 56.*

If total R&D expenses are compared to Gross Domestic Product (GDP) Sweden's expense is more than double the EU average. Sweden is followed by Finland. With 1,66 percentage of GDP Norway spends less on R&D than the other Nordic countries and less than EU average. Sweden followed by Finland spends more on R&D both in the business sector and in higher education than the other countries. With regard to R&D expenses in the business sector Iceland and Norway spend less than EU average. Danish expenditures correspond to the EU average.

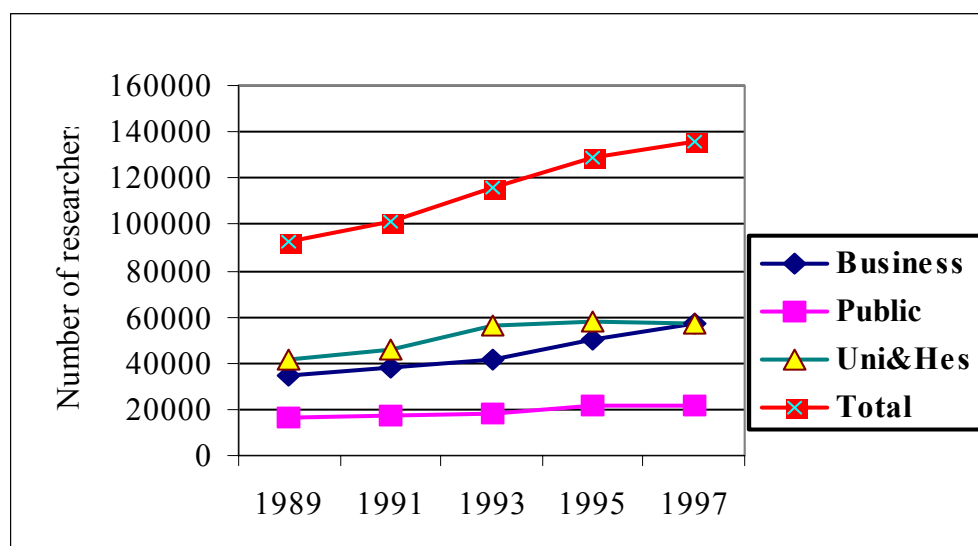
The picture is turned upside down when we compare R&D expenses in the *Government sector*. Swedish investments are half the EU average whereas the Icelandic expenses are more than double the EU average.

*In short, in the Nordic comparison Sweden and Finland have more persons per thousand both in R&D and in RSE. They have the largest total R&D expenses when measured as a percentage of GDP and they are the largest spenders in R&D within both the business sector and the sector for higher education. Norway and Denmark are the bottom pair except with regard to R&D expenses in the government sector, where they hold a middle position.*



The data on the development of research personnel in the period from 1989 to 1997 shows that the “stock” of academically trained Nordic researchers has risen with 47 *percentage* from 92,762 persons in 1989 to 136,160 persons in 1997 – (see sources to figure 1).

**Figure 1: Total number of academically trained researchers (RSE) in the Nordic countries 1989-1997**



Sources: Nordisk FoU-Statistik for 1997 og statsbudgetanalyse 1999, tab.7. Nordisk FoU-Statistik for 1989 og statsbudgetanalyse 1991, tab.4. Nordisk FoU-Statistik for 1993 og statsbudgetanalyse 1995; Nordisk FoU-Statistik for 1991 og statsbudgetanalyse 1993; Nordisk FoU-Statistik for 1989 og statsbudgetanalyse 1991.

Names of used tables: "FoU-personale fordelt på udførende sektor. FoU-personale med afgangseksamen fra universitet eller højere læreanstalt".

A closer look at the data from this period reveals that by far the greatest development has taken place within the business sector. In 1989 a total of 34,904 academically trained researchers were employed in this sector. From 1993 onwards the growth has accelerated and in 1997 a total of 57,181 academically trained researchers were employed in the business sector corresponding to a 64 *percentage* growth. The universities and other higher education institutions have experienced a more moderate growth of 39 *percentage* and the government sector has had the slowest growth, that is 31 *percentage*.

*In short, it appears that the business sector is of steadily growing importance as a place of employment for researchers and the government sector is of relatively declining importance.*

## Research personnel in higher education 1989 to 1997<sup>5</sup>

The numbers of students and researchers has grown immensely the last century. In Denmark, for instance, there were in total 4,000 students enrolled in university education in 1900 and in 2000 there were 100,000<sup>6</sup>. Similar growth in number of students and researchers has taken place in the other Nordic countries. Over the last decades the organisation of research and research institutes have become important objects of research policies.<sup>7</sup> A qualified discussion of these topics calls for information on facts, numbers and developments in this area. This working paper will try to contribute some of the needed background information.

If we look at the recent period from 1989 to 1997 academically trained research personnel in Nordic institutes for higher education has grown with 39 percentages from 41,285 persons to 57,321 persons<sup>8</sup>. When we distribute the numbers on countries, the picture becomes more diversified – in fact, the differences between the national developments are stunning.

Comparing the development in the Nordic countries over this eight-year period, Sweden comes out at the bottom with a growth of only 16 *percentages* in contrast to a more than fifty percentage growth in Denmark, Finland and Iceland, Norway, too, had a steeper growth rate than Sweden over this period. One explanation might be that the growth in Sweden took place at an earlier date than in other Nordic countries. Back in 1989 Sweden had – in relation to population size – a larger proportion of research personnel than the other Nordic countries.

Iceland has had a drastic growth rate. But with regard to Iceland it should be kept in mind throughout the working paper that a change in a small total affects the results disproportionately.

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<sup>5</sup> In this chapter - unless otherwise mentioned - the terms researcher and research personnel have to be understood as academically trained research personnel (RSE) ONLY and NOT to be understood in the broader sense covering all persons involved in research (R & D).

<sup>6</sup> "Universitet", Vol.19, p.534. Den Store Danske Encyklopædi.

<sup>7</sup> For more detailed accounts of the development see Ståhle 1996:63-106; 1998:111-127 & 1999:96-103.

<sup>8</sup> See fig. 1 in addition to Nordisk FoU-statistik for 1989, table 9 & Nordisk FoU-statistik for 1989, table 7.

**Table 3: Development of Nordic RSE research personnel in Higher Education 1989 – 1997; distributed on countries; in full time equivalents**

|                     | 1989   | 1991   | 1993   | 1995         | 1997   | Percentage *      |
|---------------------|--------|--------|--------|--------------|--------|-------------------|
| Denmark             | 3.952  | 4.138  | 4.627  | <b>5.520</b> | 6.143  | 55 % [48%]        |
| Finland **          |        | 5.455  | 6.097  | 6.481        | 8.518  | [56%]             |
| Iceland             | 184    | 215    | 205    | 380          | 462    | 151% [115%]       |
| Norway              | 3.669  | 4.154  | 4.737  | 4.993        | 5.091  | <b>39 % [23%]</b> |
| Sweden <sup>9</sup> | 11.647 | 11.447 | 11.445 | 11.873       | 13.515 | 16 % [18%]        |
| Nordic countries    |        | 25.409 | 27.111 | 29.247       | 33.729 | [33%]             |

Source: OECD, MSTI database (STI/EAS Division), table 50. November 2000.

\* Listed percent outside brackets cover the period 1989 – 1997: Listed percent inside brackets cover the period 1991 – 1997.

\*\* Finland only information from the period 1991-1997.

Denmark, Finland and Norway are comparable, both with regard to population size and numbers of research personnel. An explanation for the growth rate here as well as in Iceland could be that the expansion of the sector for higher education and the founding of new institutions have lagged behind those of Sweden.

In 1989 Denmark had in *full time equivalents* 283 researchers more than Norway. Eight years later, in 1997, this difference had increased to 1.852 full time equivalents. From Finland we have information for researchers in full time equivalents from 1991. From 1991 to 1997 Finland has had the largest growth rate, 56 *percentage* followed by Denmark's 48 *percentage*, whereas Norway is far behind with a growth of 23 *percentage*.

*It should be noticed, however, that national developments in full time equivalents may differ from the development in actual numbers due to differences in occupational structures and in research structures.*

Next step in this 'excavation' is to include gender differentiation in the examination of the growth of research personnel in the Nordic countries.

1991 is the first year with comparable information from all the Nordic countries on the gender aspect. In that year Denmark had the highest share of male researchers of all

<sup>9</sup> In 1993 Sweden carried out revisions of the statistical practice, therefore inconsistencies in Swedish data may occur.

the Nordic countries, - 81 *percentage*. However, the Danish research statistics<sup>10</sup> contain information on gender composition back to 1967; the data indicate a slow decline in the male share of Danish researchers from 1967 until now. In the period 1979 to 1997 the male share went from 86 *percentage* in 1979 over 81 *percentage* in 1991 and down to 72 *percentage* in 1997. This declining trend appears to be stronger in the 1990s than in the preceding period.

**Table 4: Gender composition of research personnel in higher education; percentage**

|         | 1989 |    | 1991 |    | 1993 |    | 1995 |    | 1997 |    |
|---------|------|----|------|----|------|----|------|----|------|----|
|         | M    | W  | M    | W  | M    | W  | M    | W  | M    | W  |
| Denmark |      |    | 81   | 19 | 77   | 23 | 76   | 24 | 72   | 28 |
| Finland | 65   | 35 | 66   | 34 | 65   | 35 | 64   | 36 | 62   | 38 |
| Iceland | 80   | 20 | 71   | 29 | 64   | 36 |      |    |      |    |
| Norway  | 78   | 22 | 76   | 24 | 75   | 25 | 79   | 29 | 68   | 32 |
| Sweden  | 60   | 40 | 74   | 26 | 72   | 28 | 67   | 33 | 65   | 35 |

*Source: Own database, see footnote no. 1.*

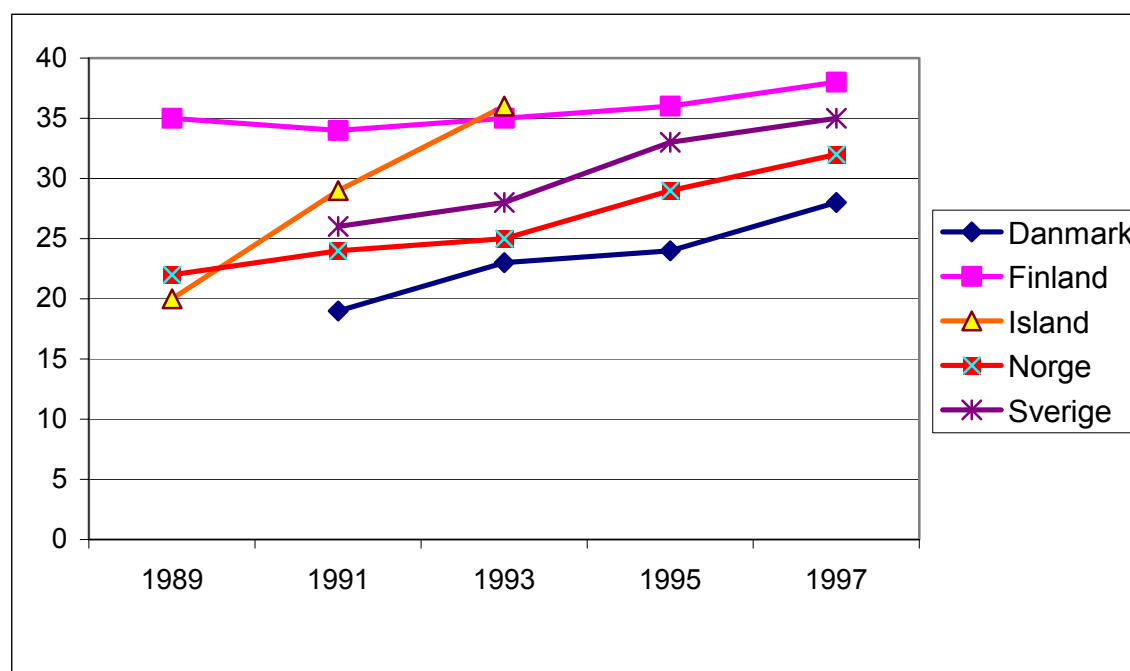
*Remark: As the Swedish statistical procedure as been revised over the years some inconsistencies do appear in time series tables. See Nordisk FoU-statistik for 1997:47.*

Throughout the period 1989 to 1997 Finland has the highest proportion of female researchers, the proportion grew from 35 to 38 *percentage*. In the same period Finland has had 61 *percentage* growth in total research personnel. The share of Icelandic female researchers expanded rapidly between 1989 and 1993 from 20 to 36 *percentage*. Icelandic data are not available for the later years, so unfortunately it is not possible to investigate whether the expansion continued throughout the whole period.

<sup>10</sup> Siune & Jensen 2000:3, 11.

Sweden differs again; here the proportion of female researchers has declined from 1989 to 1991 moving from 40 *percentage* down to 26 *percentage*. On this point the data are probably incorrect. In 1997 the proportion is 35 *percentage*<sup>11</sup>. Despite fluctuations the female share in the research personnel in Sweden appears to have been larger than in Denmark and Norway.

**Figure 2. Development of female research personnel (RSE) in higher education 1982-1997; percentage**



Source: table 4.

See also remark to table 4.

*Throughout the Nordic countries the general tendency regarding gender composition of research personnel in the period 1989 to 1997 has been a slow, but steady decrease of the male share and a slowly, but steady increase of the female share.*

*The collected Nordic research personnel in 1997 are, roughly speaking, composed of two thirds men and one-third women. The following section examines the development of gender distribution in job positions.*

<sup>11</sup> Cf. footnote 5. Remark: The Swedish statistical procedure as been revised over the years, therefore some inconsistencies appear in time series tables. For more information on the Swedish statistical revisions, see e.g. Nordisk FoU-statistik for 1997:47.

## Gender and position

The slow, but steady, increase in women's share of university positions and the corresponding decrease of men's share was apparent from table 4. Table 5 distributes female research personnel in job categories.

**Table 5: Development of women's share of job categories in higher education; percentage**

| Year           | Country | Professor <sup>12[9]</sup> | Associate professor | Assistant professor | Other permanent RSE personnel |
|----------------|---------|----------------------------|---------------------|---------------------|-------------------------------|
| <b>Denmark</b> |         |                            |                     |                     |                               |
| 1991           |         | 4%                         | 16%                 | 22%                 | 20%                           |
| 1993           |         | 5%                         | 17%                 | 26%                 | 26%                           |
| 1995           |         | 6%                         | 19%                 | 29%                 | 33%                           |
| 1997           |         | (7%)* 8%                   | 21%                 | (37%)* 38%          |                               |
| <b>Finland</b> |         |                            |                     |                     |                               |
| 1991           |         | 14%                        | 37%                 | 27%                 | 41%                           |
| 1993           |         | 16%                        | 39%                 | 30%                 | 43                            |
| 1995           |         | 16%                        | 41%                 | 29%                 | 44%                           |
| 1997           |         | 18%                        | 41%                 | 30%                 | 41%                           |
| <b>Iceland</b> |         |                            |                     |                     |                               |
| 1993           |         | 6%                         | 19%                 | 37%                 |                               |
| 1996           |         | 8%                         | 22%                 | 45%                 |                               |
| 1997           |         | 7%                         | 20%                 | 47%                 |                               |
| 1999           |         | 7%                         | 26%                 | 53%                 |                               |
| <b>Norway</b>  |         |                            |                     |                     |                               |
| 1991           |         | 9% (2%)**                  | 15%                 | 28%                 | 27%                           |
| 1993           |         | 9% (7%)**                  | 19%                 | 30%                 | 36%                           |
| 1995           |         | 10% (12%)**                | 22%                 | 32%                 | 42%                           |
| 1997           |         | 11% (14%)**                | 24%                 | 32%                 | 46%                           |
| <b>Sweden</b>  |         |                            |                     |                     |                               |
| 1993           |         | 7%                         | 21%                 | 42%                 | 24%                           |
| 1994           |         | 7%                         | 22%                 | 43%                 | 26%                           |
| 1997           |         | 11%                        | 24%                 | 46%                 | 34%                           |
| 1998           |         | 11%                        | 24%                 | 50%                 | 37%                           |

\*Personnel financed by internal means only.

\*\*Norwegian *høgskoledosent*.

\*\*\* Norwegian *førstelektor* from 1997.

<sup>12[9]</sup> Professor includes *høgskoledosent* (NO). Associate professor includes *lektor*, *docent* (DK, SE), *biträdande professor* (FI), *1. amanuensis* (NO), *overassistent* (FI). Assistant professor includes *adjunkt* (DK), *Amanuensis* (NO). Other permanent research personnel include *assistant* and *1. lektor* (NO).

The highest percentage of female researchers is found in junior positions<sup>13</sup> – but Finland is a marked exception. Here women have had a higher share of the senior positions ‘associate professor’ for several years. In the other Nordic countries the proportion of female junior researchers is between one third and one half of the personnel. The growth rate has been different, though. Finland has the highest proportion of female research personnel, but it has not changed very much in the 1990s.

41 percent of all ‘associate professors’ in Finland are women. In the four other countries women hold around one fourth of the ‘associate professor’ positions.

Throughout the period 1991 to 1997 Finland also had a larger share of female professors than the other Nordic countries, the Finnish share going up from 14 to 18 *percent*. Norway and Sweden are approaching the Finnish situation, both with 11 *percent* female professors. Iceland and Denmark share the bottom position with 7 *percent* of female professors.

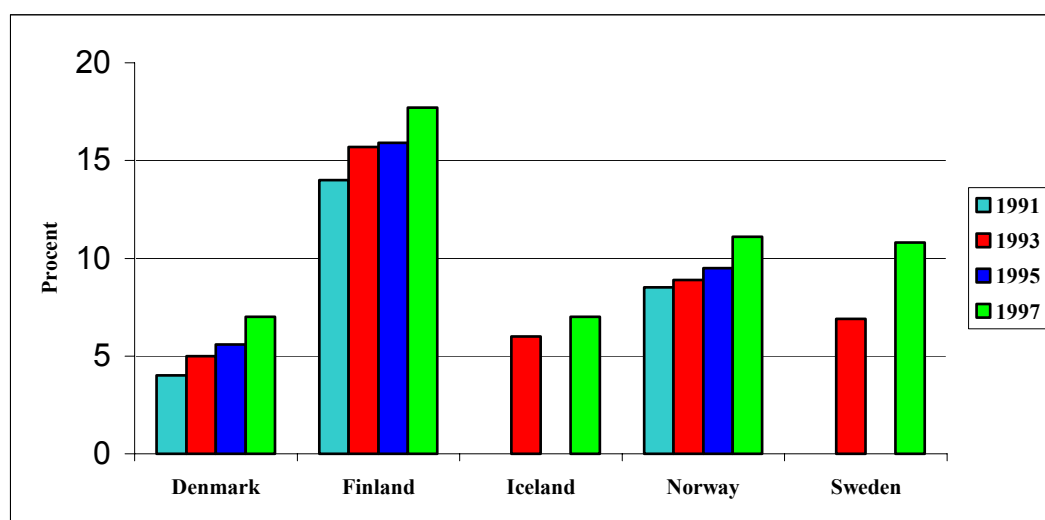
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<sup>13</sup> Cf. table 6. A recent report from Cambridge University shows the same tendency: the more junior the position the larger the female proportion. In Cambridge the distribution is as follows:

|                               |              |
|-------------------------------|--------------|
| University Assistant Lecturer | 36,0 % women |
| University Lecturer           | 18,5 % women |
| Reader                        | 12,8 % women |
| Professor                     | 6,3 % women  |

Ref: Schneider & Ross, 2001, graph 2: “Full Time Academic Staff as at 1<sup>st</sup> April 2000.

**Figure 3. Female professors 1991-1997; percentage**



Source: own database.

Remark: As the Swedish statistical procedure as been revised over the years some inconsistencies do appear in time series tables. See Nordisk FoU-statistik for 1997:47.

When compared with the situation in Europe, North America, New Zealand and Australia Finland is still positioned in the top, only surpassed by Turkey. In the international context Finland ranks as number two out of 23/24 countries<sup>14</sup> with regard to the number of female professors in permanent positions. Norway takes place number nine followed by Sweden as number ten. With the position as number fifteen Iceland is in the lower half of the list and so is Denmark which shares place number seventeen together with French Belgium. Table 6 shows the proportion of female professors in a number of selected countries.

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<sup>14</sup> The list contains 24 countries as Belgium is counted twice: French Belgium and Flemish Belgium.



**Table 6: Female professors: Percentage of faculty that are women  
(different ranks, all disciplines)**

| Country               | Year   | A<br>(Full) | B<br>(Assoc) | C<br>(Assist) |
|-----------------------|--------|-------------|--------------|---------------|
| Turkey                | 1996/7 | 21.5        | 30.7         | 28.0          |
| Finland               | 1998   | 18.4        |              |               |
| Portugal <sup>a</sup> | 1997   | 17.0        | 36.0         | 44.0          |
| France                | 1997/8 | 13.8        | 34.2         |               |
| Spain                 | 1995/6 | 13.2        | 34.9         | 30.9          |
| Norway                | 1997   | 11.7        | 27.7         | 37.6          |
| Sweden                | 1997/8 | 11.0        | 22.0         | 45.0          |
| Italy                 | 1997   | 11.0        | 27.0         | 40.0          |
| Greece                | 1997/8 | 9.5         | 20.3         | 30.6          |
| UK                    | 1996/7 | 8.5         | 18.4         | 33.3          |
| Iceland               | 1996   | 8.0         | 22.0         | 45.0          |
| Israel                | 1996   | 7.8         | 16.0         | 30.8          |
| Belgium (Fr)          | 1997   | 7.0         | 7.0          | 18.0          |
| Denmark               | 1997   | 7.0         | 19.0         | 32.0          |
| Ireland               | 1997/8 | 6.8         | 7.5          | 16.3          |
| Austria               | 1999   | 6.0         | 7.0          | 12.0          |
| Germany               | 1998   | 5.9         | 11.3         | 23.8          |
| Switzerland           | 1996   | 5.7         | 19.2         | 25.6          |
| Belgium (Fl)          | 1998   | 5.1         | 10.0         | 13.1          |
| Netherlands           | 1998   | 5.0         | 7.0          | 20.0          |
| Australia             | 1997   | 14.0        | 23.0         | 40.7          |
| USA                   | 1998   | 13.8        | 30.0         | 43.1          |
| Canada                | 1998   | 12.0        |              |               |
| New Zealand           | 1998   | 10.4        | 10.2/23.5    | 45.5          |

*The countries are listed according to the percentage of female full professors.*

*Note: Belgium keeps two sets of statistics, one for the French (Fr) and one for the Flemish (Fl) part.*

<sup>a</sup> *Portugal. Numbers include only academic staff performing R & D activities.*

*For sources of figures and notes to Table, see The Etan Report 2000:10. Table 2.1. European Commission.*

Some of the internal Nordic differences may be explained by the fact that some of these countries have reformed the job structure during the examined period. Some of the reforms have included upgrading of associate professors to the level of full professors. Other reforms have contained various elements of positive gender discrimination – such reforms have not taken place in Denmark, but have to various degrees been applied in Norway, Sweden and Finland. Just recently the Norwegian government has again decided to open more professor positions to women in fields where more women are wanted <sup>15</sup>.

Historical circumstances play a role, too. The 20<sup>th</sup> century's wars in Finland may at an early date have influenced recruitment to positions at universities and other higher institutions of education in Finland. This in turn may have influenced women's choice of profession also later on in the century.

Similar circumstances cannot explain why all the South European, Mediterranean and Over Seas countries count among the first thirteen countries in table 6 – in addition to Finland, Norway, Sweden – and that the bottom eleven countries – except for Israel – all are Northern European countries, including Denmark and Iceland. A satisfactory explanation would call for comparative analyses of history, cultural traditions and class in the various countries.

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<sup>15</sup> 20 new professor positions for women -see press note from April 2001: Pressemelding nr. 029-01.

## Gender, position and discipline

Irrespective of discipline or country, positions as full professor are mainly occupied by men. In the Nordic data from 1997 only in five cases does a main research area in a Nordic country have 20 *percentage* or more female professors (table 7).

**Table 7: Gender and main disciplinary area in higher education 1997**

| Main disciplinary area | Country        | Professor *,<br>percentage |     | Total female RSE.<br>In numbers ** |
|------------------------|----------------|----------------------------|-----|------------------------------------|
|                        |                | M                          | W   |                                    |
|                        | <b>Denmark</b> |                            |     | <b>Total 2,864</b>                 |
| Natural sciences       |                | 97                         | 3   | 698                                |
| Technical sciences     |                | 99,9                       | 0,1 | 231                                |
| Health sciences        |                | 89                         | 11  | 339                                |
| Agro- & vet. sciences  |                | 92                         | 8   | 280                                |
| Social sciences        |                | 89                         | 11  | 437                                |
| Arts & letters         |                | 90                         | 10  | 879                                |
|                        | <b>Finland</b> |                            |     | <b>Total 4,600</b>                 |
| Natural sciences       |                | 90                         | 10  | 946                                |
| Technical sciences     |                | 95                         | 5   | 342                                |
| Health sciences        |                | 78                         | 22  | 1,140                              |
| Agro- & vet. sciences  |                | 81                         | 19  | 96                                 |
| Social sciences        |                | 80                         | 20  | 1,281                              |
| Arts & letters         |                | 65                         | 35  | 795                                |
|                        | <b>Iceland</b> |                            |     | <b>Total 124</b>                   |
| Natural sciences       |                |                            |     | 24                                 |
| Technical sciences     |                |                            |     | 14                                 |
| Health sciences        |                |                            |     | 35                                 |
| Agro- & vet. sciences  |                |                            |     | 29                                 |
| Social sciences        |                |                            |     | 14                                 |
| Arts & letters         |                |                            |     | 8                                  |
|                        | <b>Norway</b>  |                            |     | <b>Total 4,362</b>                 |
| Natural sciences       |                | 94                         | 6   | 547                                |
| Technical sciences     |                | 98                         | 2   | 245                                |
| Health sciences        |                | 87                         | 13  | 1,219                              |
| Agro- & vet. sciences  |                | 92                         | 8   | 125                                |
| Social sciences        |                | 87                         | 13  | 1,219                              |
| Arts & letters         |                | 80                         | 20  | 1,007                              |
|                        | <b>Sweden</b>  |                            |     | <b>Total 7,171</b>                 |
| Natural sciences       |                | 93                         | 7   | 900                                |
| Technical sciences     |                | 94                         | 6   | 1,016                              |
| Health sciences        |                | 92                         | 8   | 1,579                              |
| Agro- & vet. sciences  |                | 87                         | 13  | 595                                |
| Social sciences        |                | 86                         | 14  | 2,038                              |
| Arts & letters         |                | 79                         | 21  | 1,043                              |

Source: own database.

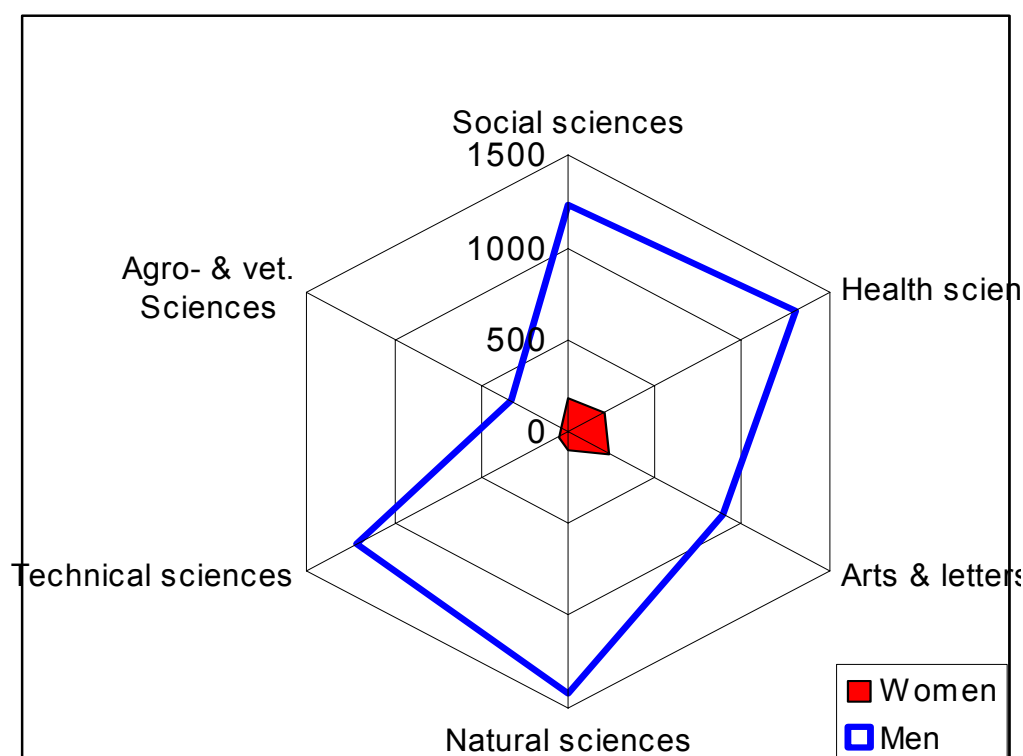
\* Professor incl. høgskoledosent (NO) & biträdande (FI),

\*\* Female RSE in numbers, see Nordisk FoU-statistik 1997, table 8.

Three of the five cases are Finnish: Arts & Letters with 35 percentage, Health Science with 22 percentage and Social Sciences with 20 percentages. One is Swedish: Arts & Letters with 21 percentage: The last case is Norwegian: Arts & Letters with 20 percentage. The highest percentage of female professors in Denmark is found in Arts & Letters with 10 percentages. Data from Iceland are not available.

In the Nordic countries between 90 and 99,9 percentage of all full professors in natural and technical sciences are men. This is not surprisingly in the Nordic countries since these fields traditionally have a low female representation compared to male representation (figure 4).

**Figure 4: Distribution of male and female professors in main research areas in the Nordic countries 1997; numbers**



Source: own database; see also table 8.

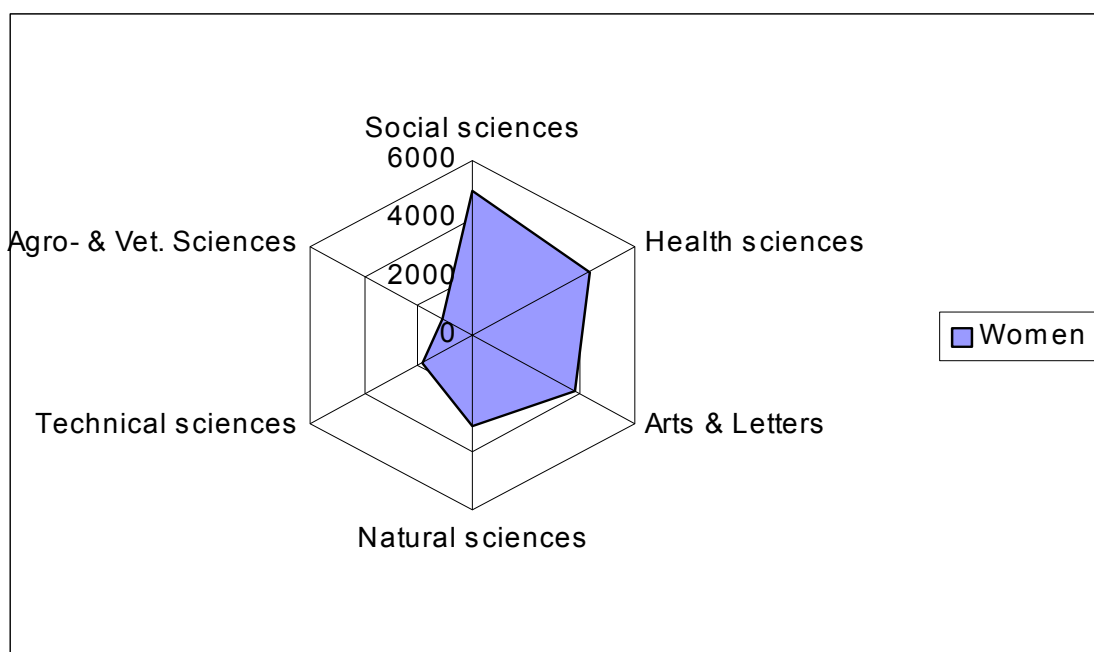
The picture - as illustrated by figure 4 - changes when gender is considered to junior positions.

In Denmark, for instance, we found that only 0,1 percentage of professors in technical sciences were women, but women constituted 24 percentage of the technical sciences RSE personnel employed in the ‘adjunkt’ position<sup>16</sup>. In agricultural & veterinarian sciences 8 percentage of Danish professors were women and 54 percentage had an ‘adjunkt’ position. The same picture is found in all the Nordic countries.

If we look at the distribution of all female RSE personnel among research areas 32 percentage of all female RSE in Denmark are found in the technical and natural sciences (929 persons of a total of 2,864, table.7). For Iceland the corresponding percentage is 31, for Finland 28 percentage and for Sweden 27 percent. The lowest share of women in these fields is found in Norway with 18 percentages.

Figure 5 shows this distribution for the Nordic countries seen én bloc.

**Figure 5: Distribution of all female RSE in main research areas in the Nordic countries 1997 (numbers)**



Source: own database; see also table 8.

*In junior positions the percentage of female researchers in all fields is higher than in senior positions. The more junior the position the larger the female share.*

<sup>16</sup> Corresponds to the American category assistant professor.

## Nordic women in academia, 1870-2000

There are in varying degree female researchers in all sciences. There has been a slow, but steady influx of female researchers and students into all scientific fields. But when and in which disciplines did the first Nordic women commence academic training?

From around 1870 the first Nordic women received their student exam<sup>17</sup> and were soon granted access to full studies at the universities. From 1870 to 1900 women came to be represented in most disciplines. Women gained rights to academic positions in public institutions in 1906 in Finland, in 1912 in Norway and then Denmark followed in 1921 and Sweden in 1927.

Natural Sciences and Engineering –and in both areas especially the chemistry branch - attracted a large proportion of the women as did biology. Medicine has right from the start been a popular study for women and so have philology, history and archaeology in the Arts and Letters field. Also law studies enrolled female students early, whereas other Social Sciences did not really enter the academic arena until the 20th century, hence women have entered economy and sociology relatively late. Finland appears to have had women with high degrees and in high offices from quite early days.

Which areas attract women today? On a Nordic “top-six” of main scientific fields in terms of actual numbers Social Sciences come in as number one with 4,983 female researchers, followed by Health Sciences and Arts & Letters with 4,312 and 3,732 female researchers respectively. The Natural Sciences, with 3,115 female researchers, attract almost as many women as Arts & Letters. Technical Sciences employ 1,848 female researchers. Agricultural and Veterinarian sciences recruit fewest women; here we find a total of 1,125 women, half of which in Sweden<sup>18</sup> - see figure 6.

The largest number of female RSE is to be found in the Social Sciences and in the Natural & Technical Sciences taken together. It has been a common assumption and worry that women avoid natural and technical sciences in favour of Arts & Letters, but this study reveals that when looking at actual numbers women do have a slight preference for the Natural and Technical sciences as 4,963 female researchers in the Nordic countries are employed here and 3,732 are employed in the Arts & Letters field – see also table 8. The percentage of female professorships, associate and assistant

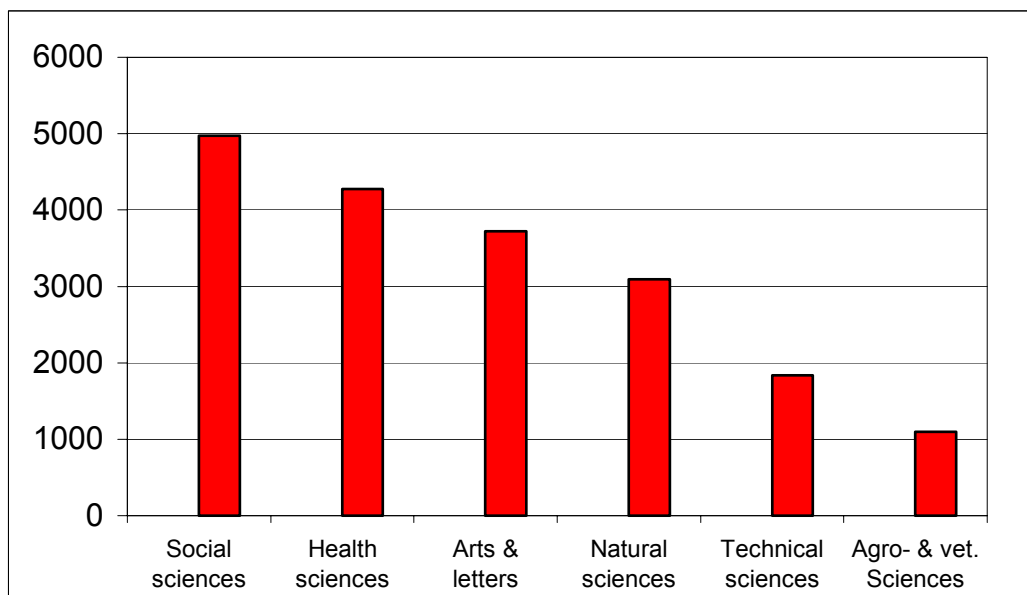
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<sup>17</sup> Qualifying exam equal to *Abitur* in Germany and *A-Levels* in England.

<sup>18</sup> For all references to numbers here, see table 6.

professorships and of female students in relation to males is lower in the Natural and Technical sciences than in the other main areas despite the fact that the actual number of women is higher in Natural and Technical Sciences than in the other areas.

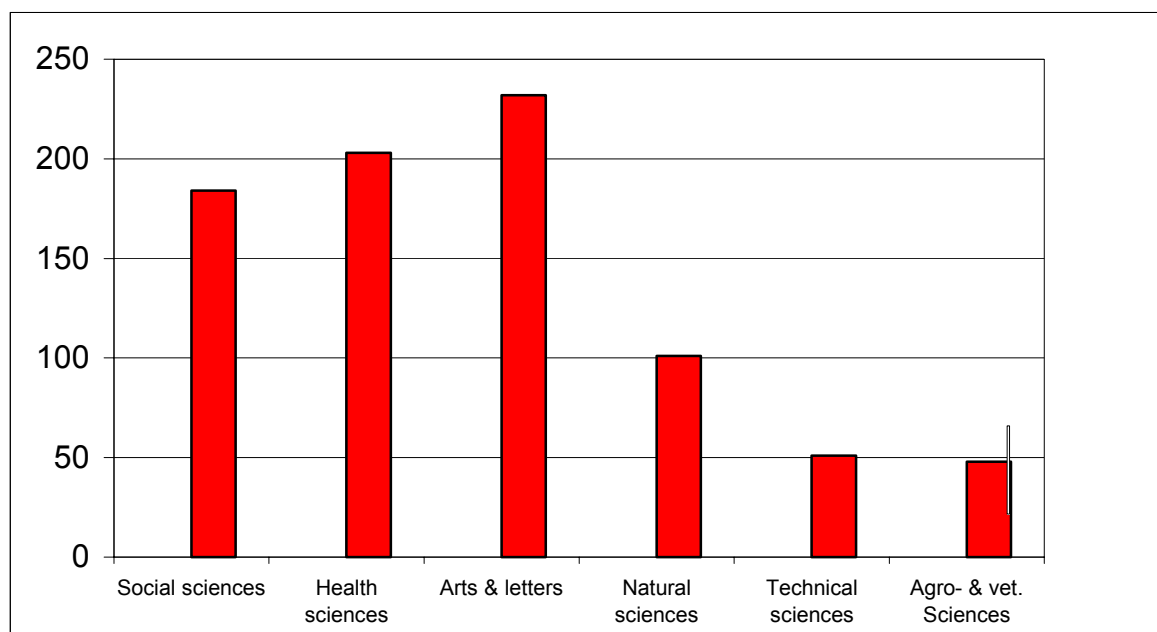
**Figure 6: Distribution of women in RSE in Nordic countries 1997; numbers**



Source: own database, see also table 6.

*There is no clear correlation between number of female RSE in an area and number of female professors as appears from a comparison of figures 6 and 7.*

**Figure 7: Distribution of female professors in Nordic countries 1997; numbers\***



Source: Own database, see also table 6.

\* Information from Iceland is not available

In 1997 the Nordic countries (Iceland not included) had 7,167 professors, 819 of whom were women and 6.370 were men. Table 7 and 8 show the absence of correlation between number of female research personnel and the amount of female professors.

This point can be illustrated if we, for instance, compare Arts & Letters with Health sciences in relation to the total RSE. Then we will find that in Arts & Letters 21 percentage of professors are women and 41 percentage of the total Arts & Letters RSE are women; whereas in Health Sciences almost the same percentage of total Health science RSE is women (42%), although only 13 percentage women hold professorships there.

The percentage of women RSE in Social Sciences and in Technical/Natural Sciences is the same (26%). But the percentage of female professors is considerably higher in Social Sciences (13%) than in Technical/Natural Sciences (4%). On the other hand, the percentage of female RSE in Arts & Letters is lower (20%) than in the aforementioned cases. But here the percentage of female professors is higher than in any of them.

**Table 8: Distribution of Nordic female professorships. 1997\***

|                                    | Male & Female share of professorships in main areas |       | Proportion in relation to total female professorships in all fields | Female RSE    |             |
|------------------------------------|---|-------|---|---------------|-------------|
|                                    | Men   | Women |   | Numbers       | Percent     |
| <b>Social sciences</b>             | 87%   | 13%   | 22%   | 4,989         | 26%         |
| <b>Health sciences</b>             | 87%   | 13%   | 25%   | 4,312         | 23%         |
| <b>Arts &amp; Letters</b>          | 79%   | 21%   | 28%   | 3,732         | 20%         |
| <b>Tech. &amp; Nat. sciences**</b> | 94%   | 6%    | 19%   | 4,963         | 26%         |
| <b>Agro-&amp; Vet. sciences</b>    | 87%   | 13%   | 6%  | 1,125         | 6%          |
| <b>Total</b>                       |   |       | <b>100%</b>   | <b>19,121</b> | <b>100%</b> |

Source: own database. See also table 6.

\* Information from Iceland is not available

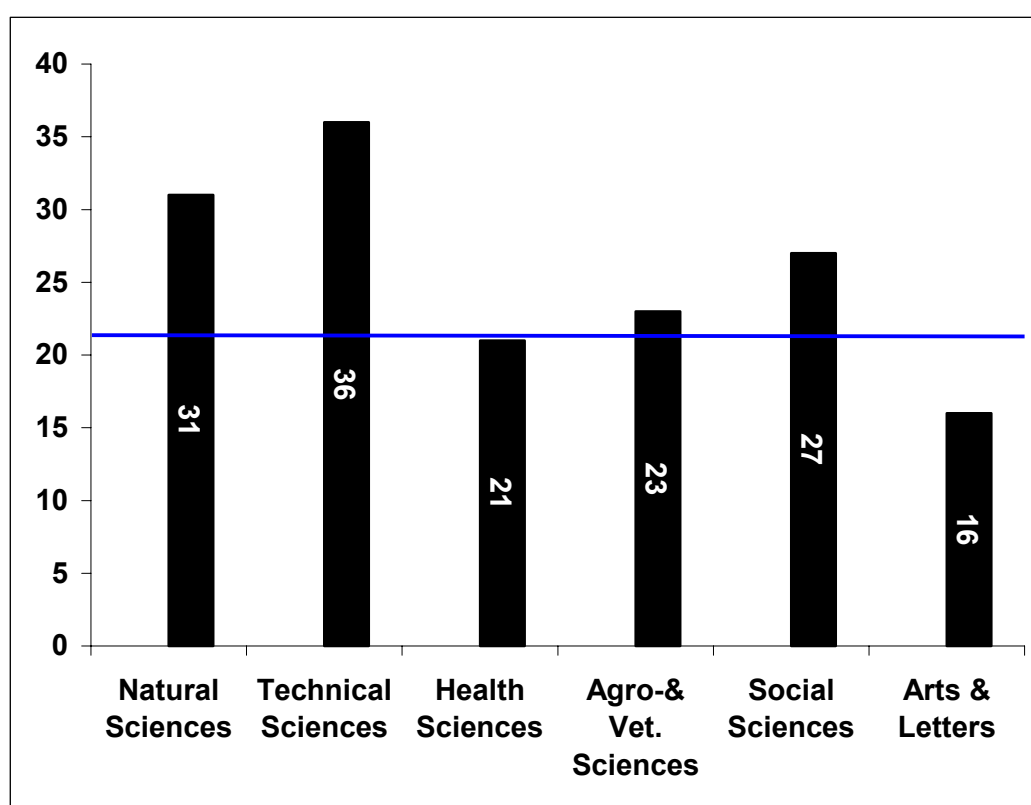
\*\* Natural Sciences 93% male and 7% female professors. Technical Sciences 96% male and 4% female professors. Natural Sciences female professorship proportion in relation to total female professorships in all fields: 12%; for Technical Sciences: 6%.



Figure 8 shows that behind each female professor in the Natural Sciences one finds twice as many female researchers as one finds behind the female Arts & Letters professors.

Seen from the other end, figure 8 and table 8 show that it takes 23 female RSE to each professor in the Agro- & Veterinary Sciences and 36 to each female professor in the Technical Sciences. But despite the higher relative number of female professors in the Agro- & Veterinary Sciences than in Natural & Technical sciences many more women choose careers in the later.

**Figure 8: Number of female RSE per female professor 1997 in main research areas in Nordic countries**



Source: Own database

\*The horizontal line indicates the Nordic average: 21 female RSE per one female professor.

Value is indicated by ciphers on dark background.

The debate on gender in academia refers often to the 'role model theory'. According to this, the role models – here female professors - will attract other persons to his or hers field and thus act as a locomotive for development.

A comparison of the share of female professors in different research areas with the share of female RSE in the same research areas does not confirm that there is any correlation between the two.

*The 'role model theory' appears to be wanting as a means of explanation of the situation so far, and therefore probably also as a model for policy.*

*In short, the amount of women in an academic field is not automatically followed by a proportional amount of female professors. A mixture of structural causes, individual cases and historical circumstances might explain the differences.*

## Conclusion

The comparison of the Nordic countries showed that Sweden and Finland had more personnel both in R&D and in RSE per thousand inhabitants in the labour force. They have the largest total R&D expenses when measured as a percentage of GDP and they are the largest spenders in R&D within both the business sector and in the sector for higher education. Norway and Denmark is the bottom pair except for R&D expenses in the government sector, where they hold a middle position.

It also appears that in all Nordic countries the business sector is of growing importance as a place of employment for researchers and the government sector is of declining importance.

The time series analysis of academically trained research personnel in relation to discipline, to gender and to position revealed that there are common features and tendencies in all five Nordic countries. The same slow, but steady increase in the proportion of women to men has taken place in all the countries in the University and Other Higher Education Sector - though not simultaneously and not at the same rate.

In 1997 the gender distribution of the total Nordic research personnel was two third of men and one-third of women.

It was common to all research fields that the more junior the position the larger the female share and there was a lack of correlation between number of female RSE in a given area and number of female professors. Hence the conclusion that the role model theory appears to be wanting as an explanation. The situation calls for other factors to be taken into account.

With regard to gender representation this study reveals that in actual numbers women do have a slight preference for the Natural and Technical Sciences over Arts & Letters. However, the relative share of women appears to be lower in the Natural and Technical sciences than in the other fields.

The ratios of men to women in the various research areas are similar in the Nordic countries, too. This indicates that the processes at work in the Nordic research landscapes are relatively similar.

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