

# WoS or Scopus?

**The state of Finnish scientific research at the start of the 2010s  
according to international citation data**

Reports of the Ministry of Education and Culture, Finland 2013:18



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<http://www.minedu.fi/OPM/Julkaisut/julkaisulistaus?lang=en>

Layout: Teija Metsänperä, Ministry of Education and Culture  
Cover image: Rodeo

ISBN 978-952-263-235-7 (PDF)

ISSN-L 1799-0343

ISSN 1799-0351 (Online)

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## Abstract

This report describes the state of, and developments in, Finnish scientific research in the period 2000–2010. The report was produced with reference to publication and citation data in the Thomson Reuters' Web of Science (WoS) and Elsevier's Scopus databases. An appendix also contains a comparison of the data.

The WoS and Scopus databases mainly give a similar impression of developments in Finnish science. The number of Finnish publications rose by a quarter in the last decade. Over the three-year period 2008–2010, the number of publications according to WoS was 29,000, and, according to Scopus, around 30,000. These are publications that include at least one author representing a Finnish research organisation (non-fractionalised figures). If co-publications are fractionalised according to the number of the countries of the writers contributing to them, Finnish writers account for 20,500 and 21,600 of all publications respectively (fractionalised figures). The fact that the number of non-fractionalised publications has grown faster than the number of fractionalised ones shows how Finnish publications are increasingly appearing as a result of international cooperation in research.

Despite the increase in the number of publications, Finland's contribution to global scientific publications has declined. According to the WoS data, it accounted for 0.71% in the period 2000–2002, but between 2008 and 2010 it was just 0.57%. The corresponding figures from Scopus are 0.69% and 0.53%. This decline is partly due to the rapid growth in the number of global publications, especially since China and India are now a greater presence in the market for scientific publications than before.

According to WoS, Finland's citation and the Top10 index have started to rise again, having shown a downward trend in the early 2000s. The citation index calculated with reference to Scopus data, meanwhile, is rising moderately, though steadily, and the Top10 index indicates a rise in the mid-2000s. The citation index is a reflection of the international impact of research. The Top10 index, for its part, indicates whether the research conducted by an examined unit (country, university, research institute) achieves a share among the total number of publications of the 10% that are cited most. Both indicators in this report are so structured that an examined unit is well placed in an international comparison if the indicator attains a value that is greater than 1. The upward trend in indicator values would suggest that Finnish science is moving in a

positive direction, but that is at least partly influenced by structural changes in progress in global data,

the most significant of which are the increase in contributions from China and India and the decrease in those made by the United States.

The greatest changes to publication numbers, if examined for each main scientific discipline, are the smaller contribution on the part of medical and health sciences and the greater one made by the social sciences. The citation indices for disciplines have reflected the general trend in the citation index. The agricultural and forestry sciences and medical and health sciences are faring the best. The impact of biological and environmental sciences, natural sciences and engineering and technology also exceeds the world average. The citation index for social sciences is below the world average.

Viewed from the perspective of research organisation type, it is universities that produce the majority of publications. They accounted for two-thirds (WoS)/three-fifths (Scopus) of all Finnish fractionalised publications. Publications by state research institutes and university hospitals both account for a good tenth of the total number of publications. Other more notable organisations that publish include hospital districts and companies. Universities of applied sciences, however, account for less than 1% of all publications. By the end of the decade, all the research organisation types apart from companies had a citation index above the world average

The highest values on the citation index for individual research organisations that are biggest in terms of number of publications were obtained by the National Institute for Health and Welfare, Kuopio University Hospital and the University of Helsinki.

In a comparison of OECD countries Finland's position had declined, although both its citation index and Top10 index positions were slightly stronger in the period 2008-2010 than they had been in the early part of the decade. At the start of the 2000s, Finland was in 8th position on the WoS citation index and 9th on the Top10 index. The corresponding positions in the most recent period were 13 and 14. The Scopus data showed Finland's position as 9th place on both indices at the start of the 2000s and 13 and 12 on the citation index and Top10 index respectively in the most recent period.

Almost half of the Finnish publications in the period 2008-2010 were produced in collaboration with foreign research organisations. The share of international co-publications grew in the 2000s in all scientific disciplines. Collaboration has a particularly important role to play in the natural and medical sciences. The share of international co-publications in the humanities is significantly lower than with other disciplines.

From the perspective of the main scientific disciplines of Finnish research organisations, the indication is that the University of Helsinki is the leader in all disciplines as regards numbers of publications, with the exception of engineering and technology and natural sciences. It is Aalto University that produces the greatest number of publications in the field of technology. According to WoS, Aalto University also produces almost as many publications on natural sciences as the University of Helsinki, and even more, according to Scopus. In the area of medical and health sciences, the University of Helsinki shares the leading position with the Helsinki University Central Hospital.

According to the WoS data, the highest values on the citation index for the impact made by research were received by the University of Helsinki together with Aalto

University and the University of Jyväskylä in natural sciences. The highest citation index value for biological and environmental sciences was obtained by the National Institute for Health and Welfare. In engineering and technology, Åbo Akademi University, Aalto University and the University of Oulu were in first place. On the citation index for medical and health sciences, the highest values were obtained by the National Institute for Health and Welfare, the University of Oulu, Turku University Hospital, the University of Eastern Finland and Helsinki University Central Hospital. MTT Agrifood Research Finland held first position in agricultural and forestry sciences, and Aalto University and the University of Turku in social sciences.

The Scopus citation index gives first place in natural sciences and biological and environmental sciences to the University of Helsinki, in engineering and technology to Åbo Akademi University and Aalto University, in medical and health sciences to the National Institute for Health and Welfare and the University of Eastern Finland, and in social sciences to the University of Turku, the University of Jyväskylä and Aalto University.



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# 1 Introduction

This report describes the state of, and developments in, Finnish scientific research in the period 2000–2010. The aim is also to compare the data sets in WoS with those in Scopus. The report was compiled by a working group set up by the Ministry of Education and Culture. The working group consisted of:

- Olli Poropudas, Ministry of Education and Culture
- Anu Nuutinen, Academy of Finland
- Janne Pölönen, Federation of Finnish Learned Societies
- Yrjö Leino, CSC – IT Center for Science Ltd
- Paula Mikkonen, National Library of Finland
- Hanna-Mari Puuska, CSC – IT Center for Science Ltd

The report is based on the publication and citation data in the Thomson Reuters' Web of Science (WoS) and Elsevier's Scopus databases. Both databases contain references to millions of scientific publications, such as the publication's name, its authors, their affiliations (information on the research organisation an author works for), the disciplines a publication represents, the type of publication, the year it appeared and the sources used. This information serves to calculate indicators that can be used to assess the scope and impact of the scientific publishing activity of research organisations.

Publications cited in the WoS and Scopus databases cover several hundred scientific fields. In this report, however, they are grouped into seven main *scientific disciplines* (see Appendix 1 for the classification). They are

- natural sciences
- biological and environmental sciences
- engineering and technology
- medical and health sciences
- agricultural and forestry sciences
- social sciences
- the humanities

The numbers of publications shown and the citation indices are generally based on fractionalised publication numbers. Non-fractionalised publications refer to publications whose author represents at least one examined unit (country, university, research institute). The fractionalised publication number is obtained by dividing co-publications among the participating units.<sup>1</sup>

The scientific impact of the publishing activity of a research unit (e.g. a research organisation, a main scientific discipline) is represented in the relative citation index<sup>2</sup>. The relative citation index gives a picture of the international impact that the research has had. It is calculated by dividing the number of

<sup>1</sup> For the applications undertaken with regard to the different examined units, see Appendix 3.

<sup>2</sup> In chapters 2, 3 and 4 the shorter concept of the *citation index* is used instead of *relative citation index*.

citations for a publication by the average number of citations for all publications for the discipline in question. If a publication attracts as many citations as the average for that field, its citation index will have a value of 1. If the number of citations is greater than the average, the citation index value will be greater than 1. If the number of citations is below the average for the field, the citation index will have a value less than 1. A publication is regarded as having a greater impact the more its value exceeds the average citation value for the field.

An examined unit whose relative citation index is high also always releases publications that have no citations whatsoever. Equally, a unit with a low relative citation index may employ research groups that repeatedly publish a large number of articles that attract citations. To assess the contribution made by these top publications, the *Top10 index* is used. The Top10 index indicates whether the research conducted by a unit achieves a share corresponding to the total number of publications for that unit of the 10% that are cited most. As with the relative citation index, a Top10 index value of 1.0 also means that the share of top publications in the research unit's output is equal to the world average, and index values greater than 1.0 mean that the share of top publications in its output is greater than 10%.<sup>3</sup>

Research units are examined by research organisation and research organisation type (Appendix 2). Research organisation types are the following:

- universities
- universities of applied sciences
- state research institutes
- university hospitals
- other hospital districts
- companies

Of these research organisation types, it is universities, state research institutes, and university hospitals that are examined in more detail here. For other organisation types, only the publication numbers are

given. With respect to indices that reflect impact, no results are reported if the unit being analysed does not produce more than 100 publications in total in the three-year period covered (see appended tables). This is because the indicators for small units can fluctuate greatly from one year to the next, for example when one publication among a whole group attracts a large number of citations.

The state of Finnish scientific research in 2010 is examined with reference to the Web of Science in chapter 2 and Scopus in chapter 3. In chapter 4, the pictures provided by the data are compared. Appendix 3 contains a more detailed description of the data processing methods employed.

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<sup>3</sup> For more details, see Appendix 3.

## 2 The state of Finnish scientific research in 2010 according to the Web of Science

### Total number of Finnish publications and their international impact

The number of Finnish WoS publications rose steadily in the past ten years (Figure 2.1). Over the three-year period 2000–2002, the number of publications was around 23,000, but in the period 2008–2010 it was around 29,000 (non-fractionalised

figures). If co-publications are divided according to the number of the countries contributing, Finnish contributions account for 17,600 and 20,500 of all publications (fractionalised figures). The fact that non-fractionalised figures have grown faster than fractionalised figures is a reflection of the ever greater number of Finnish publications that are being released in the context of international co-publications.

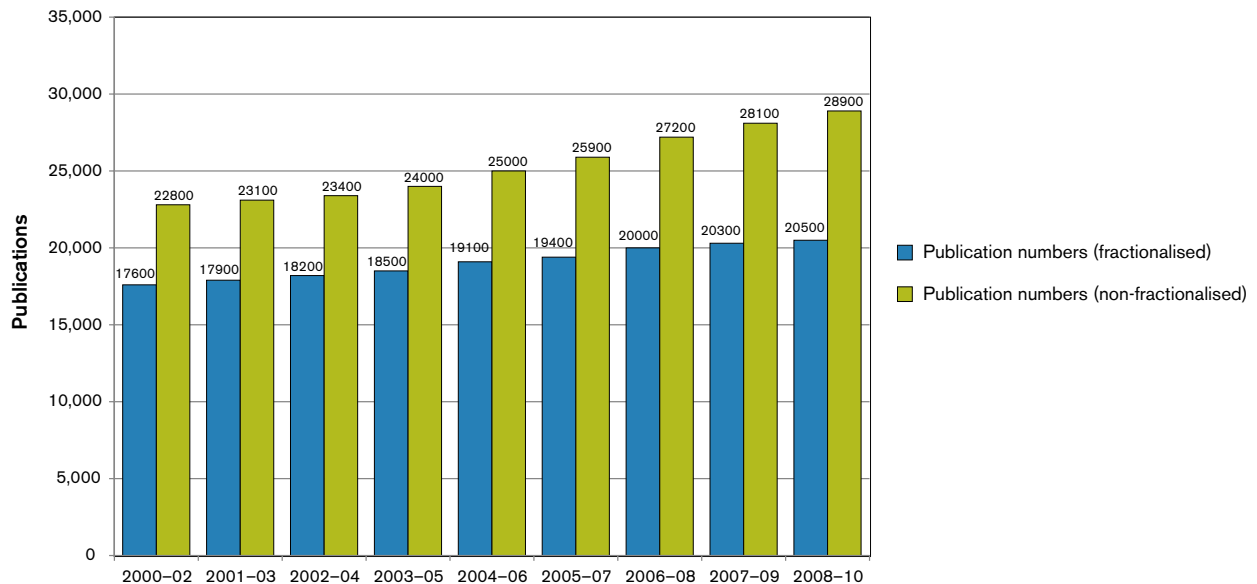


Figure 2.1. Trend in the number of Finnish publications in the period 2000–2010 according to WoS.

Despite the increase in the number of publications, Finland's contribution to global scientific publications has declined (Figure 2.2). It accounted for 0.71% in the period 2000–2002, but between 2008 and 2010 it was just 0.57%. This decline is partly due to the rapid growth in the number of global publications, especially since China and India are now a much greater presence in the market for scientific publications. Finland's citation and Top10 indices have started to rise again, having shown a downward trend in the early 2000s (Figure 2.3). The upward trend in indicator values would suggest that Finnish science is moving in

a positive direction, but this is also influenced by structural changes in global output.

### Trend by scientific discipline

Examined on the basis of scientific discipline, most publications are on the subject of medical and health sciences, which accounted for 32% of all the publications registered by Thomson Reuters in the three-year period 2008–2010 (Figure 2.4). Other major disciplines mentioned in this data and in the classification of scientific disciplines used are natural sciences and biological and environmental sciences.



Figure 2.2. Finnish share of world publications 2000–2010 according to WoS, % (fractionalised publications)

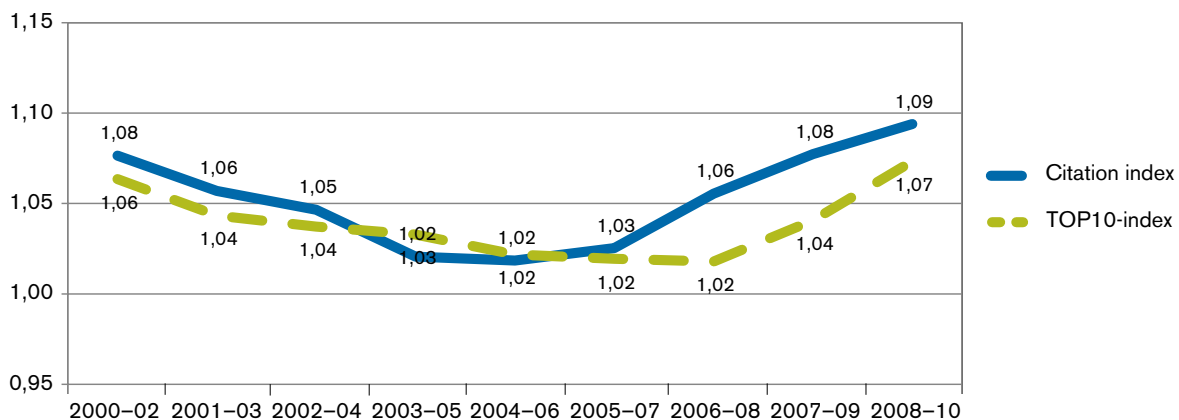
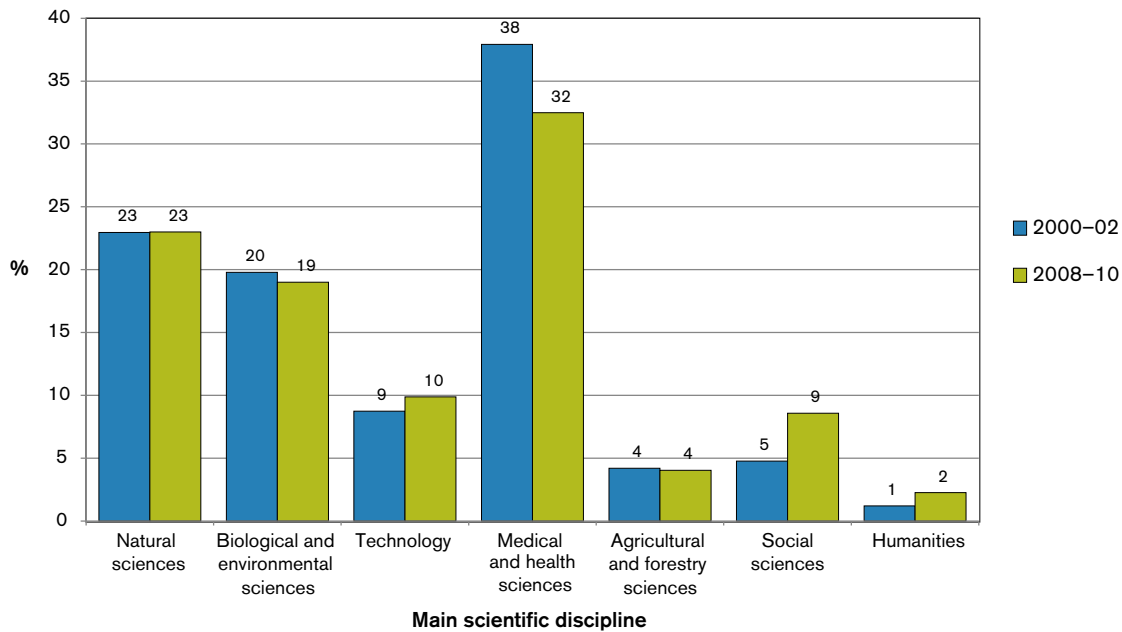


Figure 2.3. Finland's citation index and Top10 index 2000–2010 according to WoS

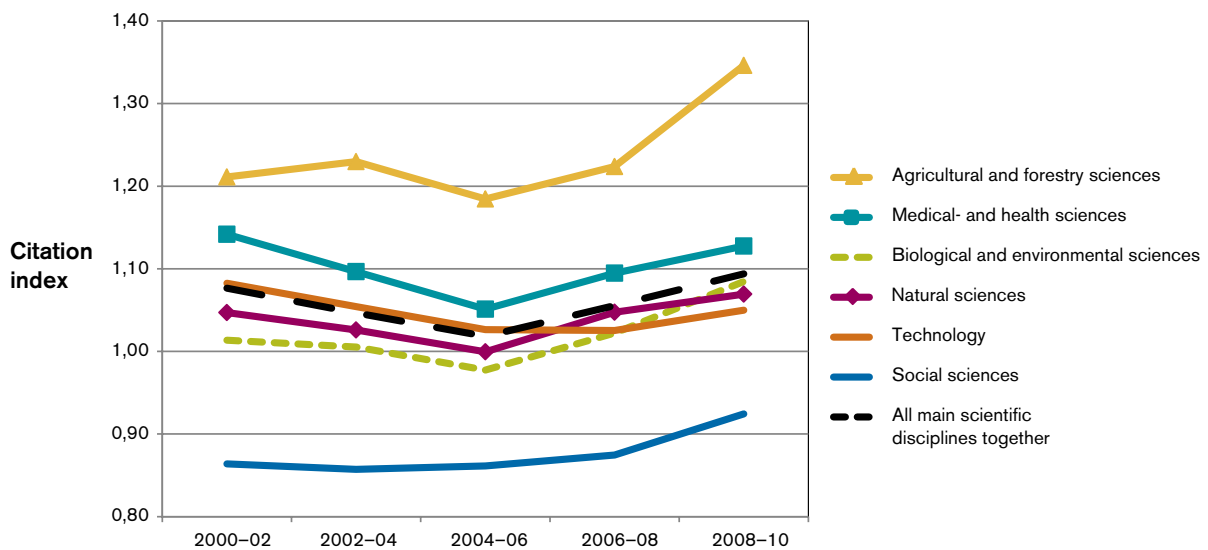
The greatest change in the 2000s is the fall in the contribution from medical and health sciences by six percentage points and the corresponding rise of four percentage points in social sciences.

The citation indices for the main scientific disciplines have reflected the general trend in the citation index (Figure 2.5). The citation indices for all the main scientific disciplines rose in the latter

half of the decade, having fallen in the first half. It is the agricultural and forestry sciences and medical and health sciences that are faring best. The impact of biological and environmental sciences, natural sciences and engineering and technology also exceeds the world average. The citation index for social sciences is below the world average, but is now rising in that direction.



**Figure 2.4.** Contributions made by the main scientific disciplines to Finnish publications (fractionalised) in the periods 2000-2002 and 2008-2010, according to WoS, %



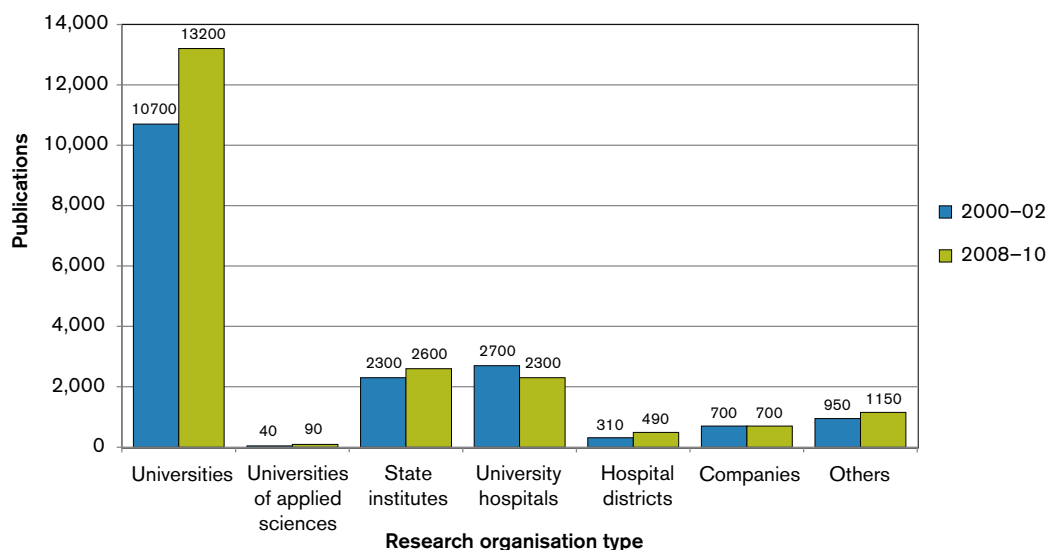
**Figure 2.5.** Citation index for the main scientific disciplines that are biggest in terms of publication numbers 2000-2010 according to WoS, %

## Research organisations

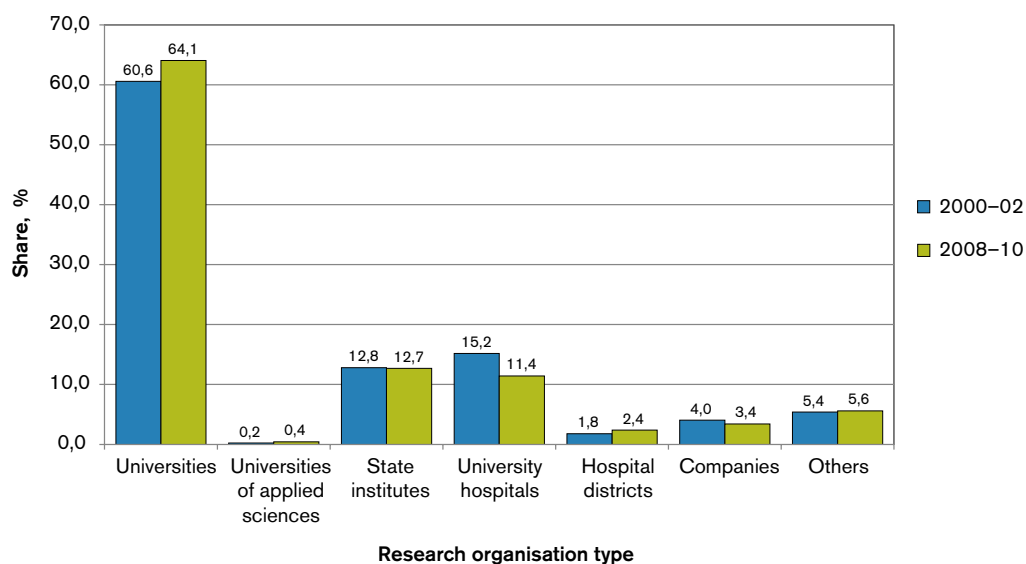
Among research organisations the greatest number of publications is produced by the universities – 13,200 in the three-year period 2008–2010 (Figure 2.6). They account for 64% of the total (Figure 2.7). The number of publications from state research institutes was 2,600 (12.7%), and from university hospitals 2,300 (11.4%). The figures for universities and state research institutes rose in the 2000s. Publication numbers for hospital districts and companies remained

under the one thousand mark. Universities of applied sciences accounted for just 0.4% of all publications by the end of the decade.

The citation index for research organisations showed the same trend in the 2000s as the citation index for the whole country: fairly high values at the start of the decade that dipped halfway through the period and then rose again later (Figure 2.8). By the end of the decade, the citation index for universities and state research institutes was close to 1.10 and for university hospitals it was slightly higher.



**Figure 2.6.** Number of publications (fractionalised) by research organisation type 2000–2010, according to WoS



**Figure 2.7.** Contributions by research organisation type to Finnish publications 2008–2010, according to WoS, %

The relative citation index for companies remained below 0.95 throughout the decade.

The highest citation index for research organisations that are the biggest in terms of their publication numbers is that for the National Institute for Health and Welfare (1.40), and the second highest is for MTT Agrifood Research

Finland (1.39). Kuopio University Central Hospital comes next (1.24) and in fourth place is the University of Helsinki (1.22). The following also have positions above the world average: the University of Eastern Finland, Åbo Akademi University, the University of Oulu, Aalto University, and the University of Jyväskylä.

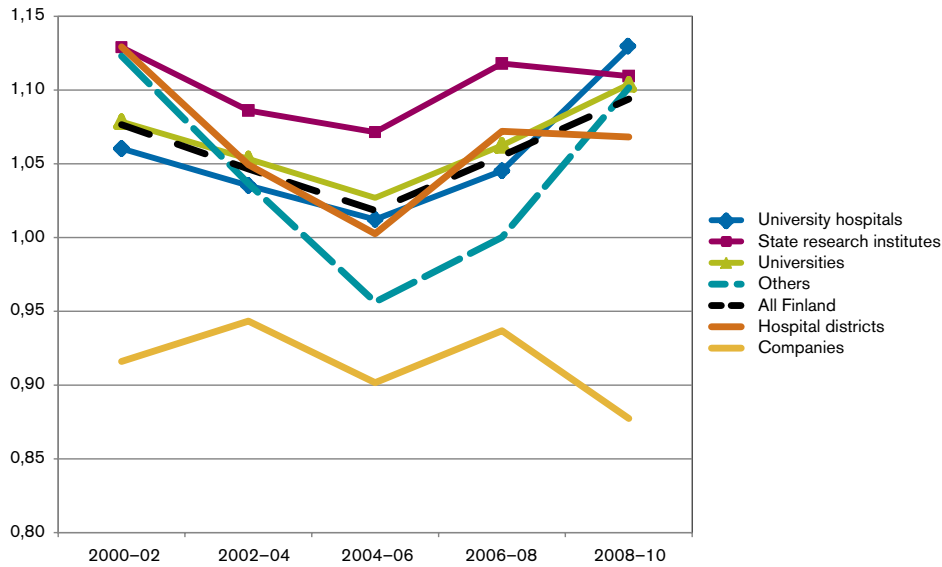


Figure 2.8. Trend in the citation index by research organisation type 2000–2010, according to WoS

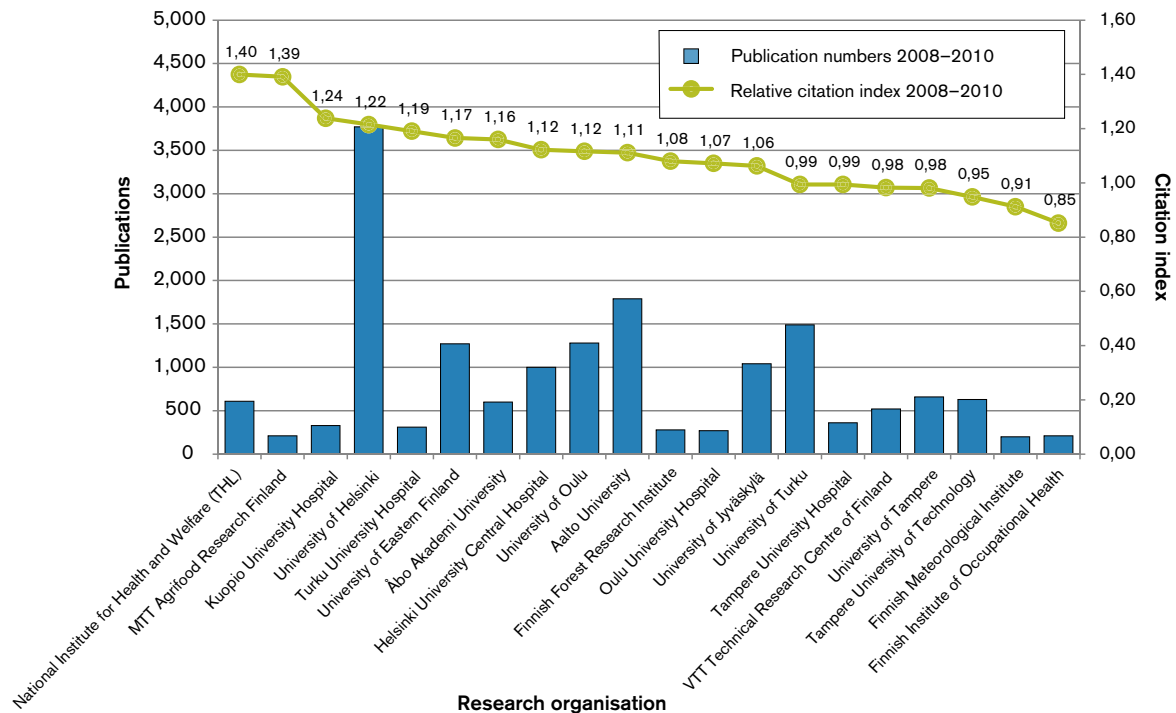


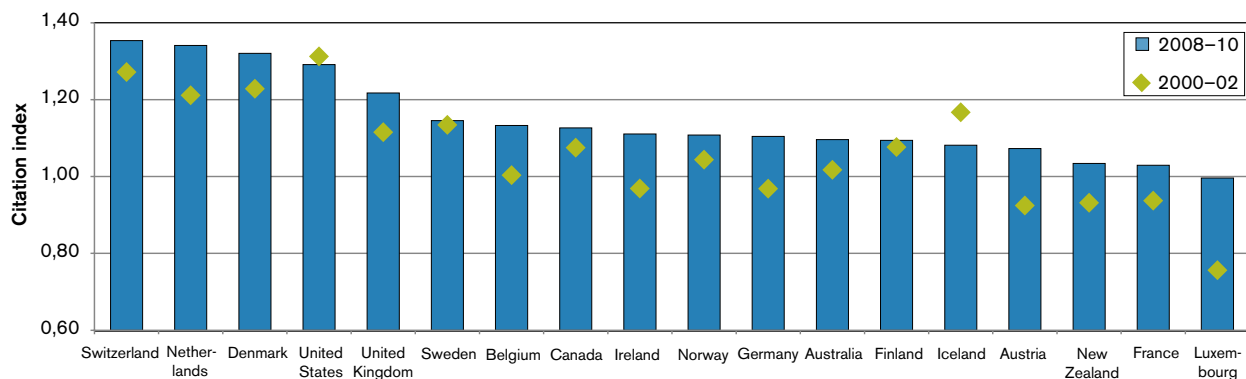
Figure 2.9. Citation indices for the biggest research organisations 2008–2010, according to WoS NB. The diagram gives the data for the 20 research organisations that are biggest in terms of their publication numbers.



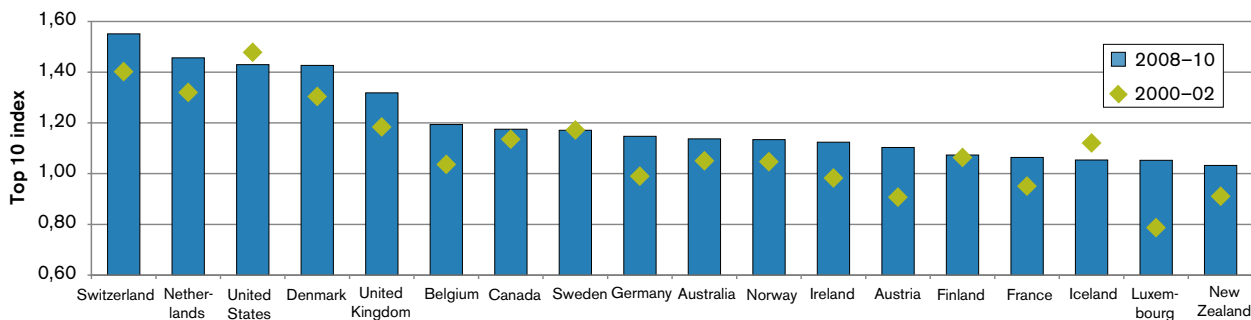
## Finland's position in an international comparison

In a comparison of OECD countries, 18 were in an average position or above it on the citation index and the Top10 index globally in the period 2008–2010 (Figures 2.10 and 2.11). The four leading countries were Switzerland, the Netherlands, Denmark and the United States. The citation indices for all countries compared, apart from the United States and Iceland, were higher in the period 2008–2010 than at the start of the decade. The same was also true of the Top10 index. Sweden's Top10 index remained the same in both review periods.

An examination of Finland's position using the citation indicators shows that global competition in publishing grew more intense in the 2000s. Finland's position declined in the comparison of OECD countries, although both the Finnish citation index and its Top10 index were in a slightly stronger position in 2008–2010 than at the beginning of the decade (Figure 2.12). Finland ranked 8th (citation index) and 9th (Top10 index) at the start of the 2000s. The corresponding positions in the most recent period were 13 and 14. Overtaking Finland in the 2000s were Belgium, Ireland, Norway, Germany and Australia, when positions in both comparisons are examined.



**Figure 2.10.** Citation index for OECD countries in average position or above on the global scale in the most recent period 2000–2002 and 2008–2010

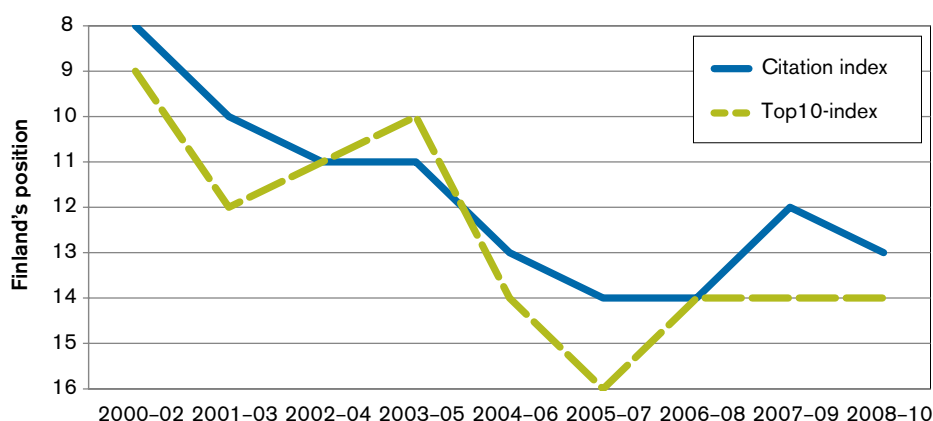


**Figure 2.11.** Top10 index for OECD countries in average position or above on the global scale in the most recent period 2000–2002 and 2008–2010

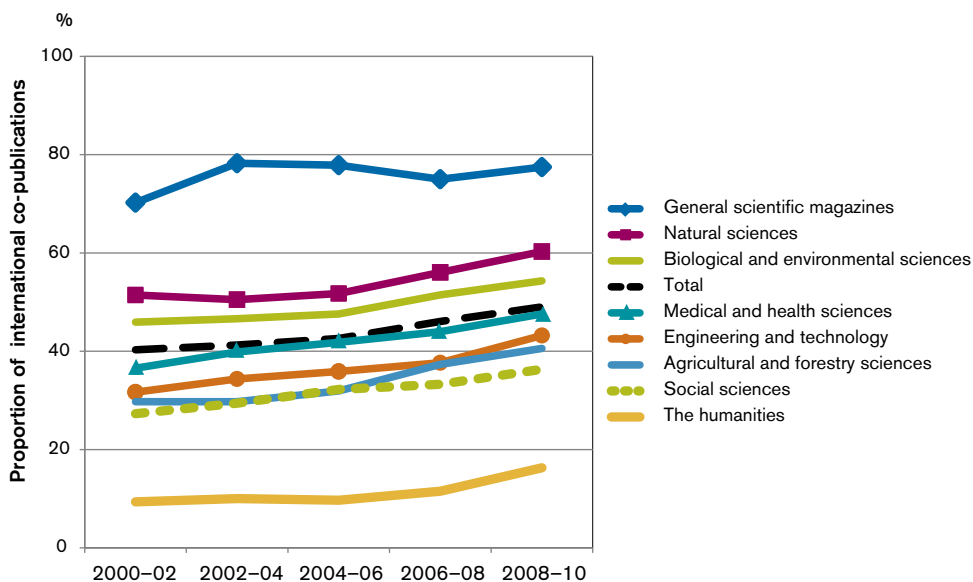
## Internationalisation of Finnish science

Most research is conducted outside Finland, so international cooperation is very important for Finnish science. Almost half of the Finnish publications in the period 2008–2010 were produced in collaboration with foreign research organisations. The proportion of international co-publications increased from the start of the

2000s in all scientific disciplines. Collaborations are highly significant in natural and medical sciences, in which a major part of research is published in general scientific magazines. The share of international co-publications in the humanities is far smaller than with other disciplines (Figure 2.13).



**Figure 2.12.** Finland's position in a comparison of the relative citation indices and Top10 indices for OECD countries 2000–2010



**Figure 2.13.** Proportion of international co-publications by scientific discipline 2000–2010.

## Research organisations by main scientific discipline

The diagrams for individual main scientific disciplines (2.14–2.19) give the number of publications and the citation index for all those research organisations that released more than 100 publications in the scientific field under scrutiny in the period 2008–2010. The position of a research organisation in the period 2008–2010 is indicated by a coloured ball that moves along the vertical axis to reflect the citation index and along the horizontal axis to represent the number of publications. The size of the ball, furthermore, is determined by the number of publications. The lighter-coloured ball represents the number of publications and the citation index for a research organisation in the period 2000–2002. A comparison of the situation in 2008–2010 with that in 2000–2002 reveals how the position of the various research organisations changed over the whole decade.

The University of Helsinki publishes more than the others in the field of natural sciences, and it achieves the highest citation index of all Finnish research organisations together with the University of Jyväskylä, which has seen the most dramatic rise. Other organisations that achieved a citation index that is higher than the world average include Aalto University and the Finnish Meteorological Institute, even though their citation index fell. At the same time, Aalto University almost caught up with the University of Helsinki in the number of publications devoted to natural sciences.

The University of Helsinki stands out as the clear leader for publications in biological and environmental sciences. But the National Institute for Health and Welfare, whose number of publications is almost ten times smaller, rose on the citation scale to a point that was much higher than even that for the University of Helsinki.

In engineering and technology, Aalto University increased its lead as the largest publisher compared to the other research organisations. The citation index for publications of Åbo Akademi University climbed to outstrip Aalto in the 2000s. Meanwhile, the citation index for the University of Oulu fell

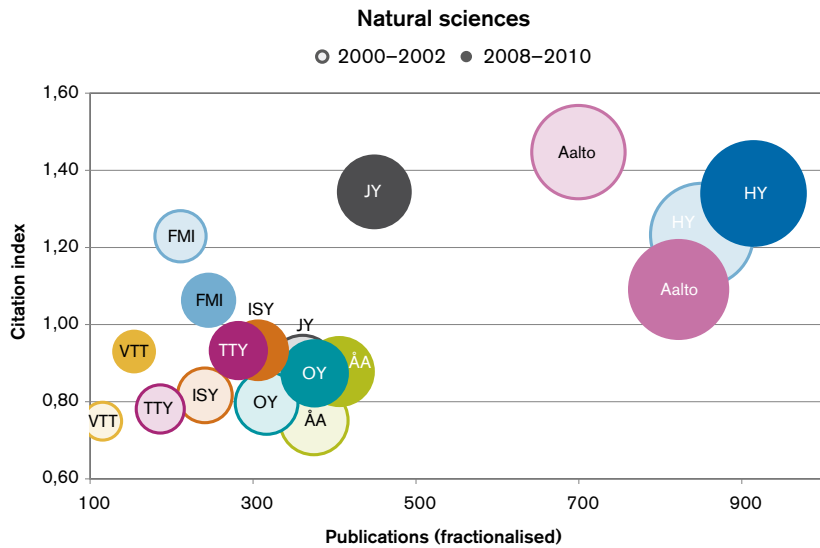
below the figure for Aalto, though remaining above the world average.

In medical and health sciences, Helsinki University Central Hospital and the University of Helsinki publish more than the others. The highest citation index value is achieved by the National Institute for Health and Welfare. Furthermore, the University of Oulu, Turku University Central Hospital, University of Eastern Finland, the University of Turku and Kuopio University Central Hospital achieved higher citation index values than Helsinki University Central Hospital and the University of Helsinki, or values as high as the last two institutions, clearly exceeding the world average.

In agricultural and forestry sciences, the University of Helsinki publishes more than the others. The highest citation index value is attained by MTT Agrifood Research Finland. The citation index for the University of Eastern Finland and that for the Finnish Forest Research Institute (Metla) also exceed the world average.

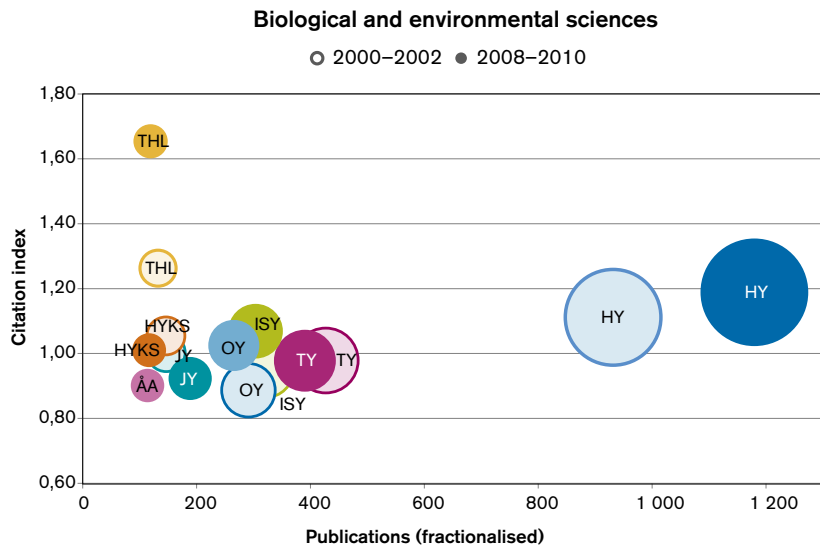
The University of Helsinki publishes the most with respect to social sciences, though during the 2000s, four other universities produced 100 publications on social sciences. The highest citation index values are attained by Aalto University, the University of Turku and the University of Jyväskylä.

In the humanities, only the University of Helsinki produced more than 100 publications in the period 2008–2010.



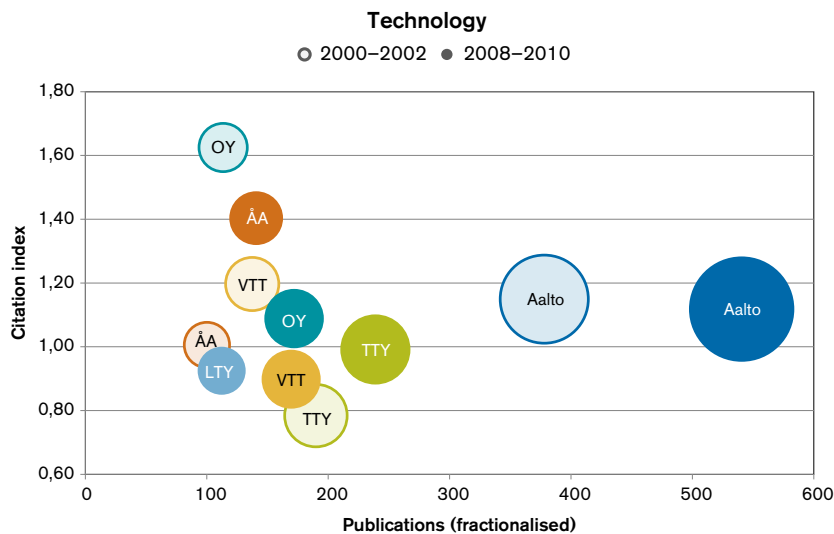
VTT = Technical Research Centre of Finland  
 FMI = The Finnish Meteorological Institute  
 ISY = University of Eastern Finland  
 TTY = Tampere University of Technology  
 OY = University of Oulu  
 ÅA = Åbo Akademi University  
 JY = University of Jyväskylä  
 Aalto = Aalto University  
 HY = University of Helsinki

**Figure 2.14.** Number of publications and the citation index for social sciences by research organisation 2000–2002 and 2008–2010, according to WoS



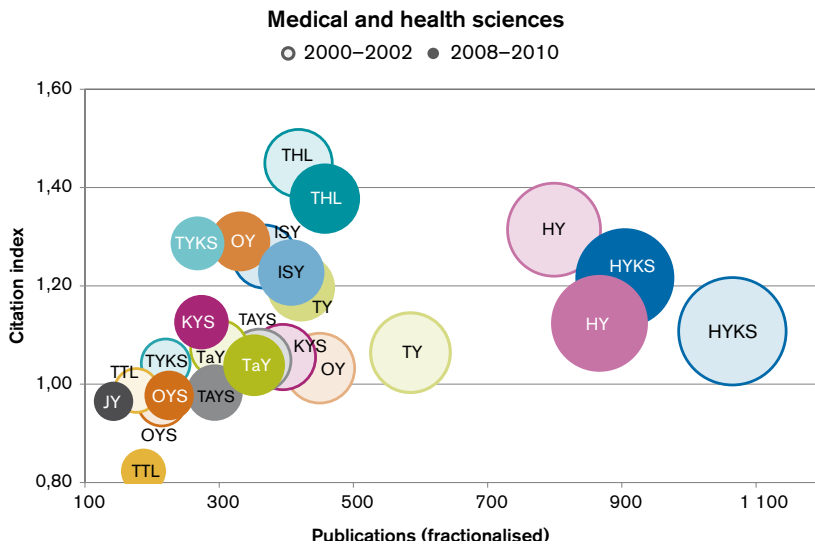
THL = National Institute for Health and Welfare  
 HYKS = Helsinki University Central Hospital  
 ISY = University of Eastern Finland  
 TY = University of Turku  
 OY = University of Oulu  
 ÅA = Åbo Akademi University  
 JY = University of Jyväskylä  
 HY = University of Helsinki

**Figure 2.15.** Number of publications and the citation index for biological and environmental sciences by research organisation 2000–2002 and 2008–2010, according to WoS



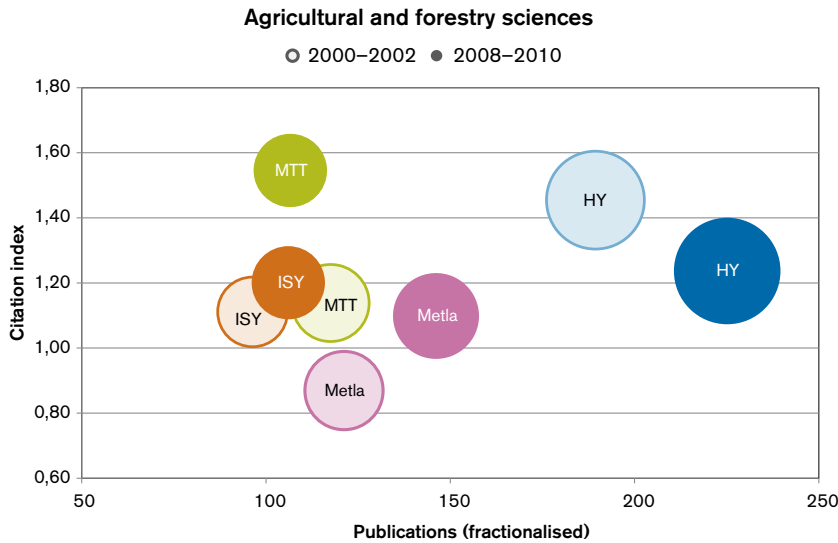
VTT = VTT Technical Research Center of Finland  
 OY = University of Oulu  
 ÅA = Åbo Akademi University  
 LTY = Lappeenranta University of Technology  
 TTY = Tampere University of Technology  
 Aalto = Aalto University

**Figure 2.16.** Number of publications and the citation index for engineering and technology by research organisation 2000–2002 and 2008–2010, according to WoS



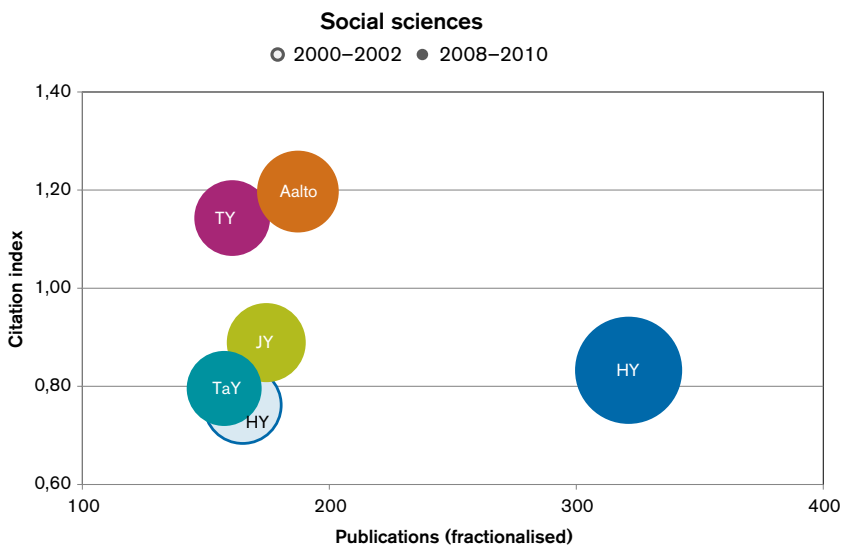
TTL = Institute of Occupational Health  
 JY = University of Jyväskylä  
 OYS = Oulu University Hospital  
 TYKS = Turku University Central Hospital  
 TAYS = Tampere University Hospital  
 KYS = Kuopio University Hospital  
 TaY = University of Tampere  
 OY = University of Oulu  
 THL = National Institute for Health and Welfare  
 ISY = University of Eastern Finland  
 TY = University of Turku  
 HY = University of Helsinki  
 HYKS = Helsinki University Central Hospital

**Figure 2.17.** Number of publications and the citation index for medical and health sciences by research organisation 2000–2002 and 2008–2010, according to WoS



Metla = Finnish Forest Research Institute  
 MTT = MTT Agrifood Research Finland  
 ISY = University of Eastern Finland  
 HY = University of Helsinki

**Figure 2.18.** Number of publications and the citation index for agricultural and forestry sciences by research organisation 2000–2002 and 2008–2010, according to WoS



TY = University of Turku  
 Aalto = Aalto university  
 JY = University of Eastern Finland  
 TaY = University of Tampere  
 HY = University of Helsinki

**Figure 2.19.** Number of publications and the citation index for social sciences by research organisation 2000–2002 and 2008–2010, according to WoS

### 3 The state of Finnish scientific research in 2010 according to Scopus

#### Total number of Finnish publications and their international impact

The number of Finnish Scopus publications rose steadily in the last decade (Figure 2.1). Over the three-year period 2000–2002, the number of publications was around 22,000, but in the period

2008–2010 it was 30,000 (non-fractionalised figures). If co-publications are divided according to the number of the countries contributing, Finnish contributions account for 18,200 and 21,600 of all publications (fractionalised figures). The fact that non-fractionalised figures have grown faster than fractionalised figures

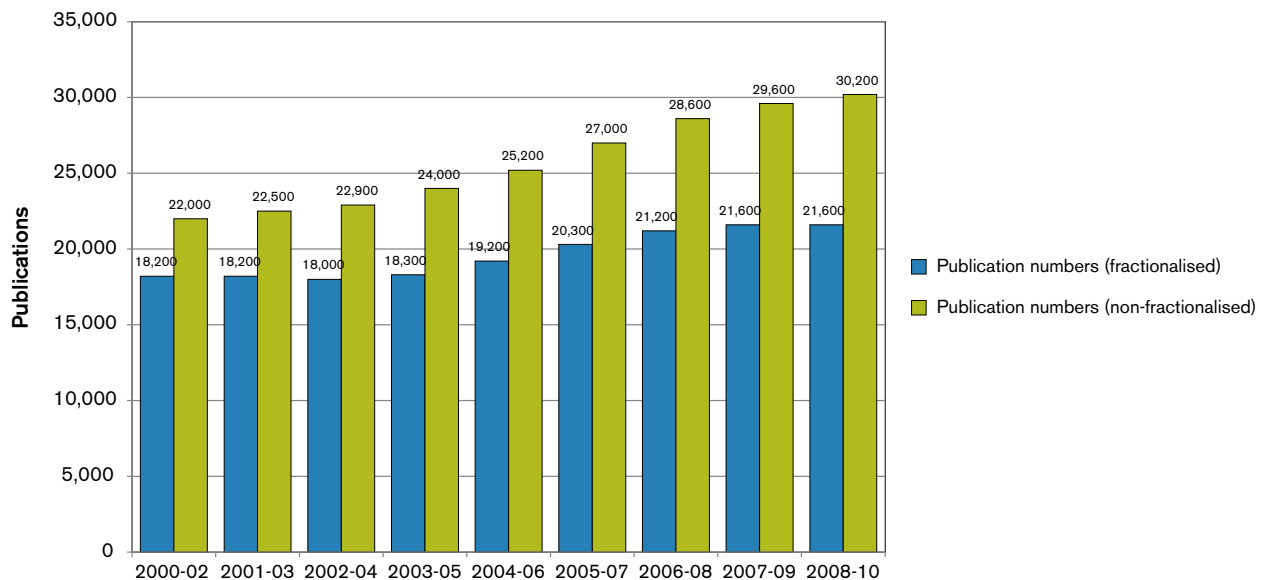


Figure 3.1. Trend in the number of Finnish publications in the period 2000–2010 according to Scopus.

Despite the increase in the number of publications, Finland's contribution to global scientific publications has declined (Figure 3.2). It accounted for 0.69% in the period 2000–2002, but only 0.53% between 2008 and 2010. This decline is partly due to the rapid growth in the number of global publications, especially since China and India are now far more of a presence in the market for scientific publications than before.

Both the citation index and the Top10 index have seen slight rises over the 2000s, although the rise in the Top10 index was more robust (Figure 3.3).

### Trend by scientific discipline

Examined on the basis of scientific discipline, most publications are on the subject of medical and health sciences, which accounted for 34% of all the publications registered with Scopus in the three-year period 2008–2010 (Figure 3.4).

Other major disciplines mentioned in this data and in the classification of scientific disciplines used are natural sciences and biological and environmental sciences. The greatest change in the 2000s is the fall in the contribution from medical and health sciences by four percentage points and the corresponding rise of seven percentage points in social sciences.

The citation indices for medical and health sciences, natural sciences and biological and environmental sciences rose in line with the citation index for the whole country (Figure 3.5). However, the rise in the indices for agricultural and forestry sciences, engineering and technology and social sciences ceased in the middle of the decade, and was followed by a decline. At the end of the decade, medical and health sciences and agricultural and forestry sciences were in the best position, and above the national average. The citation index for all the main scientific indices was, in any case, over the world average.

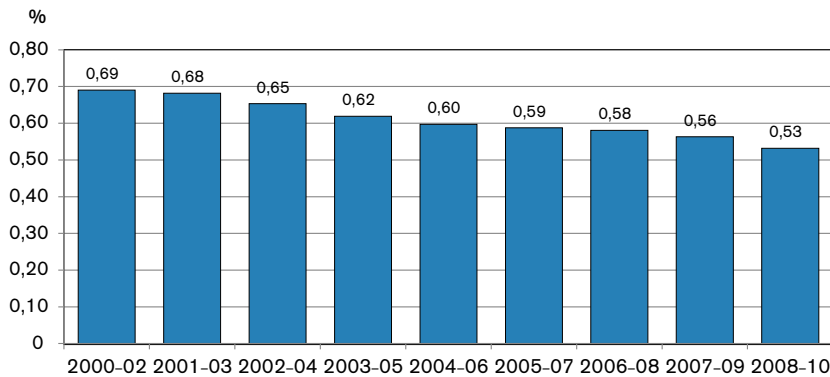


Figure 3.2. Finnish share of world publications 2000–2010 according to Scopus, % (fractionalised publications)

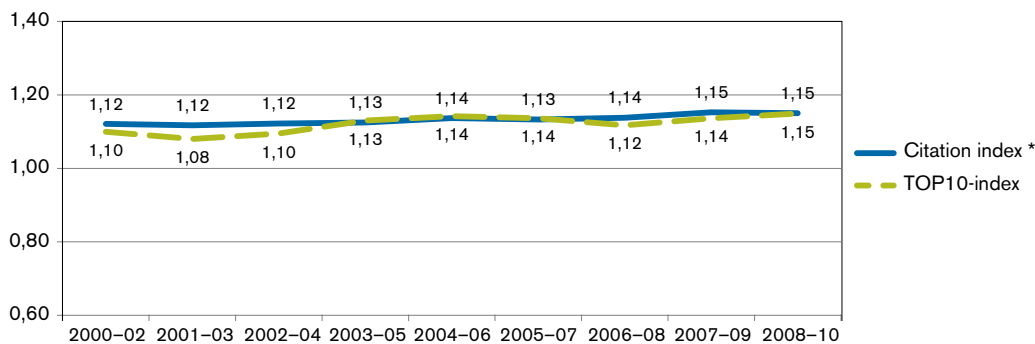
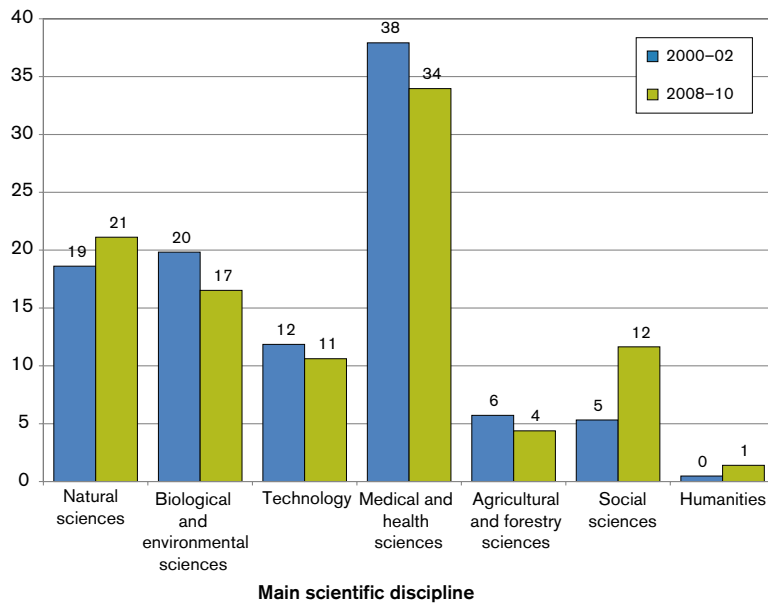
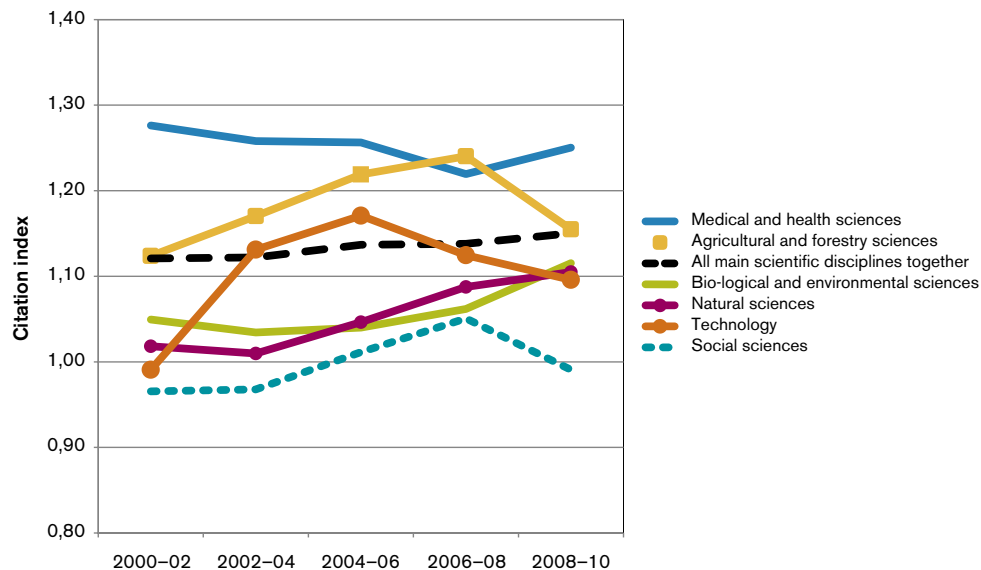


Figure 3.3. Citation index and Top10 index 2000–2010 according to Scopus.





**Figure 3.4.** Contributions made by the main scientific disciplines to Finnish publications (fractionalised) in the periods 2000–2002 and 2008–2010, according to Scopus, %

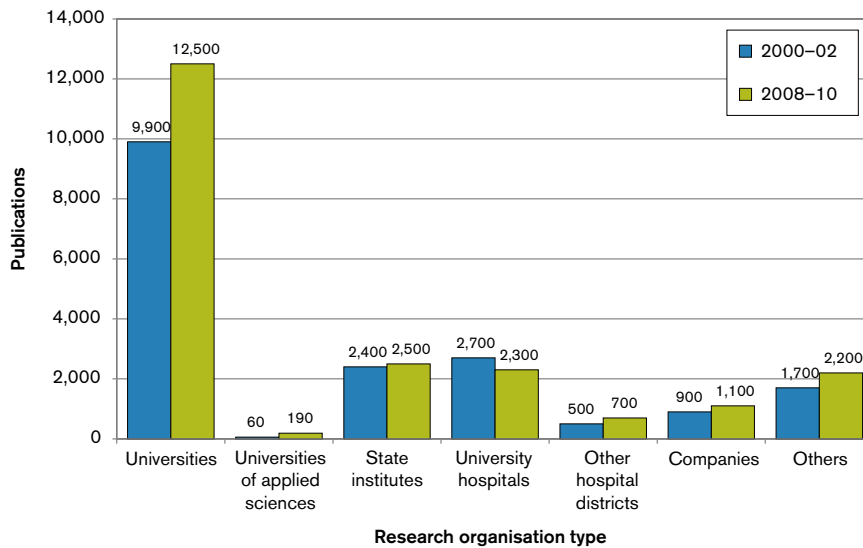


**Figure 3.5.** Citation index for the main scientific disciplines that are biggest in terms of publication numbers 2000–2010 according to Scopus, %

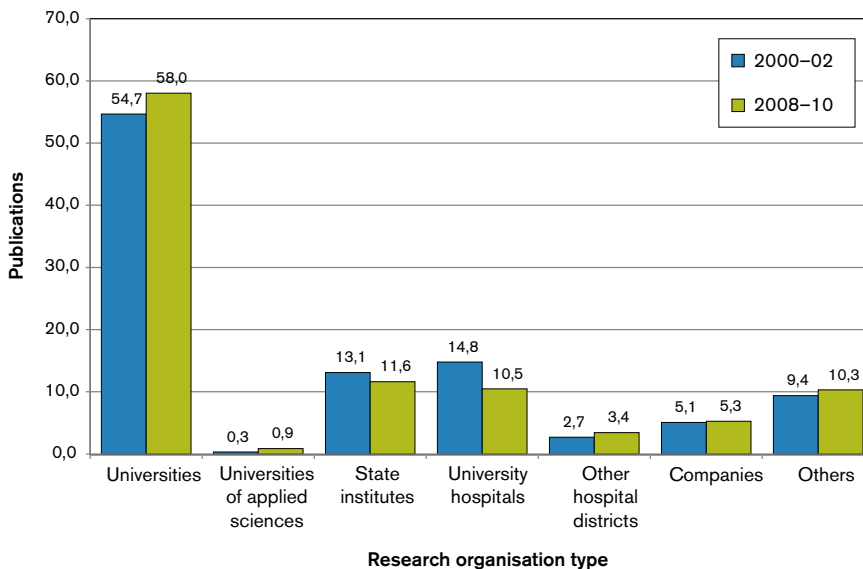
## Research organisations

Among research organisations, it is the universities that produce most publications – 12,500 in the three-year period 2008–2010 (Figure 3.6). They account for 58% of the total for Finland (Figure 3.7). The number of publications from state research institutes was 2,500 (11.6 %), and from university hospitals

2,300 (10.5%). Only the publication numbers for universities rose appreciably in the 2000s. Publication numbers for hospital districts remained below the 1,000 mark, while those for companies exceeded it. Universities of applied sciences accounted for just 0.9% of all publications by the end of the decade.



**Figure 3.6.** Number of publications (fractionalised) by research organisation type 2000–2010, according to Scopus



**Figure 3.7.** Contributions by research organisation type to Finnish publications 2008–2010, according to Scopus, %

The citation indices for university hospitals and hospital districts were above the national average throughout the 2000s, and the same is true of universities. The citation index for state research institutes dipped in the latter half of the decade and fell below the national average (Figure 3.8). The citation index for companies remained below the international average throughout the decade, but exceeded it in the last three-year period. The small number of publications from universities of applied sciences attracted a high

number of citations in the latter half of the 2000s.

Of the research organisations that are biggest in terms of publication numbers, the National Institute for Health and Welfare has the highest citation index (1.36), with Kuopio University Central Hospital in second place (1.33). Third is the University of Helsinki (1.30), and fourth is Helsinki University Central Hospital (1.27). The citation index for all the research organisations apart from the Finnish Forest Research Institute (Metla) exceeds the world average (Figure 3.8).

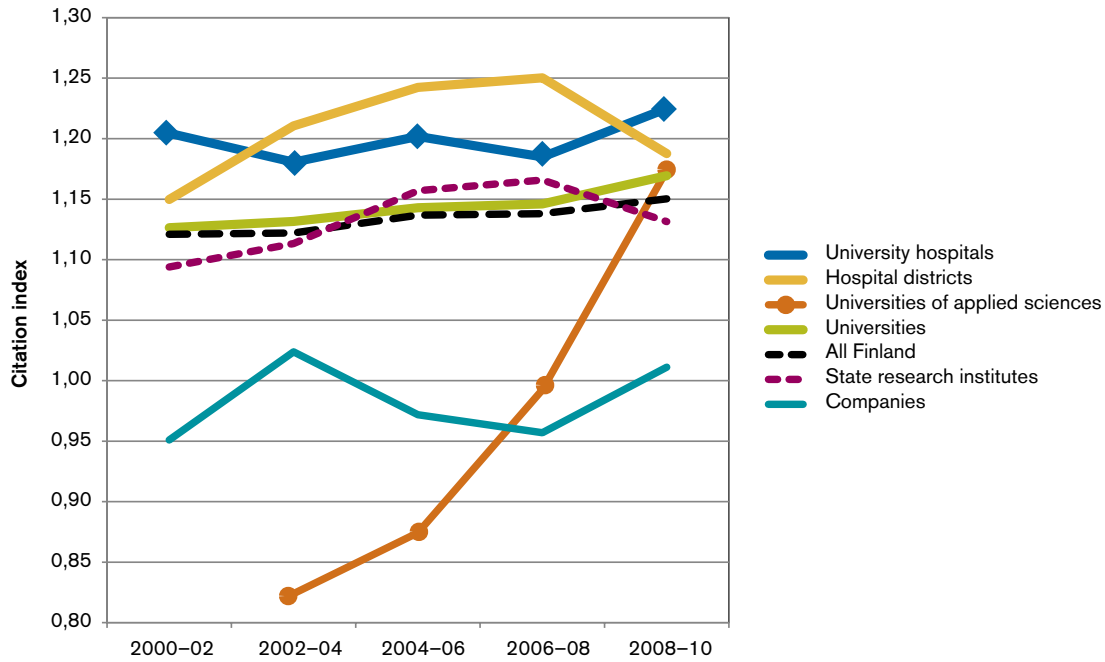


Figure 3.8. Trend in the citation index by research organisation type 2000–2010, according to Scopus

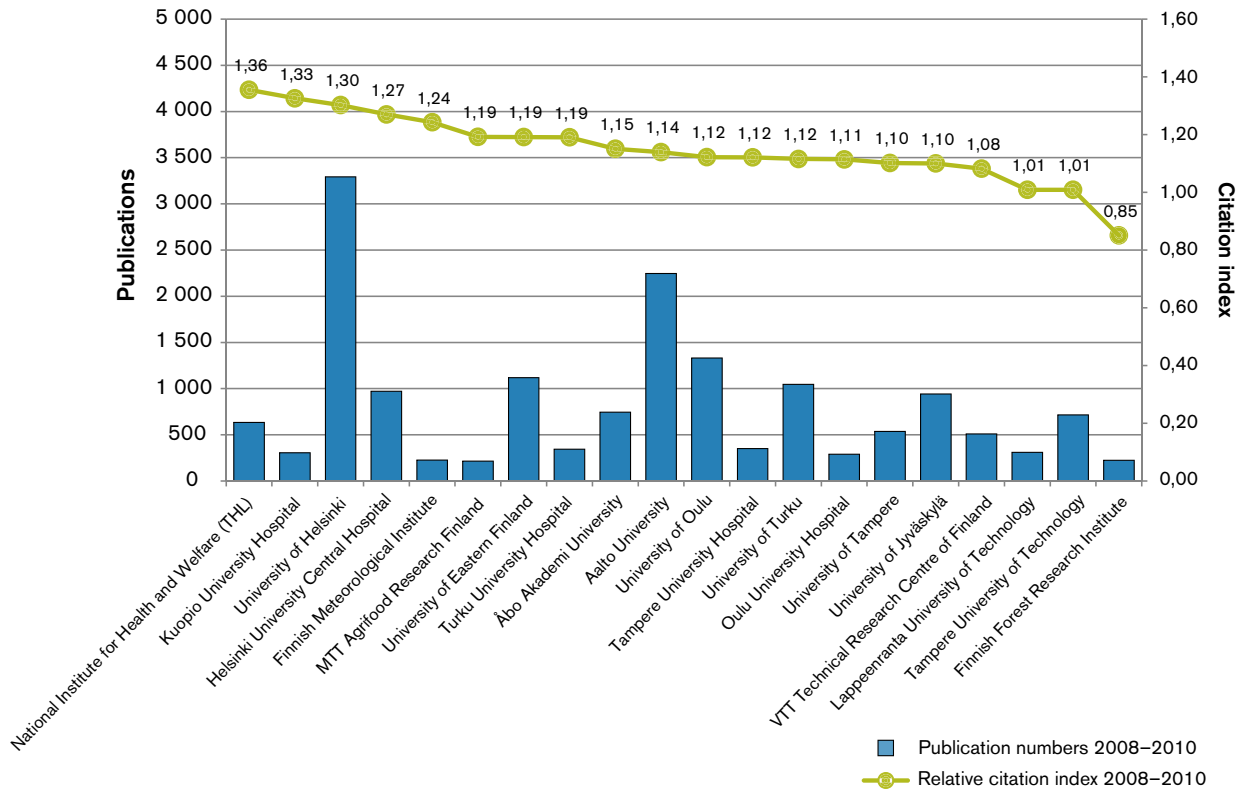


Figure 3.9. Citation indices for the biggest research organisations 2008–2010, according to Scopus NB. The diagram gives the data for the 20 research organisations that are biggest in terms of their publication numbers.

## Finland's position in an international comparison

In a comparison of OECD countries, 20 were in average position or above it on the citation index and Top10 index globally in the period 2008–2010 (Figures 3.10 and 3.11). The top three countries were the Netherlands, Switzerland and Denmark. The citation indices for all countries compared, apart from the United States and Iceland, were higher in the period 2008-2010 than at the start of the decade.

An examination of Finland's position using the citation indicators shows that global competition in publishing intensified in the 2000s. Finland's position declined in the comparison of OECD countries, although both the Finnish citation index and its Top10 index were in a slightly stronger position in 2008-2010 than at the beginning of the decade (Figure 3.12). Finland ranked ninth in both comparisons at the start of the 2000s. Its position in the most recent period was 13 (citation index) and 12 (Top10 index). Climbing up ahead of Finland in the 2000s were Belgium, Germany, Austria and Australia, when positions in both comparisons are examined.

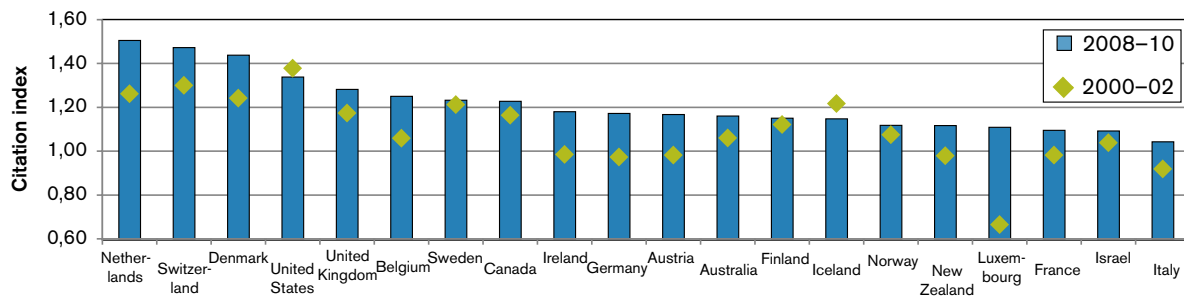


Figure 3.10. Citation index for OECD countries in average position or above it on the global scale in the most recent period 2000–2002 and 2008–2010

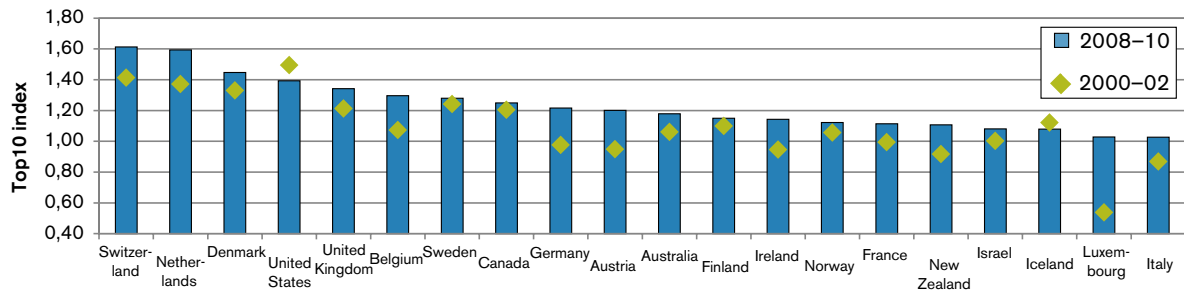


Figure 3.11. Top10 index for OECD countries in average position or above it on the global scale in the most recent period 2000–2002 and 2008–2010

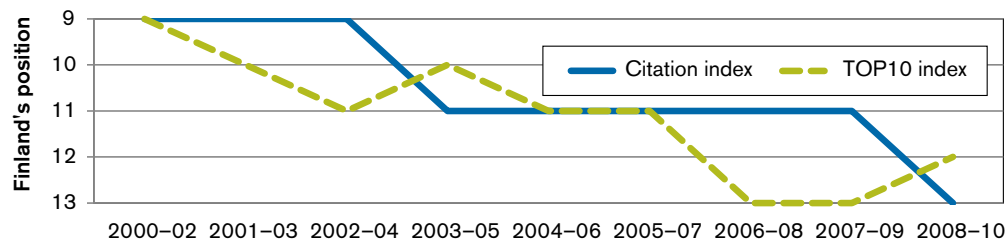
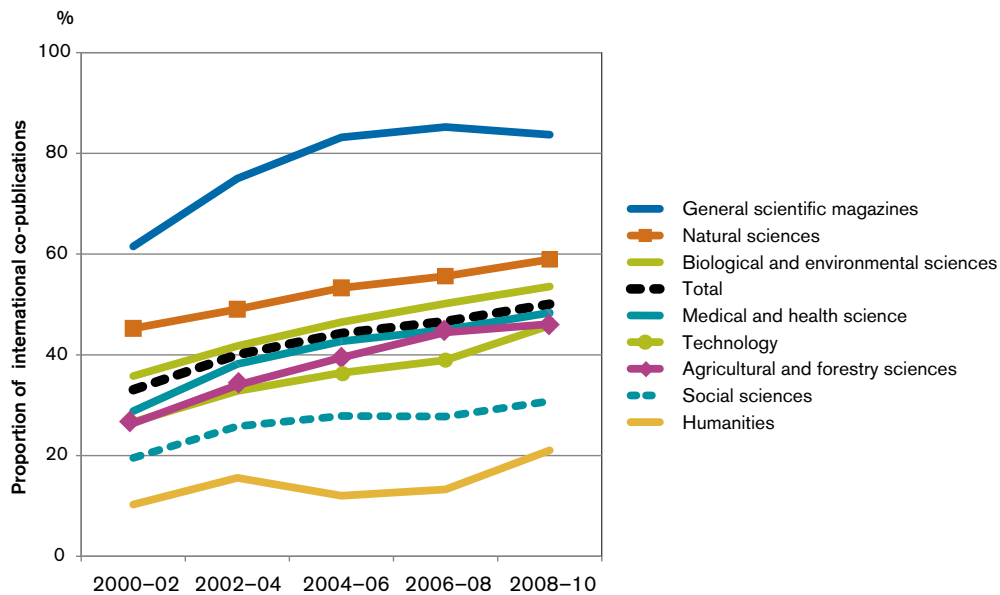


Figure 3.12. Finland's position in a comparison of the relative citation indices and Top10 indices for OECD countries 2000–2010



**Figure 3.13.** Proportion of international co-publications by scientific discipline 2000–2010.

### Internationalisation of Finnish science

Most research is conducted outside Finland, so international cooperation is very important for Finnish science. Almost half of the Finnish publications in the period 2008–2010 were produced in collaboration with foreign research organisations. The share of international co-publications grew in the 2000s in all scientific disciplines. Collaborations are highly significant in natural and medical sciences, a major part of research into which is published in general scientific magazines. The share of international co-publications in the humanities and the social sciences is far smaller than with other disciplines (Figure 3.13).

### Research organisations by main scientific discipline

The diagrams for individual main scientific disciplines (3.14–32.19) give the number of publications and the citation index for all those research organisations that released more than 100 publications in the scientific field under scrutiny in the period 2008–2010. The position of a research organisation in the period 2008–2010 is indicated by a coloured ball that moves along the vertical axis

to reflect the citation index and along the horizontal axis to represent the number of publications. The size of the ball, furthermore, is determined by the number of publications. The lighter-coloured ball represents the number of publications and the citation index for a research organisation in the period 2000–2002. A comparison of the situation in 2008–2010 with that in 2000–2002 reveals how the position of the various research organisations changed over the whole decade.

In natural sciences, Aalto University overtook the University of Helsinki in the number of publications, though the latter has the highest value on the citation index. The citation indices for Aalto University and the University of Jyväskylä fell close to the world average, whereas the University of Oulu, the University of Eastern Finland and VTT Technical Research Centre of Finland improved their position on the citation index to one that was considerably over the world average. The citation index value for the Tampere University of Technology also surpassed the world average.

In biological and environmental sciences, the University of Helsinki greatly outstrips the others in numbers of publications, achieving the highest citation index value. The citation index value for seven other research organisations also surpasses the world average.

In engineering and technology, Aalto University increased its lead as the largest publisher compared to

the other research organisations. The citation index for publications of Åbo Akademi University climbed to outstrip Aalto in the 2000s. Meanwhile, the citation index for the University of Oulu fell below the figure for Aalto, while remaining above the world average. The citation index for the Tampere University of Technology rose close to the world average.

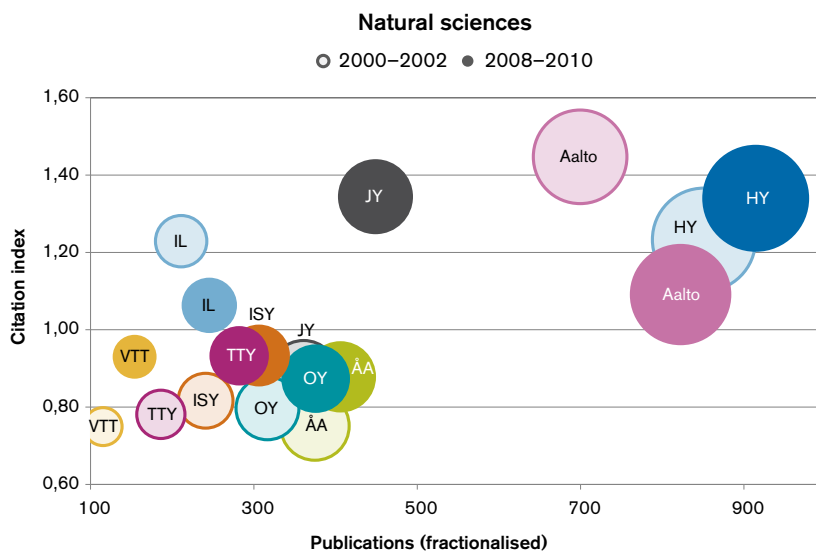
The University of Helsinki overtook Helsinki University Central Hospital as the biggest publisher in the field of medical and health sciences. The highest citation index value was obtained by the National Institute for Health and Welfare. Furthermore, the University of Eastern Finland, Åbo Akademi University, Tampere University of Technology and the University of Oulu achieved higher citation index

values than Helsinki University Central Hospital and the University of Helsinki, or values as high as the last two institutions, clearly exceeding the world average.

In the field of agricultural and forestry sciences, only the University of Helsinki produced more than 100 publications in the period 2008–2010.

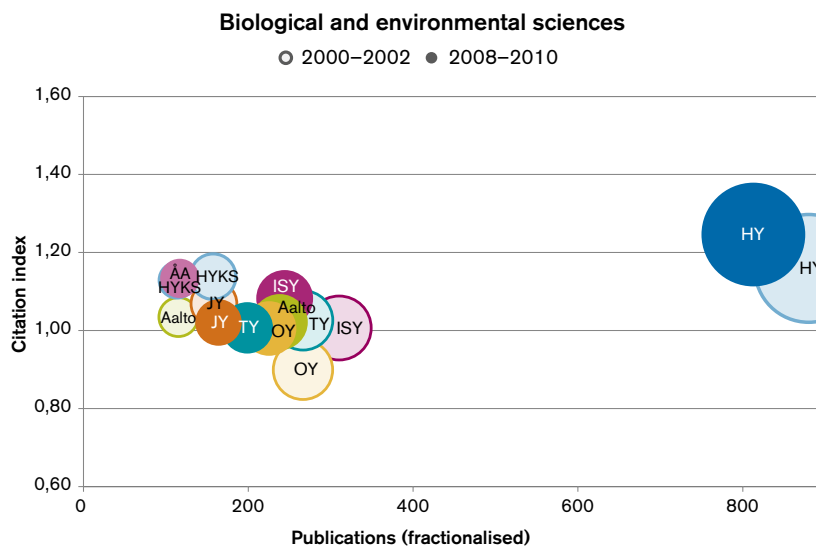
The University of Helsinki publishes the most with respect to social sciences. However, during the 2000s, seven other universities produced over 100 publications in that field. The University of Turku, Aalto University and the University of Jyväskylä have the highest citation index values, surpassing the world average.

In the humanities, only the University of Helsinki produced more than 100 publications in the period 2008–2010.



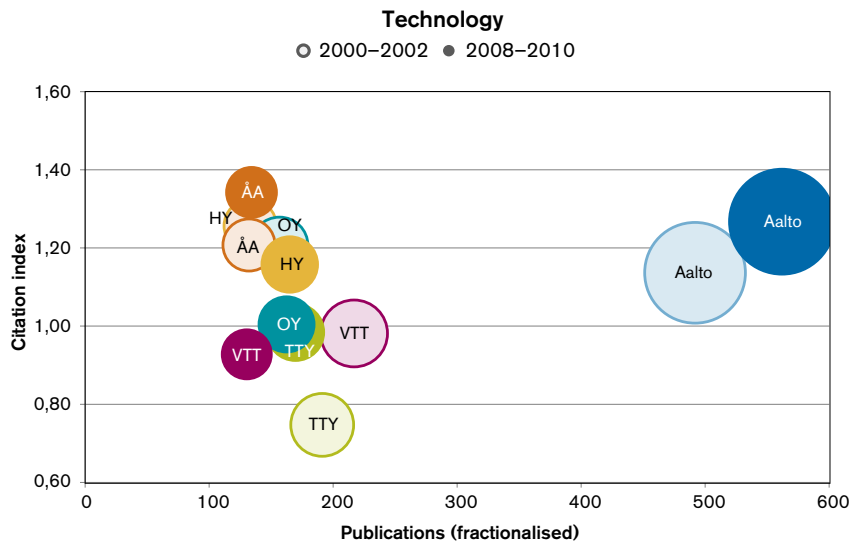
VTT = VTT Technical Research Center of Finland  
 TTY = Tampere University of Technology  
 ISY = University of Eastern Finland  
 IL = The Finnish Meteorological Institute  
 OY = University of Oulu  
 ÅA = Åbo Akademi University  
 JY = University of Jyväskylä  
 Aalto = Aalto university  
 HY = University of Helsinki

**Figure 3.14.** Number of publications and the citation index for social sciences by research organisation 2000–2002 and 2008–2010, according to Scopus



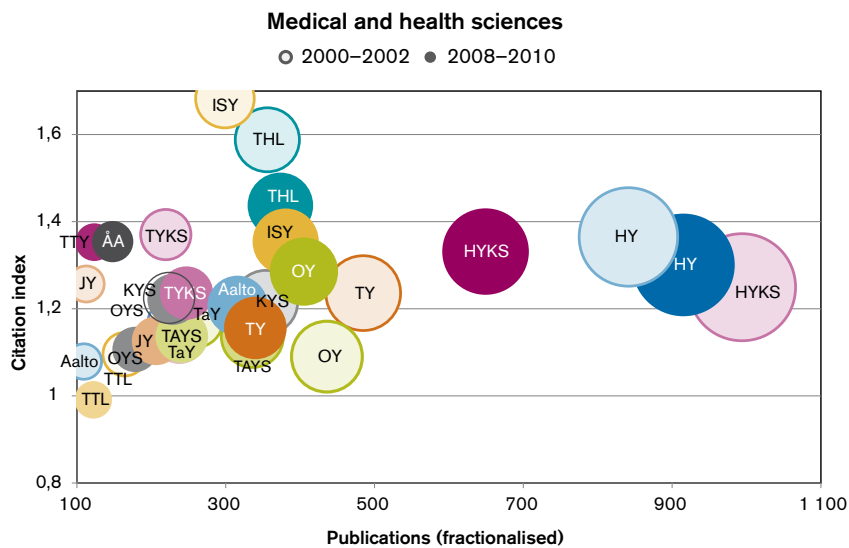
Aalto = Aalto university  
 ÅA = Åbo Akademi University  
 HYKS = Helsinki University Central Hospital  
 JY = University of Jyväskylä  
 TY = University of Turku  
 OY = University of Oulu  
 ISY = University of Eastern Finland  
 HY = University of Helsinki

**Figure 3.15.** Number of publications and the citation index for biological and environmental sciences by research organisation 2000–2002 and 2008–2010, according to Scopus



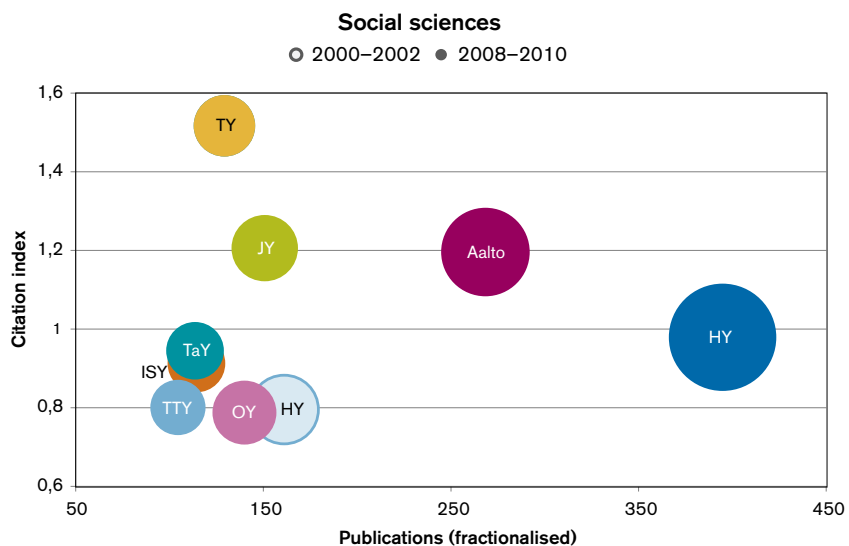
VTT = VTT Technical Research Center of Finland  
 ÅA = Åbo Akademi University  
 HY = University of Helsinki  
 OY = University of Oulu  
 TTY = Tampere University of Technology  
 Aalto = Aalto University

**Figure 3.16.** Number of publications and the citation index for engineering and technology by research organisation 2000–2002 and 2008–2010, according to Scopus



Aalto = Aalto University  
 JY = University of Jyväskylä  
 TY = University of Turku  
 ÅA = Åbo Akademi University  
 TTL = Institute of Occupational Health  
 KYS = Kuopio University Hospital  
 OYS = Kuopio University Hospital  
 TYKS = Turku University Central Hospital  
 TaY = University of Tampere  
 TAYS = Tampere University Hospital  
 Aalto = Aalto University  
 TY = University of Turku  
 ISY = University of Eastern Finland  
 THL = National Institute for Health and Welfare  
 OY = University of Oulu  
 HYKS = Helsinki University Central Hospital  
 HY = University of Helsinki

**Figure 3.17.** Number of publications and the citation index for medical and health sciences by research organisation 2000–2002 and 2008–2010, according to Scopus



ISY = University of Eastern Finland  
 TaY = University of Tampere  
 TY = University of Turku  
 OY = University of Oulu  
 JY = University of Jyväskylä  
 Aalto = Aalto University  
 HY = University of Helsinki

**Figure 3.18.** Number of publications and the citation index for social sciences by research organisation 2000–2002 and 2008–2010, according to Scopus

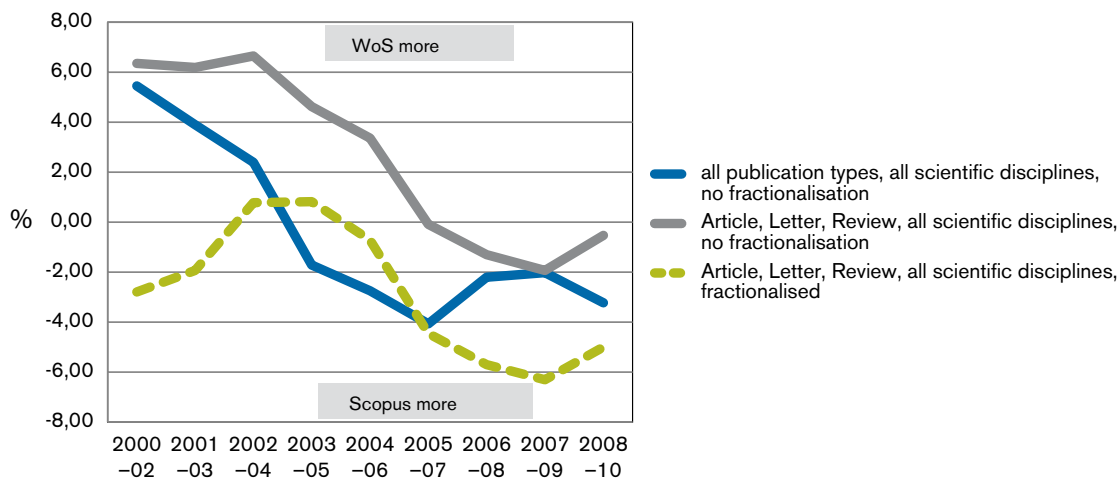


# 4 Web of Science and Scopus: comparison of results

## Coverage

Figure 4.1 shows the trend in the difference in publication numbers for WoS and Scopus during the first decade of the present Millennium. The diagram shows that the difference between the

databases is not great, but there is a clear trend during the first few years of the decade: WoS is more comprehensive, but, following the launch of Scopus, the latter succeeded in reaching a larger number of Finnish publications.



**Figure 4.1.** Differences between the numbers of Finnish publications in WoS and Scopus by scientific discipline 2000–2010, % of the more comprehensive database.

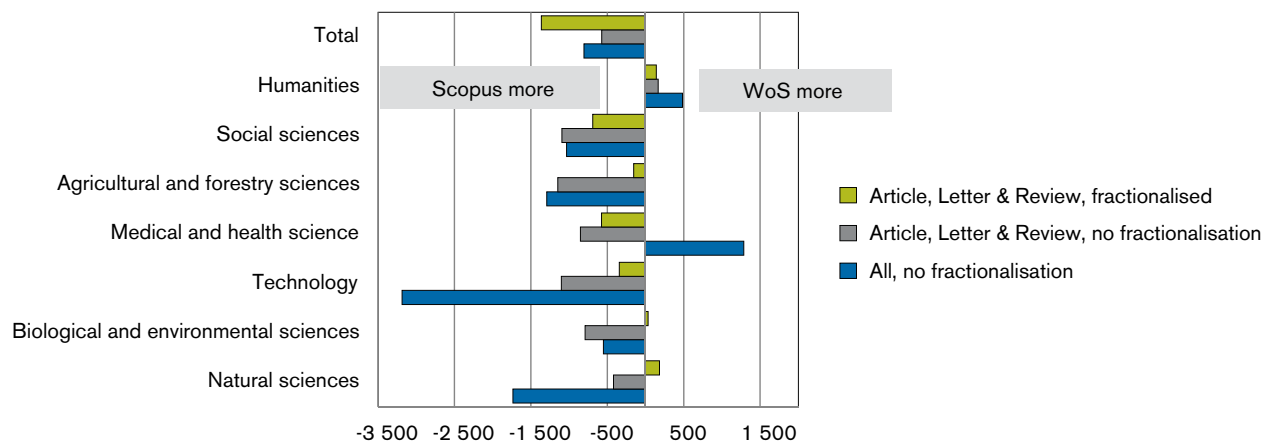
The diagram was produced in such a way that for each scientific discipline<sup>4</sup>, the number of Scopus publications was deducted from the number of WoS publications, after which the difference was divided by the number of publications in the more comprehensive database. Results with a positive value (+) mean that WoS is more comprehensive for the category of publication under scrutiny, and negative results (-) mean that Scopus is more comprehensive. Coverage is compared with reference to three publication types: 1) all non-fractionalised Finnish publications found in the database, 2) non-fractionalised publications in the Article, Letter and Review category, and 3) the fractionalised publication number for the same types.

An examination by scientific discipline for the period 2007–2009 shows that Scopus has more Finnish publications in all scientific fields except for medical and health sciences and the humanities, in which WoS is more comprehensive. In addition, WoS is slightly more comprehensive in the area of fractionalised publications on natural sciences.

The discipline-specific weighting differences are reflected on the organisational level. Universities

that are oriented towards technology and business will find more of their publications in Scopus, but universities with a medical faculty are more widely represented in the WoS database. The University of Oulu, which has both a medical and a technical and scientific faculty, is better represented in Scopus (Figure 4.3). The difference between major universities is 10-30% of the number of publications in the more comprehensive database, but with the small universities, the difference may be as much as 40% or more.

Furthermore, the state research institutes divide into two groups, according to which database has more publications by them. The difference shows that the Finnish Food Safety Authority Evira, the Finnish Meteorological Institute, MTT Agrifood Research Finland and VTT Technical Research Centre of Finland benefit most from Scopus; WoS, on the other hand, is a more suitable database for the Geological Survey of Finland, Forest Research Institute (Metla), National Institute for Health and Welfare and Institute of Occupational Health (Figure 4.4).



**Figure 4.2.** Difference between numbers of Finnish publications in WoS and Scopus by scientific discipline 2000–2010.

<sup>4</sup> There is statistical bias in the non-fractionalised results, due to the different classifications of scientific disciplines in the databases. The discipline system used in Scopus contains more categories than that in WoS, and it is partly owing to this that, on average, more disciplines are recorded for the publications contained in Scopus than is the case with WoS. Thus, a single publication may appear in Scopus more frequently under many disciplines and therefore may be counted many times. This bias is absent in the total number of Finnish publications, because each publication is only included once in the end result.

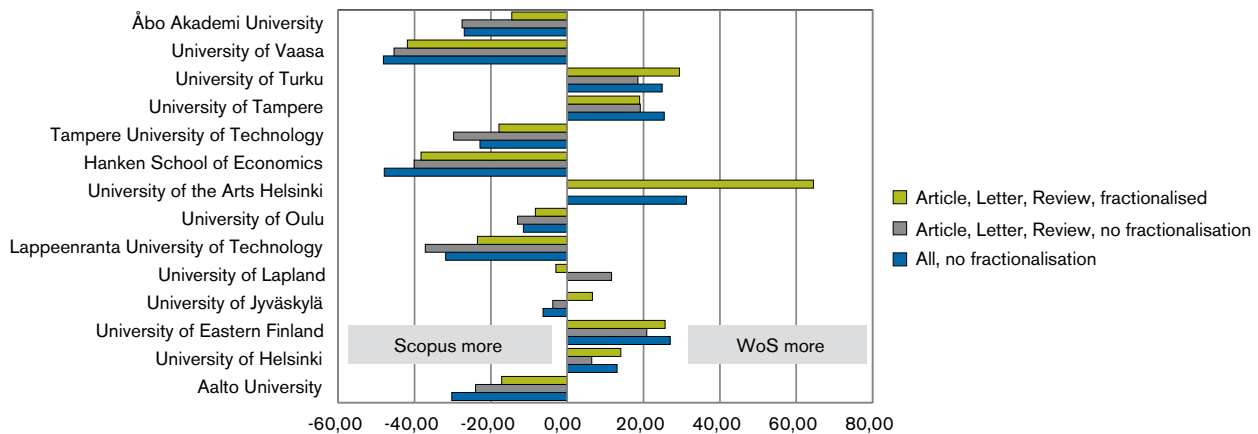


Figure 4.3. Difference between numbers of Finnish publications in WoS and Scopus by university 2007–2009, %

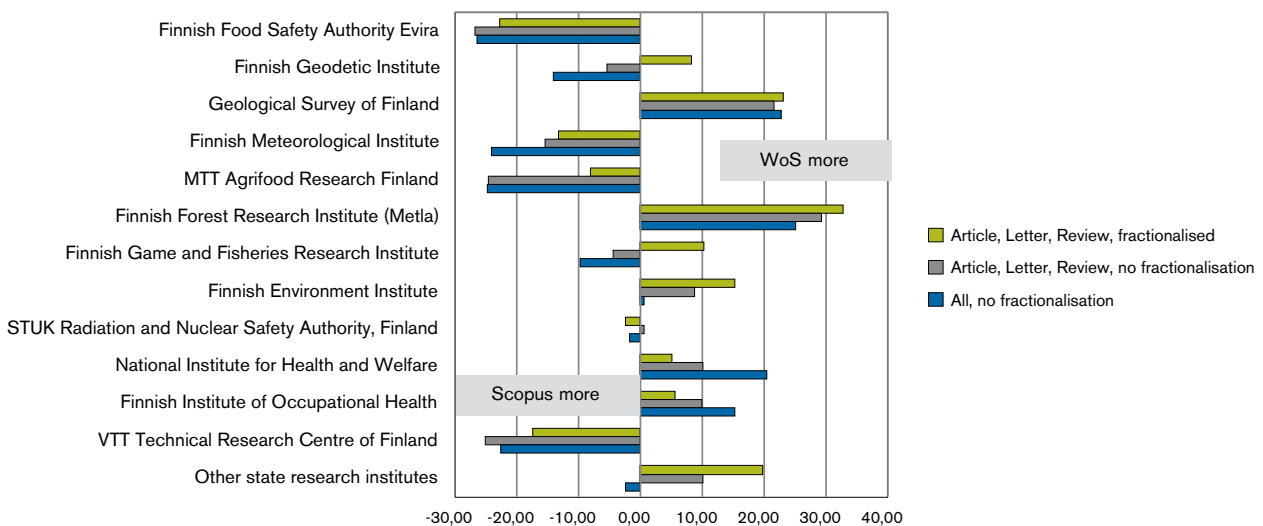


Figure 4.4. Difference between numbers of Finnish publications in WoS and Scopus by research institute 2007–2009, %

## Citation and Top10 index

The Scopus citation index gives patently higher values for Finnish publications than WoS (Figure 4.5)<sup>5</sup>. The difference is mainly due to the fact that there is clearly a larger number of Finnish publications in English than what is average for the publications in Scopus. Publications in English attract more references than others. The WoS database, meanwhile, consists almost entirely of publications written in English, which is why the Finnish publications do not gain an advantage, compared to the other WoS publications.

A more accurate picture of the differences between the databases is provided by Finland's position in the citation index when compared with the major science nations (Figure 4.6). In each three-year period between 2000 and 2010, the Finnish citation index has been given a higher position by Scopus than by WoS. Furthermore, Finland's position was generally better in the Scopus data. In the period 2008–2010, Finland was in the same position (13) in both sets of data.

<sup>5</sup> The difference between the databases is more or less the same in the Top10 index, though even more in Scopus's favour.

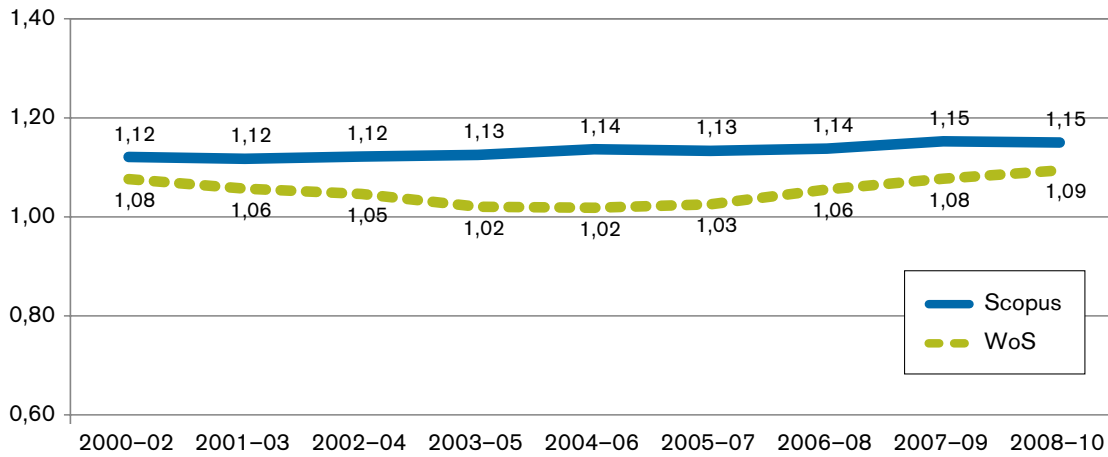


Figure 4.5. Citation index according to the WoS and Scopus data 2000–2010

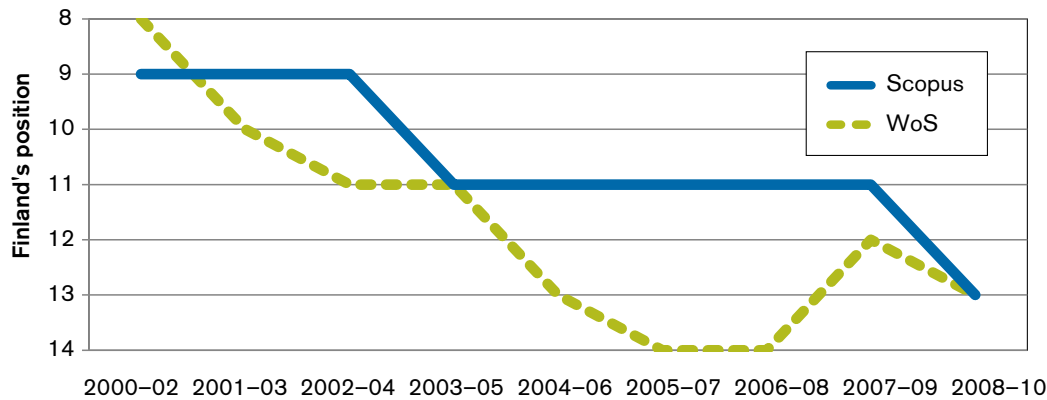


Figure 4.6. Finland's position in a comparison of the citation indices for OECD countries 2000–2010, according to the WoS and Scopus databases

Figure 4.7 compares the databases for the citation index for universities. The horizontal axis represents the WoS citation index for universities, and the vertical axis the Scopus one. The sizes of the circles representing the universities correspond to their publication numbers. The diagram includes universities for which the publication number exceeds 100 in the three-year period 2007–2009. The universities beneath the broken line receive a higher citation index value in the WoS database, and those above it receive a higher citation index value in the Scopus database. All the universities

under scrutiny receive a higher citation index value in Scopus than in WoS, with the exception of the University of Jyväskylä.

Figure 4.8 gives the corresponding results for the biggest state research institutes. With these the situation is the reverse: the majority of institutes achieve a higher citation index value in the WoS database.

The respective positions of universities depends on which database is used in a national comparison. Table 4.1 shows how the positions based on the relative citation index for the biggest universities

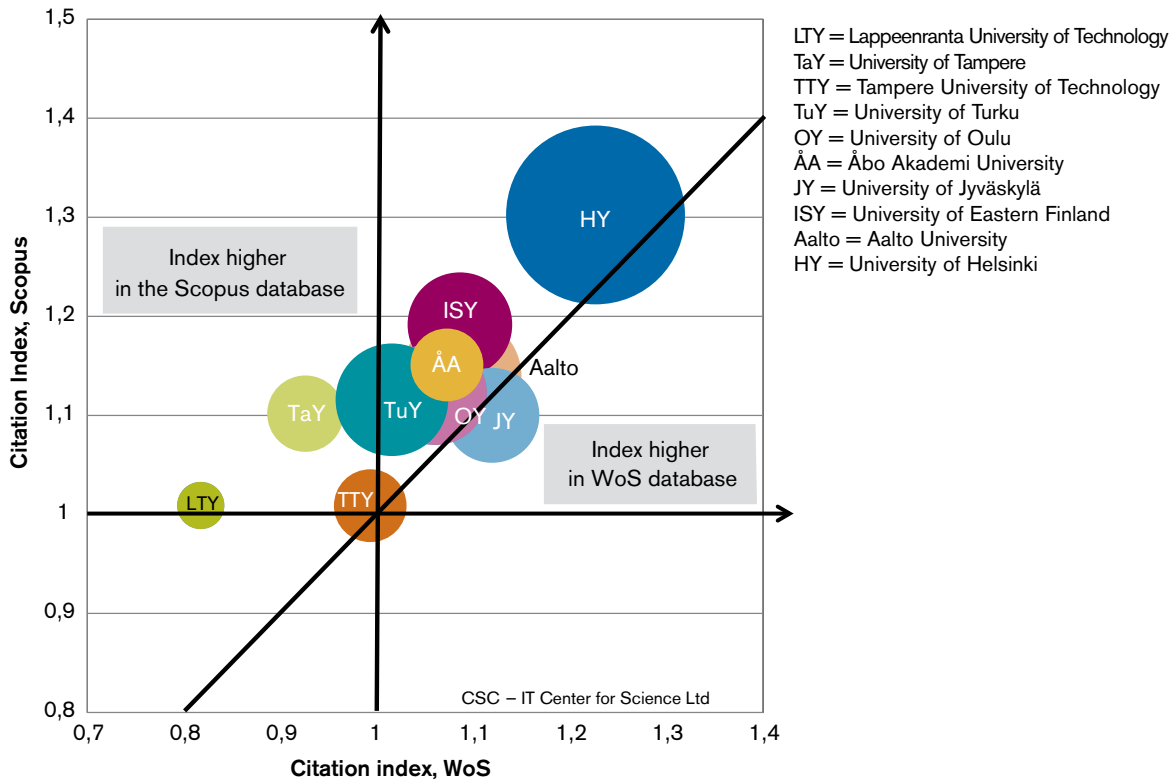


Figure 4.7. Relative citation index for universities 2007-2009, according to the WoS and Scopus databases.

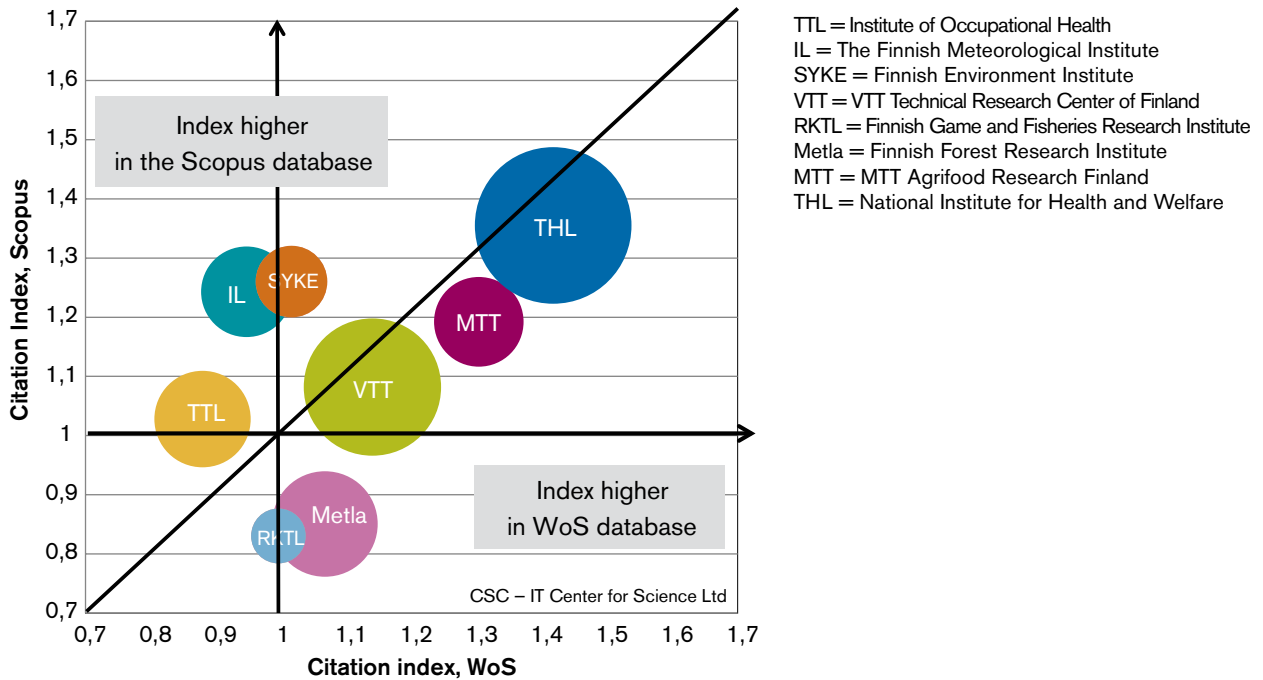


Figure 4.8. Relative citation index for research institutes 2007-2009, according to the WoS and Scopus databases.

change over the period 2004–2010, if Scopus is used instead of WoS. The change in position is depicted by means of positive (+) and negative (-) figures. A positive figure means that the position improves if one moves from the WoS citation index to the Scopus index, and a negative figure means that the position weakens. The final column gives the average

value for all five periods examined. The University of Eastern Finland (average rise of 2.2 places per period), University of Oulu (rise of 1.2 places per period) and University of Tampere (one place per period) all benefit from the Scopus database. But Scopus is manifestly a poor option for the University of Jyväskylä (fall of 4 places per period).

**Table 4.1.** Change in the position of the biggest universities in a national comparison with Scopus being used instead of WoS

Position (WoS) - position (Scopus)	2004–06	2005–07	2006–08	2007–09	2008–10	Average
Aalto University	0	1	1	1	-1	0.4
University of Helsinki	-1	-2	0	0	0	-0.6
University of Eastern Finland	4	3	2	0	2	2.2
University of Jyväskylä	0	-3	-6	-5	-6	-4
Lappeenranta University of Technology	-2	2	0	0	1	0.2
University of Oulu	2	1	2	0	1	1.2
Tampere University of Technology	0	4	-2	-2	-2	-0.4
University of Tampere	-1	-3	3	4	2	1
University of Turku	-1	-2	1	0	1	-0.2
Åbo Akademi University	-1	-1	-1	2	2	0.2

Appendix Table 1 b (WoS). Shares of research organizations of Finnish publications in the years 2000–2010, %

Research organization	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
<b>Main scientific disciplines total</b>									
Universities	60,6	61,2	61,8	62,2	62,2	62,5	62,7	63,5	64,1
Polytechnics	0,2	0,3	0,3	0,3	0,3	0,4	0,4	0,4	0,4
State research institutes	12,8	13,0	12,9	12,9	13,2	13,0	13,1	12,8	12,7
University hospitals	15,2	14,2	13,5	12,9	12,7	12,3	12,0	11,7	11,4
Other health care units	1,8	1,9	2,0	2,1	2,2	2,2	2,2	2,3	2,4
Companies	4,0	3,9	4,0	3,8	3,8	3,6	3,7	3,5	3,4
University of Helsinki	17,8	17,9	18,0	18,4	18,1	18,4	18,6	18,8	18,7
Aalto University	7,3	8,0	8,5	8,7	8,8	8,6	8,4	8,3	8,5
University of Turku	9,0	8,6	8,4	8,2	8,1	7,8	7,4	7,3	7,4
University of Eastern Finland	6,3	6,4	6,3	6,3	6,2	6,3	6,3	6,3	6,4
University of Oulu	7,0	6,7	6,4	6,3	6,2	6,2	5,9	6,1	6,2
University of Jyväskylä	4,2	4,3	4,3	4,3	4,1	4,3	4,7	5,1	5,2
Helsinki University Central Hospital	7,1	6,7	6,5	6,4	6,3	5,9	5,7	5,4	5,2
University of Tampere	2,8	2,7	2,8	2,7	2,9	2,9	3,3	3,3	3,4
National Institute for Health and Welfare	3,5	3,3	3,2	3,2	3,2	3,0	3,1	3,0	3,1
Åbo Akademi University	2,7	2,9	3,1	3,2	3,1	3,1	3,1	3,2	3,1
Tampere University of Technology	2,5	2,5	2,8	2,8	3,0	2,9	3,0	2,9	3,1
VTT Technical Research Center of Finland	2,5	2,7	2,7	2,6	2,6	2,6	2,5	2,4	2,4
Tampere University Hospital	2,4	2,3	2,2	2,0	1,9	1,9	1,9	1,9	1,8
Kuopio University Hospital	2,9	2,6	2,3	2,1	1,9	1,9	1,8	1,7	1,7
Turku University Central Hospital	1,5	1,4	1,3	1,3	1,4	1,4	1,4	1,4	1,5
Finnish Forest Research Institute	1,3	1,4	1,4	1,6	1,6	1,7	1,6	1,5	1,4
Lappeenranta Univ. of Technology	0,7	0,8	0,8	0,9	1,1	1,3	1,2	1,2	1,3
Oulu University Hospital	1,4	1,3	1,1	1,1	1,2	1,3	1,2	1,2	1,3
Institute of Occupational Health	1,5	1,4	1,4	1,3	1,3	1,2	1,3	1,2	1,2
The Finnish Meteorological Institute	0,9	0,9	0,8	0,8	0,8	0,8	0,9	1,0	1,0
The Finnish Meteorological Institute	1,1	1,1	1,0	1,0	1,0	1,1	1,1	1,1	1,0
<b>Natural sciences I</b>									
Universities	81,6	81,3	81,4	82,1	82,6	83,1	82,8	82,7	82,4
Polytechnics	0,2	0,2	0,2	0,3	0,3	0,3	0,2	0,2	0,2
State research institutes	11,3	11,5	11,0	10,3	10,2	9,9	10,5	10,8	11,2
University hospitals	0,5	0,5	0,5	0,5	0,5	0,4	0,4	0,4	0,4
Other health care units	0,0	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Companies	4,3	4,1	4,5	4,5	4,4	4,1	4,0	3,8	3,7

Research organization	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
University of Helsinki	21,0	20,0	19,5	20,0	19,8	20,2	19,7	19,6	19,1
Aalto University	17,3	18,6	19,3	19,1	18,3	17,6	17,2	17,1	17,2
University of Jyväskylä	8,9	8,6	8,0	7,7	7,5	8,3	8,8	9,3	9,4
University of Turku	9,2	8,9	8,8	8,4	8,7	8,6	8,3	8,3	8,5
University of Oulu	7,8	7,3	7,0	7,1	7,4	7,6	7,6	7,9	7,9
University of Eastern Finland	5,9	6,0	5,8	5,9	6,4	6,8	7,2	6,8	6,4
Tampere University of Technology	4,6	4,6	5,3	5,6	6,0	5,3	5,5	5,3	5,9
Joint university research institutes	5,2	5,3	5,9	6,1	6,2	5,9	5,7	5,3	5,1
Åbo Akademi University	4,7	4,7	4,8	4,7	4,6	4,6	4,4	4,6	4,3
VTT Technical Research Center of Finland	3,9	4,3	4,3	3,9	3,8	3,5	3,3	3,0	3,3
The Finnish Meteorological Institute	2,8	2,7	2,2	2,2	2,2	2,5	2,9	3,2	3,2
Lappeenranta Univ. of Technology	0,9	1,3	1,4	1,8	1,9	2,1	2,0	1,9	1,9
University of Tampere	1,0	1,0	1,0	1,2	1,4	1,5	1,6	1,4	1,2
<b>Natural sciences II</b>									
Universities	68,2	67,9	67,9	67,4	67,0	67,6	68,3	69,3	69,3
Polytechnics	0,2	0,2	0,2	0,2	0,2	0,2	0,3	0,3	0,4
State research institutes	15,2	15,9	16,6	16,8	17,4	17,0	16,9	16,0	15,9
University hospitals	9,2	8,7	8,4	8,4	8,2	7,6	7,0	7,1	7,0
Other health care units	0,8	0,8	0,8	1,0	1,1	1,2	1,2	1,3	1,3
Companies	2,4	2,3	2,3	2,2	2,2	2,0	2,1	2,3	2,4
University of Helsinki	26,7	27,4	27,4	27,9	27,9	29,2	30,3	30,7	30,3
University of Turku	12,2	11,5	11,3	10,8	10,8	10,4	10,2	9,9	10,0
University of Eastern Finland	9,2	9,0	8,9	8,4	8,0	7,7	7,5	7,7	7,8
University of Oulu	8,3	8,0	7,6	7,5	7,1	7,2	6,9	7,0	6,8
University of Jyväskylä	4,2	4,4	4,6	4,5	4,1	4,0	4,4	4,9	4,8
Joint university research institutes	3,3	4,2	4,6	4,7	4,8	4,7	3,9	3,6	3,7
Åbo Akademi University	2,5	2,7	2,8	3,0	3,1	3,0	2,8	2,7	2,9
Helsinki University Central Hospital	4,2	4,0	3,8	3,8	3,7	3,5	3,2	3,2	3,0
National Institute for Health and Welfare	3,8	3,8	3,7	3,6	3,6	3,2	3,0	3,0	3,1
Aalto University	2,1	2,1	2,3	2,2	2,5	2,4	2,4	2,4	2,5
VTT Technical Research Center of Finland	2,4	2,4	2,6	2,5	2,6	2,6	2,5	2,4	2,4
Finnish Forest Research Institute	1,9	2,1	2,2	2,4	2,4	2,3	2,5	2,5	2,5
University of Tampere	2,0	2,0	2,0	2,0	2,0	2,0	2,1	2,2	2,3
Finnish Environment Institute	1,4	1,8	1,9	2,2	2,2	2,3	2,4	2,2	2,1
Tampere University Hospital	1,5	1,5	1,6	1,7	1,8	1,6	1,6	1,5	1,5
Tampere University of Technology	0,6	0,5	0,6	0,7	0,9	1,2	1,2	1,2	1,2
MTT Agrifood Research Finland	1,3	1,1	1,0	1,1	1,2	1,4	1,4	1,3	1,3
Kuopio University Hospital	2,2	2,0	1,8	1,7	1,5	1,3	1,2	1,3	1,3
Finnish Game and Fisheries Research Institute	1,4	1,5	2,0	1,8	1,9	1,5	1,6	1,2	1,3
Other health science research	1,4	1,5	1,4	1,4	1,4	1,5	1,4	1,3	1,2
The Finnish Meteorological Institute	0,7	0,8	0,7	0,8	0,7	0,8	0,7	0,9	1,1



Research organization	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
<b>Natural sciences total</b>									
Universities	75,4	75,2	75,4	75,7	75,9	76,4	76,5	76,7	76,5
Polytechnics	0,2	0,2	0,2	0,3	0,3	0,3	0,3	0,3	0,3
State research institutes	13,1	13,5	13,5	13,1	13,3	13,0	13,3	13,1	13,3
University hospitals	4,5	4,3	4,0	4,0	3,8	3,5	3,3	3,4	3,4
Other health care units	0,4	0,4	0,4	0,5	0,5	0,5	0,6	0,6	0,7
Companies	3,4	3,3	3,5	3,5	3,5	3,2	3,2	3,1	3,1
University of Helsinki	23,6	23,4	23,0	23,4	23,3	24,1	24,3	24,5	24,1
Aalto University	10,2	11,1	11,8	11,7	11,5	11,0	10,8	10,6	10,6
University of Turku	10,6	10,1	9,9	9,5	9,6	9,4	9,1	9,0	9,2
University of Oulu	8,1	7,6	7,3	7,2	7,3	7,4	7,3	7,5	7,4
University of Jyväskylä	6,7	6,7	6,5	6,3	6,0	6,4	6,9	7,3	7,3
University of Eastern Finland	7,4	7,3	7,2	7,0	7,1	7,2	7,3	7,2	7,0
Joint university research institutes	4,3	4,8	5,3	5,5	5,6	5,4	4,9	4,6	4,5
Tampere University of Technology	2,7	2,7	3,2	3,5	3,8	3,5	3,6	3,5	3,8
Åbo Akademi University	3,7	3,7	3,9	4,0	4,0	3,9	3,7	3,8	3,7
VTT Technical Research Center of Finland	3,2	3,4	3,5	3,3	3,3	3,1	2,9	2,7	2,9
The Finnish Meteorological Institute	1,9	1,8	1,5	1,6	1,5	1,7	1,9	2,2	2,3
University of Tampere	1,5	1,4	1,4	1,5	1,7	1,7	1,8	1,7	1,7
National Institute for Health and Welfare	1,9	1,9	1,8	1,7	1,7	1,5	1,5	1,4	1,5
Finnish Forest Research Institute	1,2	1,3	1,4	1,5	1,4	1,4	1,4	1,4	1,5
Helsinki University Central Hospital	2,0	1,9	1,8	1,8	1,7	1,6	1,5	1,5	1,4
Finnish Environment Institute	0,9	1,1	1,1	1,2	1,2	1,2	1,4	1,3	1,3
Lappeenranta University of Technology	0,6	0,8	0,9	1,1	1,2	1,3	1,2	1,2	1,2
<b>Technology</b>									
Universities	67,6	68,6	69,9	70,5	72,5	72,8	73,1	73,7	75,2
Polytechnics	0,3	0,5	0,5	0,5	0,5	0,6	0,6	0,6	0,4
State research institutes	12,4	12,2	10,9	11,9	11,2	11,4	11,1	11,5	11,5
University hospitals	0,6	0,4	0,4	0,5	0,6	0,7	0,6	0,7	0,6
Other health care units	0,1	0,1	0,0	0,1	0,1	0,1	0,1	0,1	0,0
Companies	15,5	14,8	15,1	13,4	12,4	11,6	11,6	10,8	9,8
Aalto University	24,5	25,3	24,6	26,6	27,7	28,1	27,1	26,6	26,6
Tampere University of Technology	12,3	12,2	12,5	10,9	11,2	11,0	12,1	11,3	11,8
University of Oulu	7,4	7,2	7,7	8,1	8,6	8,6	7,7	8,3	8,5
VTT Technical Research Center of Finland	8,9	8,8	7,9	8,5	8,0	8,3	8,0	8,3	8,3
Åbo Akademi University	6,5	6,9	7,3	7,6	7,2	7,1	7,0	7,1	6,9
Lappeenranta University of Technology	4,4	4,5	4,2	3,8	4,4	4,9	5,2	5,0	5,5
University of Helsinki	5,2	4,7	4,8	4,5	4,3	4,1	4,1	4,5	4,5
University of Eastern Finland	2,4	2,6	2,4	2,6	2,5	3,0	3,6	4,4	4,7
University of Turku	2,7	2,8	3,9	4,3	4,0	3,2	2,9	3,0	2,8
University of Jyväskylä	2,0	2,1	1,8	1,5	1,7	1,8	2,3	2,6	2,8
Joint university research institutes	0,5	0,8	1,3	1,5	1,4	1,3	1,2	1,1	1,1

Research organization	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
<b>Medical and health sciences</b>									
Universities	40,8	41,2	40,9	41,0	40,0	40,1	40,0	40,5	40,6
Polytechnics	0,3	0,4	0,3	0,3	0,3	0,3	0,3	0,4	0,4
State research institutes	10,0	9,8	9,9	10,2	10,4	10,2	10,8	11,0	11,2
University hospitals	33,7	32,7	32,3	31,2	31,6	31,1	30,6	29,9	29,4
Other health care units	4,1	4,6	4,9	5,2	5,5	5,6	5,6	6,0	6,2
Companies	2,5	2,2	2,2	2,2	2,3	2,3	2,4	2,5	2,5
Helsinki University Central Hospital	15,9	15,6	15,8	15,9	16,0	15,2	14,7	14,0	13,6
University of Helsinki	11,9	12,4	12,8	13,0	12,8	13,1	13,5	13,4	13,0
National Institute for Health and Welfare	6,2	6,1	6,2	6,3	6,4	6,2	6,4	6,4	6,9
University of Turku	8,7	8,5	8,0	7,9	7,4	7,1	6,4	6,3	6,3
University of Eastern Finland	5,5	5,8	6,0	6,5	6,3	6,3	6,1	5,9	6,1
Other health science research	5,6	5,8	5,9	6,1	6,3	6,5	6,3	6,0	5,9
University of Tampere	4,5	4,4	4,4	4,1	4,2	4,3	4,8	5,1	5,3
University of Oulu	6,7	6,6	5,9	5,7	5,3	5,0	4,6	4,8	5,0
Tampere University Hospital	5,4	5,3	5,1	4,6	4,3	4,4	4,4	4,6	4,4
Kuopio University Hospital	5,9	5,5	5,3	4,8	4,6	4,6	4,5	4,3	4,1
Turku University Central Hospital	3,3	3,1	3,2	3,2	3,5	3,6	3,8	3,8	4,0
Oulu University Hospital	3,2	3,1	2,9	2,7	3,2	3,3	3,3	3,2	3,4
Joint university research institutes	2,4	3,3	4,0	4,0	3,8	3,2	2,8	2,8	3,1
Institute of Occupational Health	2,6	2,7	2,6	2,6	2,7	2,6	2,9	2,9	2,8
University of Jyväskylä	1,4	1,5	1,6	1,8	1,9	2,0	2,1	2,2	2,1
<b>Agricultural and forestry sciences</b>									
Universities	50,6	50,2	48,2	46,6	45,5	44,3	45,4	47,3	51,0
Polytechnics	0,2	0,3	0,3	0,5	0,5	0,7	0,7	1,0	1,2
State research institutes	43,7	44,7	44,8	45,6	46,6	47,2	45,5	42,9	39,3
University hospitals	0,0	0,1	0,2	0,4	0,4	0,2	0,2	0,2	0,3
Other health care units	0,0	0,0	0,0	0,0	0,1	0,1	0,1	0,0	0,0
Companies	4,7	4,5	4,3	3,9	3,8	4,5	4,8	4,8	4,4
University of Helsinki	25,6	25,5	24,3	24,9	25,1	24,4	25,4	24,9	27,1
Finnish Forest Research Institute	16,4	17,1	17,3	19,9	20,0	20,8	19,9	19,2	17,6
MTT Agrifood Research Finland	15,9	16,0	14,8	13,5	13,9	14,7	14,5	13,9	12,8
University of Eastern Finland	13,0	13,2	12,1	10,3	9,8	10,3	11,0	12,6	12,8
VTT Technical Research Center of Finland	4,4	5,2	5,0	4,0	3,9	4,3	4,6	4,0	3,1
University of Turku	5,0	4,3	3,9	3,0	3,2	2,9	2,7	2,8	2,9
Finnish Game and Fisheries Research Institute	5,2	4,9	4,7	4,5	4,3	3,4	2,8	2,4	2,6
University of Oulu	2,5	2,4	1,8	2,0	1,7	1,7	1,7	1,8	2,2
University of Jyväskylä	1,3	1,8	2,3	2,7	2,3	1,6	1,3	1,6	2,1
Aalto University	1,9	1,7	1,9	1,6	1,3	0,8	0,7	0,9	1,6
Åbo Akademi University	1,0	1,0	1,5	1,5	1,3	1,4	1,4	1,7	1,5
Finnish Food Safety Authority Evira	0,6	0,7	1,2	1,5	1,7	1,6	1,5	1,4	1,1

Research organization	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
<b>Social sciences</b>									
Universities	70,8	70,7	71,3	71,6	71,7	72,7	74,4	76,1	77,1
Polytechnics	0,2	0,4	0,4	0,5	0,7	0,9	1,0	0,9	0,9
State research institutes	9,1	9,2	8,6	8,5	8,7	8,5	8,1	7,6	7,1
University hospitals	7,8	7,8	7,2	6,8	6,3	5,5	5,0	4,1	3,7
Other health care units	1,2	1,2	1,2	1,5	1,4	1,4	1,1	1,0	1,0
Companies	2,0	2,2	1,8	1,5	1,3	1,5	1,4	1,2	1,2
University of Helsinki	19,6	20,4	19,5	20,4	19,1	19,7	18,4	18,5	18,2
Aalto University	7,3	8,3	8,2	8,4	8,8	8,5	9,3	9,8	10,6
University of Jyväskylä	9,4	8,3	8,5	8,3	7,5	7,6	8,8	9,7	9,9
University of Turku	10,0	9,9	9,3	9,3	9,1	9,1	8,5	8,9	9,1
University of Tampere	6,1	7,2	8,6	8,7	9,4	9,3	9,7	8,9	8,9
Åbo Akademi University	4,5	4,2	4,8	4,6	4,6	4,0	5,1	4,8	4,5
University of Eastern Finland	3,9	3,9	3,8	3,2	3,1	3,2	3,4	3,5	3,9
University of Oulu	3,8	3,2	3,0	3,0	3,7	4,1	4,1	3,9	3,8
Hanken School of Economics	3,5	2,6	2,9	2,9	3,2	2,8	2,8	2,9	3,0
National Institute for Health and Welfare	4,6	4,4	4,0	3,7	3,4	3,1	3,1	2,9	2,6
Lappeenranta University of Technology	0,5	0,8	0,8	1,1	1,2	2,0	2,0	2,3	2,1
Joint university research institutes	0,8	0,7	1,0	1,0	1,4	1,6	1,8	1,6	1,7
Helsinki University Central Hospital	2,2	2,1	2,1	1,8	1,9	1,6	1,8	1,6	1,6
Other health science research	2,2	2,0	1,6	1,8	1,7	1,7	1,4	1,5	1,4
Other state research institutes	0,8	0,8	0,6	0,5	0,8	1,3	1,5	1,4	1,3
University of Vaasa	1,3	1,0	0,9	0,8	1,0	1,5	1,6	1,5	1,3
<b>Humanities</b>									
Helsinki Institute of Physics	92,1	92,2	93,9	92,7	93,1	91,6	89,4	88,7	90,1
Universities	0,0	0,0	0,1	0,1	0,1	0,2	0,5	0,4	0,3
Polytechnics	0,4	0,2	0,3	0,1	0,3	0,5	0,9	1,0	1,3
State research institutes	0,6	0,6	0,3	0,2	0,1	0,4	0,3	0,5	0,4
University hospitals	0,0	0,1	0,1	0,1	0,0	0,1	0,1	0,1	0,0
Other health care units	0,0	0,2	0,2	0,2	0,1	0,3	0,3	0,3	0,2
Companies	49,4	47,5	49,1	49,1	43,4	38,3	36,2	39,6	40,8
University of Turku	10,7	10,4	11,5	12,6	15,4	18,3	17,0	13,5	10,7
University of Jyväskylä	7,8	7,8	7,7	6,0	6,7	7,2	6,9	8,3	8,9
University of Tampere	10,4	10,5	7,9	8,2	10,2	9,5	8,9	6,7	7,0
University of Oulu	2,6	4,3	5,5	4,7	4,0	3,6	3,6	5,1	6,8
University of Eastern Finland	3,5	3,1	1,8	1,4	0,9	2,3	3,6	4,1	4,1
Åbo Akademi University	2,8	3,2	2,5	2,8	3,3	4,2	4,6	3,9	3,5
Aalto University	1,8	3,0	5,8	5,5	5,2	3,5	3,4	2,6	2,9
University of the Arts Helsinki	1,8	1,9	1,3	1,1	2,0	2,5	2,9	2,2	2,5

Appendix Table 2 a (WoS). Relative citation indices by research organizations and disciplines in the years 2000–2010

Research organization	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
<b>Main scientific disciplines total</b>									
Universities	1,08	1,06	1,05	1,02	1,03	1,03	1,06	1,08	1,10
Polytechnics	-	-	-	-	-	-	-	-	-
State research institutes	1,13	1,10	1,09	1,07	1,07	1,09	1,12	1,12	1,11
University hospitals	1,06	1,04	1,04	1,04	1,01	1,01	1,05	1,09	1,13
Other health care units	1,13	1,08	1,05	0,96	1,00	1,04	1,07	1,07	1,07
Companies	0,92	0,97	0,94	0,92	0,90	0,96	0,94	0,93	0,88
University of Helsinki	1,20	1,22	1,22	1,18	1,14	1,11	1,16	1,18	1,23
Aalto University	1,31	1,18	1,17	1,06	1,08	1,08	1,08	1,09	1,09
University of Turku	0,97	0,91	0,90	0,91	0,95	0,95	0,96	0,99	1,02
University of Eastern Finland	1,04	1,00	0,99	0,96	0,99	0,99	1,02	1,07	1,09
University of Oulu	0,97	0,97	0,95	0,89	0,91	0,94	0,99	1,03	1,06
University of Jyväskylä	0,97	0,94	0,93	0,96	0,99	1,05	1,12	1,12	1,12
Helsinki University Central Hospital	1,10	1,09	1,10	1,11	1,08	1,09	1,12	1,14	1,18
University of Tampere	1,00	1,01	0,98	0,92	0,91	0,97	0,96	0,95	0,93
National Institute for Health and Welfare	1,42	1,41	1,33	1,32	1,27	1,27	1,33	1,40	1,42
Åbo Akademi University	1,01	1,10	1,17	1,15	1,07	1,04	1,02	1,07	1,07
Tampere University of Technology	0,78	0,75	0,68	0,71	0,79	0,90	0,99	1,01	0,99
VTT Technical Research Center of Finland	1,14	1,12	1,11	1,08	1,09	1,13	1,19	1,13	1,14
Tampere University Hospital	1,02	0,97	0,94	0,92	0,90	0,91	0,92	0,97	0,97
Kuopio University Hospital	1,06	0,99	1,03	1,04	1,05	1,01	1,04	1,11	1,14
Turku University Central Hospital	1,03	1,05	1,02	1,01	0,97	0,96	1,06	1,16	1,25
Finnish Forest Research Institute	1,08	0,94	0,93	0,90	0,94	0,96	1,05	1,09	1,07
Lappeenranta University of Technology	0,92	0,95	1,05	1,06	1,13	0,96	0,90	0,75	0,82
Oulu University Hospital	0,95	0,96	0,89	0,86	0,81	0,85	0,86	0,95	0,98
Institute of Occupational Health	0,93	0,96	0,92	0,90	0,89	0,90	0,92	0,90	0,88
The Finnish Meteorological Institute	0,81	0,73	0,85	0,93	1,00	0,95	0,97	0,95	0,95
MTT Agrifood Research Finland	1,18	1,18	1,22	1,10	1,10	1,18	1,25	1,31	1,30
<b>Natural sciences</b>									
Universities	1,07	1,04	1,05	1,01	1,02	1,01	1,06	1,08	1,10
Polytechnics	-	-	-	-	-	-	-	-	-
State research institutes	0,94	0,91	0,90	0,90	0,95	1,00	1,02	0,97	0,97
University hospitals	-	-	-	-	-	-	-	-	-
Other health care units	-	-	-	-	-	-	-	-	-
Companies	0,91	0,90	0,84	0,76	0,79	0,83	0,84	0,81	0,77
University of Helsinki	1,23	1,23	1,25	1,21	1,21	1,12	1,23	1,23	1,34

Research organization	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
Aalto University	1,45	1,28	1,31	1,16	1,15	1,13	1,12	1,11	1,09
University of Jyväskylä	0,89	0,85	0,81	0,89	0,92	1,07	1,25	1,34	1,34
University of Turku	0,75	0,69	0,69	0,79	0,84	0,85	0,84	0,85	0,88
University of Oulu	0,80	0,84	0,88	0,80	0,87	0,81	0,82	0,83	0,87
University of Eastern Finland	0,82	0,82	0,91	0,84	0,86	0,95	0,97	1,03	0,93
Tampere University of Technology	0,78	0,81	0,60	0,60	0,70	0,88	0,97	0,96	0,93
Joint university research institutes	1,23	1,37	1,32	1,28	1,25	1,17	1,16	1,05	1,06
Åbo Akademi University	1,11	1,28	1,32	1,20	1,07	1,01	1,00	1,07	1,11
VTT Technical Research Center of Finland	0,99	0,97	0,91	0,89	0,99	1,11	1,22	1,07	1,11
The Finnish Meteorological Institute	0,75	0,70	0,73	0,78	0,82	0,81	0,86	0,90	0,93
Lappeenranta University of Technology	-	-	-	-	1,12	0,96	0,84	0,69	0,75
University of Tampere	-	-	-	-	-	-	-	-	-
<b>Biological and environmental sciences</b>									
Universities	1,02	1,02	1,02	0,99	0,99	0,99	1,03	1,04	1,07
Polytechnics	-	-	-	-	-	-	-	-	-
State research institutes	1,09	1,03	1,00	1,02	1,04	1,10	1,11	1,12	1,07
University hospitals	0,99	0,98	0,98	0,92	0,93	0,92	0,96	0,96	1,01
Other health care units	-	-	-	-	-	-	-	-	-
Companies	-	-	-	-	-	-	-	-	-
University of Helsinki	1,11	1,16	1,16	1,11	1,06	1,05	1,12	1,13	1,19
University of Turku	0,98	0,93	0,94	0,93	0,99	0,98	0,98	0,96	0,98
University of Eastern Finland	0,95	0,90	0,92	0,92	0,99	0,96	0,99	1,02	1,07
University of Oulu	0,89	0,92	0,92	0,89	0,87	0,99	1,00	1,08	1,02
University of Jyväskylä	1,00	0,97	1,03	1,02	0,98	0,88	0,88	0,86	0,92
Joint university research institutes	1,07	1,07	1,08	1,08	1,16	1,20	1,26	1,33	1,36
Åbo Akademi University	-	1,03	0,99	0,95	0,96	0,93	0,95	0,93	0,90
Helsinki University Central Hospital	1,05	1,02	1,01	0,95	0,97	0,96	1,03	0,97	1,01
National Institute for Health and Welfare	1,26	1,22	1,07	0,98	1,05	1,16	1,47	1,61	1,65
Aalto University	-	-	-	-	-	0,95	-	0,80	0,73
VTT Technical Research Center of Finland	-	-	1,06	1,14	1,11	1,14	1,15	1,15	1,14
Finnish Forest Research Institute	-	-	-	-	-	-	1,01	0,96	0,89
University of Tampere	-	-	-	-	-	-	-	-	-
Finnish Environment Institute	-	-	-	-	-	-	1,15	-	-
Tampere University Hospital	-	-	-	-	-	-	-	-	-
Tampere University of Technology	-	-	-	-	-	-	-	-	-
MTT Agrifood Research Finland	-	-	-	-	-	-	-	-	-
Kuopio University Hospital	-	-	-	-	-	-	-	-	-
Finnish Game and Fisheries Research Institute	-	-	-	-	-	-	-	-	-
Other health science research	-	-	-	-	-	-	-	-	-
The Finnish Meteorological Institute	-	-	-	-	-	-	-	-	-

Research organization	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
<b>Natural sciences total</b>									
Universities	1,05	1,04	1,04	1,00	1,01	1,01	1,05	1,06	1,09
Polytechnics	-	-	-	-	-	-	-	-	-
State research institutes	1,02	0,98	0,95	0,97	1,00	1,06	1,07	1,06	1,02
University hospitals	0,98	1,00	1,01	0,95	0,93	0,92	0,96	0,96	1,00
Other health care units	-	-	-	-	-	-	-	-	-
Companies	0,90	0,90	0,86	0,78	0,77	0,81	0,81	0,82	0,81
University of Helsinki	1,17	1,20	1,20	1,15	1,13	1,08	1,17	1,18	1,25
Aalto University	1,41	1,26	1,27	1,14	1,13	1,12	1,10	1,08	1,05
University of Turku	0,87	0,82	0,82	0,86	0,92	0,92	0,91	0,90	0,93
University of Oulu	0,84	0,88	0,90	0,84	0,87	0,89	0,90	0,93	0,94
University of Jyväskylä	0,92	0,89	0,88	0,93	0,93	1,02	1,15	1,19	1,21
University of Eastern Finland	0,89	0,87	0,91	0,88	0,93	0,96	0,98	1,02	1,00
Joint university research institutes	1,17	1,25	1,23	1,21	1,22	1,18	1,20	1,15	1,16
Tampere University of Technology	0,78	0,81	0,63	0,64	0,75	0,91	0,99	0,97	0,94
Åbo Akademi University	1,09	1,20	1,22	1,12	1,03	0,98	0,98	1,02	1,04
VTT Technical Research Center of Finland	1,06	1,02	0,96	0,97	1,03	1,12	1,19	1,10	1,12
The Finnish Meteorological Institute	0,80	0,73	0,80	0,84	0,89	0,87	0,92	0,92	0,92
University of Tampere	0,87	0,88	0,84	0,67	0,61	0,67	0,68	0,80	0,83
National Institute for Health and Welfare	1,26	1,19	1,08	1,02	1,08	1,17	1,43	1,56	1,61
Finnish Forest Research Institute	1,37	1,04	1,03	0,99	1,06	1,10	1,13	1,14	1,08
Helsinki University Central Hospital	1,05	1,04	1,02	0,95	0,95	0,96	1,02	0,97	1,00
Finnish Environment Institute	-	-	0,99	1,19	1,30	1,38	1,18	1,17	1,08
Lappeenranta University of Technology	-	-	-	1,00	1,07	0,94	0,83	0,70	0,75
<b>Technology</b>									
Universities	1,13	1,04	1,04	0,99	1,04	1,04	1,07	1,09	1,11
Polytechnics	-	-	-	-	-	-	-	-	-
State research institutes	1,22	1,18	1,30	1,16	1,12	1,02	0,97	0,94	0,90
University hospitals	-	-	-	-	-	-	-	-	-
Other health care units	-	-	-	-	-	-	-	-	-
Companies	0,81	0,95	0,94	0,94	0,91	0,90	0,89	0,84	0,81
Aalto University	1,15	1,09	1,01	0,93	0,97	1,01	1,05	1,09	1,12
Tampere University of Technology	0,78	0,72	0,72	0,80	0,83	0,91	0,95	1,02	0,99
University of Oulu	1,62	1,26	1,15	0,93	1,09	1,08	1,08	1,05	1,09
VTT Technical Research Center of Finland	1,20	1,17	1,32	1,21	1,14	1,00	0,96	0,92	0,90
Åbo Akademi University	1,01	1,06	1,33	1,43	1,39	1,37	1,41	1,42	1,40
Lappeenranta University of Technology	-	-	-	-	-	1,05	1,02	0,83	0,92
University of Helsinki	-	-	-	-	-	-	-	-	1,21
University of Eastern Finland	-	-	-	-	-	-	-	-	1,29
University of Turku	-	-	-	-	-	-	-	-	-
University of Jyväskylä	-	-	-	-	-	-	-	-	-
Joint university research institutes	-	-	-	-	-	-	-	-	-

Research organization	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
<b>Medical and health sciences</b>									
Universities	1,16	1,15	1,11	1,09	1,06	1,07	1,11	1,13	1,14
Polytechnics	-	-	-	-	-	-	-	-	-
State research institutes	1,27	1,34	1,28	1,24	1,16	1,13	1,15	1,16	1,17
University hospitals	1,07	1,04	1,04	1,05	1,03	1,02	1,06	1,11	1,15
Other health care units	1,18	1,13	1,10	1,00	1,04	1,07	1,10	1,08	1,07
Companies	1,08	1,11	1,05	1,14	1,10	1,32	1,26	1,25	1,07
Helsinki University Central Hospital	1,11	1,09	1,11	1,13	1,10	1,11	1,14	1,17	1,22
University of Helsinki	1,31	1,32	1,29	1,26	1,18	1,20	1,18	1,17	1,12
National Institute for Health and Welfare	1,45	1,53	1,44	1,41	1,31	1,27	1,31	1,35	1,38
University of Turku	1,06	1,04	1,03	1,06	1,05	1,12	1,15	1,21	1,20
University of Eastern Finland	1,26	1,20	1,12	1,06	1,06	1,02	1,08	1,17	1,23
Other health science research	1,23	1,13	1,07	1,01	1,00	1,03	1,08	1,09	1,09
University of Tampere	1,07	1,07	1,04	1,01	1,01	1,05	1,05	1,06	1,04
University of Oulu	1,03	1,06	0,99	0,97	0,90	0,94	1,14	1,18	1,29
Tampere University Hospital	1,05	0,99	0,94	0,92	0,92	0,92	0,94	0,98	0,98
Kuopio University Hospital	1,06	1,00	1,04	1,05	1,06	1,02	1,03	1,10	1,13
Turku University Central Hospital	1,04	1,06	1,00	1,04	0,97	0,96	1,07	1,19	1,29
Oulu University Hospital	0,96	0,97	0,89	0,85	0,81	0,85	0,86	0,96	0,98
Joint university research institutes	1,35	1,28	1,26	1,14	1,07	1,07	1,20	1,39	1,45
Institute of Occupational Health	0,99	1,03	1,00	0,96	0,92	0,87	0,87	0,84	0,82
University of Jyväskylä	1,29	1,19	1,13	1,06	1,03	0,97	1,00	0,92	0,97
<b>Agricultural and forestry sciences</b>									
Universities	1,31	1,30	1,35	1,29	1,26	1,25	1,26	1,26	1,22
Polytechnics	-	-	-	-	-	-	-	-	-
State research institutes	1,08	1,05	1,08	1,03	1,12	1,15	1,24	1,33	1,39
University hospitals	-	-	-	-	-	-	-	-	-
Other health care units	-	-	-	-	-	-	-	-	-
Companies	-	-	-	-	-	-	-	-	-
University of Helsinki	1,45	1,53	1,53	1,42	1,35	1,38	1,38	1,33	1,24
Finnish Forest Research Institute	0,87	0,83	0,84	0,84	0,89	0,91	1,00	1,08	1,10
MTT Agrifood Research Finland	1,14	1,08	1,09	1,00	1,18	1,25	1,38	1,44	1,55
University of Eastern Finland	1,11	1,01	1,14	-	-	1,23	1,20	1,19	1,20
VTT Technical Research Center of Finland	-	-	-	-	-	-	-	-	-
University of Turku	-	-	-	-	-	-	-	-	-
Finnish Game and Fisheries Research Institute	-	-	-	-	-	-	-	-	-
University of Oulu	-	-	-	-	-	-	-	-	-
University of Jyväskylä	-	-	-	-	-	-	-	-	-
Aalto University	-	-	-	-	-	-	-	-	-
Åbo Akademi University	-	-	-	-	-	-	-	-	-
Finnish Food Safety Authority Evira	-	-	-	-	-	-	-	-	-

Research organization	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
<b>Social sciences</b>									
Universities	0,85	0,89	0,87	0,92	0,85	0,87	0,85	0,90	0,90
Polytechnics	-	-	-	-	-	-	-	-	-
State research institutes	-	-	-	-	-	-	1,17	1,15	1,16
University hospitals	-	-	-	-	-	-	-	-	-
Other health care units	-	-	-	-	-	-	-	-	-
Companies	-	-	-	-	-	-	-	-	-
University of Helsinki	0,76	0,79	0,87	0,95	0,87	0,84	0,80	0,84	0,83
Aalto University	-	-	-	-	-	0,92	0,94	1,16	1,20
University of Jyväskylä	-	-	-	-	-	-	0,97	0,96	0,89
University of Turku	-	0,89	-	0,85	0,83	0,81	0,88	1,04	1,14
University of Tampere	-	-	-	-	0,97	1,04	0,93	0,88	0,80
Åbo Akademi University	-	-	-	-	-	-	-	-	-
University of Eastern Finland	-	-	-	-	-	-	-	-	-
University of Oulu	-	-	-	-	-	-	-	-	-
Hanken School of Economics	-	-	-	-	-	-	-	-	-
National Institute for Health and Welfare	-	-	-	-	-	-	-	-	-
Lappeenranta University of Technology	-	-	-	-	-	-	-	-	-
Joint university research institutes	-	-	-	-	-	-	-	-	-
Helsinki University Central Hospital	-	-	-	-	-	-	-	-	-
Other health science research	-	-	-	-	-	-	-	-	-
Other state research institutes	-	-	-	-	-	-	-	-	-
University of Vaasa	-	-	-	-	-	-	-	-	-
<b>Humanities</b>									
Universities	0,84	0,91	0,85	1,00	1,25	1,27	1,21	1,51	1,67
Polytechnics	-	-	-	-	-	-	-	-	-
State research institutes	-	-	-	-	-	-	-	-	-
University hospitals	-	-	-	-	-	-	-	-	-
Other health care units	-	-	-	-	-	-	-	-	-
Companies	-	-	-	-	-	-	-	-	-
University of Helsinki	0,79	1,03	0,78	1,02	0,90	1,01	0,91	1,80	2,07
University of Turku	-	-	-	-	-	-	-	-	-
University of Jyväskylä	-	-	-	-	-	-	-	-	-
University of Tampere	-	-	-	-	-	-	-	-	-
University of Oulu	-	-	-	-	-	-	-	-	-
University of Eastern Finland	-	-	-	-	-	-	-	-	-
Åbo Akademi University	-	-	-	-	-	-	-	-	-
Aalto University	-	-	-	-	-	-	-	-	-
University of the Arts Helsinki	-	-	-	-	-	-	-	-	-



Appendix Table 3 a (WoS). Share of international co-publications of all publications by research organizations in the years 2000–2010, %

Organization	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
<b>Total</b>									
Aalto University	40	39	39	40	40	43	45	47	48
University of Helsinki	47	48	48	48	48	50	51	52	53
University of Eastern Finland	33	33	35	36	37	38	38	40	43
University of Jyväskylä	49	50	48	48	48	49	48	47	49
University of Lapland	66	69	58	60	55	58	54	47	44
Lappeenranta University of Technology	20	24	26	32	37	40	42	45	49
University of Oulu	43	44	44	44	44	44	46	48	50
University of the Arts Helsinki	14	25	20	14	10	8	18	13	11
Hanken School of Economics	40	49	45	47	41	48	48	42	41
Tampere University of Technology	29	29	33	35	35	34	37	41	45
University of Tampere	31	30	30	29	30	34	36	36	36
University of Turku	38	39	40	42	44	46	48	50	52
University of Vaasa	39	59	64	53	49	42	43	38	39
Åbo Akademi University	42	42	43	42	43	44	43	45	48
Polytechnics	19	26	29	31	27	27	28	31	32
Joint university research institutes	51	51	51	54	55	57	57	60	62
Finnish Food Safety Authority Evira	30	31	27	25	31	29	34	34	43
Finnish Geodetic Institute	47	39	36	24	20	18	21	31	48
Geological Survey of Finland	53	50	46	55	51	45	46	51	53
The Finnish Meteorological Institute	62	60	61	62	66	67	70	68	70
MTT Agrifood Research Finland	28	27	30	32	33	33	34	37	41
Finnish Forest Research Institute	24	26	28	27	28	29	32	31	32
Finnish Game and Fisheries Research Institute	29	26	26	26	36	40	41	38	34
Finnish Environment Institute	27	25	20	25	30	34	35	39	44
Radiation and Nuclear Safety Authority	41	51	48	46	45	46	49	47	49
National Institute for Health and Welfare	44	44	47	47	46	46	47	50	52
Institute of Occupational Health	36	36	37	36	36	39	43	47	52
VTT Technical Research Center of Finland	35	36	37	38	39	41	41	44	45
Other state research institutes	43	43	42	39	43	48	50	43	40
Other health care units	26	27	27	28	29	29	30	31	33
Helsinki University Central Hospital	35	37	38	39	38	39	39	41	43
Kuopio University Hospital	25	26	28	31	31	29	29	31	35
Oulu University Hospital	19	25	31	31	28	27	28	32	34
Tampere University Hospital	28	27	28	29	32	33	33	32	35
Turku University Central Hospital	27	29	27	26	26	30	32	34	38
Other health science research	30	32	33	35	36	36	38	39	42
Companies	30	32	33	33	33	34	34	36	37
Others	26	28	28	30	31	33	32	34	36

Appendix Table 1 b (Scopus). Shares of research organizations of Finnish publications in the years 2000–2010, %

Research organization	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
<b>Main scientific disciplines total</b>									
Universities	54,7	53,8	53,5	54,1	54,4	55,2	55,6	56,5	58,0
Polytechnics	0,3	0,5	0,6	0,6	0,8	0,8	0,9	0,9	0,9
State research institutes	13,1	12,7	12,3	12,0	12,4	12,2	12,2	11,8	11,6
University hospitals	14,8	14,0	13,7	12,5	11,8	11,0	10,8	10,8	10,5
Other health care units	2,7	3,3	3,4	3,6	3,7	3,6	3,6	3,5	3,4
Companies	5,1	5,7	6,0	6,2	6,0	6,1	6,2	5,9	5,3
University of Helsinki	16,5	17,0	16,6	16,6	15,4	15,4	15,0	15,2	15,2
Aalto University	7,3	7,6	7,8	7,6	8,2	8,6	9,2	9,4	10,4
University of Oulu	7,0	6,7	6,4	6,6	6,5	6,3	5,8	6,3	6,2
University of Eastern Finland	5,2	4,6	4,4	4,2	4,4	4,7	4,6	4,4	5,2
University of Turku	6,4	5,4	5,0	5,1	5,4	5,4	5,0	4,9	4,8
Helsinki University Central Hospital	6,8	6,5	6,5	6,2	5,7	5,1	5,1	4,8	4,5
University of Jyväskylä	3,5	3,6	3,9	4,2	4,5	4,6	4,4	4,5	4,4
Åbo Akademi University	2,5	2,6	2,8	2,9	2,8	3,0	3,2	3,5	3,4
Other health care units	2,7	3,3	3,4	3,6	3,7	3,6	3,6	3,5	3,4
Tampere University of Technology	2,4	2,2	2,3	2,3	2,5	2,5	3,2	3,3	3,3
National Institute for Health and Welfare	3,1	2,8	2,7	2,7	2,7	2,5	2,5	2,7	2,9
Joint university research institutes	2,2	2,6	2,7	2,9	2,8	2,8	2,7	2,7	2,8
University of Tampere	2,6	2,7	2,7	2,7	2,6	2,7	2,7	2,5	2,5
VTT Technical Research Center of Finland	3,5	3,7	3,4	3,0	2,9	3,1	3,0	2,7	2,4
Other health science research	2,3	2,4	2,5	2,6	2,5	2,6	2,4	2,4	2,2
Tampere University Hospital	2,3	2,4	2,3	2,0	1,7	1,7	1,7	1,7	1,6
Turku University Central Hospital	1,6	1,4	1,2	1,2	1,2	1,3	1,4	1,5	1,6
Lappeenranta University of Technology	0,8	0,9	1,0	1,1	1,1	1,3	1,4	1,5	1,4
Kuopio University Hospital	2,6	2,3	2,3	1,9	1,6	1,4	1,3	1,4	1,4
Oulu University Hospital	1,5	1,4	1,4	1,3	1,4	1,4	1,4	1,4	1,3
The Finnish Meteorological Institute	0,7	0,7	0,7	0,7	0,9	0,9	1,2	1,1	1,0
Finnish Forest Research Institute	1,2	1,0	1,0	0,9	1,0	1,1	1,1	1,0	1,0
MTT Agrifood Research Finland	1,1	1,0	0,8	0,8	1,0	1,1	1,0	1,1	1,0
Institute of Occupational Health	1,4	1,4	1,4	1,2	1,2	1,1	1,2	1,1	1,0
<b>Natural sciences I</b>									
Universities	71,2	67,0	67,9	67,9	68,0	66,5	65,1	65,8	68,6
Polytechnics	0,2	0,3	0,3	0,4	0,9	0,9	1,0	0,8	0,9
State research institutes	13,0	13,9	12,1	12,2	12,4	12,3	12,5	11,6	11,0
University hospitals	2,8	3,9	4,6	4,2	4,4	4,7	5,5	5,7	5,0
Other health care units	0,4	0,7	0,7	1,0	1,1	1,4	1,5	1,5	1,6

Research organization	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
Companies	5,1	6,0	6,6	6,7	6,4	6,8	7,0	6,8	5,6
Aalto University	14,5	14,4	14,7	13,9	13,9	14,3	14,8	15,4	16,8
University of Helsinki	20,1	19,8	20,0	19,4	17,5	16,1	14,7	14,7	14,5
University of Oulu	9,0	8,1	7,5	8,2	9,1	8,5	6,8	6,9	7,2
University of Jyväskylä	6,1	5,2	6,0	6,4	7,3	7,3	7,3	6,7	6,1
University of Turku	6,4	5,1	4,9	4,9	4,8	4,7	4,4	5,1	5,1
Tampere University of Technology	4,3	3,6	3,5	3,1	3,2	3,2	4,2	4,3	4,8
Åbo Akademi University	3,5	3,4	3,5	3,7	3,9	3,9	4,0	4,3	4,7
University of Eastern Finland	4,6	4,1	4,2	4,1	4,0	4,2	4,0	3,8	4,6
VTT Technical Research Center of Finland	3,7	4,4	4,2	4,1	4,1	4,1	3,8	3,3	3,0
Joint university research institutes	3,0	2,8	3,0	2,7	2,6	2,4	2,7	2,7	2,7
Helsinki University Central Hospital	1,1	1,6	2,0	2,1	2,0	2,0	2,7	2,8	2,5
The Finnish Meteorological Institute	2,5	2,4	2,0	1,9	2,3	2,3	2,9	2,4	2,3
Lappeenranta University of Technology	0,8	1,1	1,4	1,5	1,5	1,4	1,7	1,8	2,0
University of Tampere	1,5	1,7	1,7	1,9	2,0	2,1	2,3	2,0	1,9
National Institute for Health and Welfare	1,0	1,3	1,2	1,2	1,2	1,0	1,1	1,2	1,4
<b>Natural sciences II</b>									
Universities	61,4	60,4	58,5	58,9	58,1	59,1	59,4	59,9	61,3
Polytechnics	0,2	0,3	0,5	0,5	0,5	0,4	0,6	0,6	0,8
State research institutes	15,2	13,8	13,7	13,3	14,4	14,4	14,7	14,2	13,8
University hospitals	9,5	9,7	10,0	9,5	8,9	8,2	8,0	8,2	7,4
Other health care units	1,5	2,1	2,3	2,3	2,3	2,2	2,1	2,0	1,9
Companies	3,2	3,9	4,6	5,1	5,0	5,0	5,1	5,2	5,0
University of Helsinki	24,4	24,9	23,4	24,3	22,9	23,6	22,6	22,6	22,8
University of Eastern Finland	8,6	7,5	6,6	5,8	6,0	6,1	6,2	6,0	6,8
Aalto University	3,2	4,1	4,8	4,5	4,8	4,7	5,7	5,9	6,7
University of Oulu	7,4	7,2	6,9	6,8	6,2	6,4	6,2	6,8	6,3
University of Turku	7,4	5,8	5,1	5,6	6,1	6,2	5,8	5,3	5,6
University of Jyväskylä	4,4	4,7	4,5	4,4	4,4	4,4	4,3	4,7	4,6
Joint university research institutes	3,1	3,6	3,7	3,7	3,7	3,5	3,3	3,3	3,4
Åbo Akademi University	2,0	2,3	2,5	2,7	2,7	2,9	3,1	3,3	3,3
Helsinki University Central Hospital	4,4	4,7	4,9	4,7	4,3	3,6	3,6	3,5	3,2
National Institute for Health and Welfare	3,3	3,1	2,9	2,6	2,6	2,3	2,2	2,4	2,6
VTT Technical Research Center of Finland	2,6	2,2	2,1	2,0	2,3	2,5	2,5	2,4	2,2
Tampere University of Technology	1,1	1,2	1,4	1,5	1,7	1,7	2,3	2,3	2,2
Finnish Forest Research Institute	2,8	2,2	2,1	1,9	2,3	2,4	2,5	2,1	2,0

Research organization	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
University of Tampere	2,2	2,2	2,5	2,4	2,4	2,1	2,1	1,8	1,7
MTT Agrifood Research Finland	1,9	1,6	1,5	1,4	1,8	2,0	1,8	1,7	1,6
Finnish Environment Institute	0,9	0,9	1,0	1,3	1,1	1,0	1,1	1,4	1,4
Other health science research	1,5	1,6	1,8	1,7	2,0	2,0	1,9	1,6	1,4
Tampere University Hospital	1,6	1,5	1,6	1,6	1,5	1,5	1,3	1,3	1,1
Turku University Central Hospital	0,9	0,9	0,7	0,7	0,8	1,1	1,2	1,2	1,1
Oulu University Hospital	0,8	0,8	0,8	0,6	0,7	0,9	1,0	1,2	1,0
Kuopio University Hospital	1,9	1,8	2,1	1,9	1,6	1,1	1,0	1,0	1,0
Finnish Game and Fisheries Research Institute	1,2	1,3	1,3	1,0	1,0	0,9	1,0	0,9	0,9
Institute of Occupational Health	1,3	1,3	1,3	1,0	1,1	0,9	1,0	0,9	0,7
<b>Natural sciences total</b>									
Universities	66,2	63,6	63,0	63,3	63,2	62,9	62,5	63,1	65,4
Polytechnics	0,2	0,3	0,4	0,4	0,7	0,7	0,8	0,7	0,9
State research institutes	14,1	13,8	12,9	12,7	13,4	13,3	13,5	12,7	12,2
University hospitals	6,3	6,9	7,4	6,9	6,6	6,4	6,7	6,8	6,0
Other health care units	1,0	1,5	1,5	1,6	1,7	1,8	1,8	1,7	1,7
Companies	4,1	4,9	5,6	5,9	5,7	5,9	6,1	6,1	5,3
University of Helsinki	22,3	22,4	21,8	21,9	20,2	19,7	18,4	18,3	18,1
Aalto University	8,7	9,1	9,6	9,2	9,4	9,7	10,6	11,1	12,4
University of Oulu	8,2	7,7	7,2	7,5	7,6	7,5	6,5	6,9	6,8
University of Eastern Finland	6,7	5,8	5,5	5,0	5,0	5,1	5,0	4,8	5,6
University of Jyväskylä	5,2	4,9	5,2	5,4	5,9	5,9	5,9	5,8	5,4
University of Turku	6,9	5,4	5,0	5,3	5,5	5,4	5,1	5,2	5,3
Åbo Akademi University	2,8	2,8	3,0	3,2	3,3	3,4	3,6	3,9	4,1
Tampere University of Technology	2,6	2,3	2,4	2,3	2,4	2,5	3,3	3,4	3,6
Joint university research institutes	3,1	3,2	3,4	3,2	3,1	3,0	3,0	3,0	3,0
Helsinki University Central Hospital	2,8	3,2	3,5	3,4	3,1	2,8	3,1	3,1	2,8
VTT Technical Research Center of Finland	3,1	3,3	3,1	3,0	3,2	3,3	3,2	2,9	2,6
National Institute for Health and Welfare	2,2	2,2	2,1	1,9	1,9	1,6	1,6	1,7	1,9
University of Tampere	1,9	2,0	2,1	2,1	2,2	2,1	2,2	1,9	1,8
The Finnish Meteorological Institute	1,5	1,5	1,3	1,4	1,5	1,6	2,0	1,7	1,6
Lappeenranta University of Technology	0,6	0,7	1,0	1,1	1,1	1,0	1,2	1,3	1,5
Finnish Forest Research Institute	1,8	1,7	1,6	1,3	1,3	1,5	1,6	1,4	1,3
Other health science research	1,2	1,4	1,4	1,3	1,4	1,5	1,4	1,3	1,0
MTT Agrifood Research Finland	1,3	1,2	1,0	1,0	1,3	1,3	1,2	1,1	1,0
Tampere University Hospital	1,0	1,1	1,2	1,1	1,0	1,1	1,1	1,1	0,9
<b>Technology</b>									
Universities	62,7	62,4	61,9	60,5	60,9	61,6	62,9	63,9	67,1
Polytechnics	0,3	0,5	0,7	0,7	0,7	0,7	0,8	0,8	0,7
State research institutes	13,0	12,6	11,2	12,3	12,4	12,6	12,1	11,6	10,4
University hospitals	1,4	2,2	3,2	3,2	3,1	2,6	2,9	3,2	3,2

Research organization	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
Other health care units	0,2	0,3	0,4	0,7	0,9	1,0	1,1	1,2	1,4
Companies	15,4	15,8	16,7	16,1	14,6	13,8	13,0	12,3	10,6
Aalto University	22,9	21,5	20,1	19,2	20,6	20,6	21,4	21,6	24,5
Tampere University of Technology	8,9	8,0	7,8	7,1	7,0	6,5	7,6	7,4	7,4
University of Helsinki	6,2	7,6	6,9	7,1	6,0	7,3	7,3	8,0	7,2
University of Oulu	7,3	7,1	8,0	8,4	8,2	8,0	7,1	7,6	7,1
Åbo Akademi University	6,1	6,4	6,8	6,3	6,2	5,6	5,8	5,8	5,8
VTT Technical Research Center of Finland	10,1	9,8	8,1	8,2	7,9	8,1	7,7	6,8	5,7
University of Eastern Finland	2,6	2,2	2,0	2,1	1,9	2,4	2,6	2,8	3,7
Lappeenranta University of Technology	3,8	3,7	3,7	3,6	3,6	3,8	3,4	3,2	3,3
University of Jyväskylä	2,1	2,3	2,4	2,2	2,8	3,0	3,0	2,8	3,3
University of Turku	2,2	2,5	3,0	3,2	3,0	2,5	2,6	2,9	3,2
Joint university research institutes	0,7	1,1	1,2	1,7	1,7	1,7	1,4	1,6	1,6
Helsinki University Central Hospital	0,6	0,9	1,5	1,6	1,6	1,4	1,6	1,8	1,6
National Institute for Health and Welfare	0,5	0,6	0,6	0,7	0,7	1,0	1,1	1,4	1,4
<b>Medical and health sciences</b>									
Universities	40,8	41,2	40,9	41,0	40,0	40,1	40,0	40,5	40,6
Polytechnics	0,3	0,4	0,3	0,3	0,3	0,3	0,3	0,4	0,4
State research institutes	10,0	9,8	9,9	10,2	10,4	10,2	10,8	11,0	11,2
University hospitals	33,7	32,7	32,3	31,2	31,6	31,1	30,6	29,9	29,4
Other health care units	4,1	4,6	4,9	5,2	5,5	5,6	5,6	6,0	6,2
Companies	2,5	2,2	2,2	2,2	2,3	2,3	2,4	2,5	2,5
University of Helsinki	15,9	15,6	15,8	15,9	16,0	15,2	14,7	14,0	13,6
Helsinki University Central Hospital	11,9	12,4	12,8	13,0	12,8	13,1	13,5	13,4	13,0
University of Oulu	6,2	6,1	6,2	6,3	6,4	6,2	6,4	6,4	6,9
University of Eastern Finland	8,7	8,5	8,0	7,9	7,4	7,1	6,4	6,3	6,3
National Institute for Health and Welfare	5,5	5,8	6,0	6,5	6,3	6,3	6,1	5,9	6,1
University of Turku	5,6	5,8	5,9	6,1	6,3	6,5	6,3	6,0	5,9
Other health science research	4,5	4,4	4,4	4,1	4,2	4,3	4,8	5,1	5,3
Aalto University	6,7	6,6	5,9	5,7	5,3	5,0	4,6	4,8	5,0
Joint university research institutes	5,4	5,3	5,1	4,6	4,3	4,4	4,4	4,6	4,4
Turku University Central Hospital	5,9	5,5	5,3	4,8	4,6	4,6	4,5	4,3	4,1
Tampere University Hospital	3,3	3,1	3,2	3,2	3,5	3,6	3,8	3,8	4,0
University of Tampere	3,2	3,1	2,9	2,7	3,2	3,3	3,3	3,2	3,4
Kuopio University Hospital	2,4	3,3	4,0	4,0	3,8	3,2	2,8	2,8	3,1
University of Jyväskylä	2,6	2,7	2,6	2,6	2,7	2,6	2,9	2,9	2,8
Oulu University Hospital	1,4	1,5	1,6	1,8	1,9	2,0	2,1	2,2	2,1
Åbo Akademi University	0,9	1,0	1,0	1,1	1,0	1,5	2,0	2,2	2,0
Tampere University of Technology	0,7	0,7	0,9	1,1	1,2	1,2	1,5	1,8	1,7
Institute of Occupational Health	2,4	2,3	2,1	1,8	1,9	1,9	2,0	1,9	1,7
VTT Technical Research Center of Finland	0,6	1,1	1,3	1,3	1,2	1,4	1,7	1,6	1,4

Research organization	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
<b>Agricultural and forestry sciences</b>									
Universities	52,3	51,5	52,1	54,1	54,1	53,7	54,7	56,4	58,3
Polytechnics	0,1	0,2	0,3	0,3	0,4	0,5	0,6	0,9	1,3
State research institutes	36,0	32,2	29,6	24,7	25,9	25,8	24,9	22,6	21,3
University hospitals	2,4	4,2	5,3	5,8	5,0	4,6	4,3	4,3	3,7
Other health care units	0,5	1,0	1,0	1,3	1,1	1,3	1,1	1,1	1,2
Companies	3,5	4,2	4,9	5,8	6,2	6,3	6,7	6,4	6,3
University of Helsinki	25,0	25,3	25,4	27,2	26,2	25,9	25,2	24,3	24,9
University of Eastern Finland	6,9	5,4	4,8	4,5	4,6	5,0	5,4	6,0	7,1
Aalto University	2,5	2,8	3,7	3,8	4,3	4,4	4,5	5,4	5,9
MTT Agrifood Research Finland	9,4	7,4	5,1	4,0	5,2	6,3	6,0	6,0	5,3
Finnish Forest Research Institute	4,9	3,5	3,2	3,8	5,0	5,2	5,3	4,4	4,9
University of Turku	5,2	3,7	3,3	3,3	4,5	4,6	4,5	4,5	4,8
University of Oulu	4,3	4,1	3,3	3,3	3,1	3,9	4,4	4,8	4,5
University of Jyväskylä	3,8	4,6	5,3	5,6	5,3	4,0	3,5	3,8	4,1
Åbo Akademi University	2,4	2,7	3,6	3,7	2,8	2,3	2,4	3,6	3,5
VTT Technical Research Center of Finland	13,4	13,0	11,0	6,1	4,0	4,3	3,6	3,1	2,5
National Institute for Health and Welfare	1,5	1,3	1,4	1,3	1,6	1,3	1,8	1,8	2,0
Helsinki University Central Hospital	1,2	1,8	2,3	2,6	2,5	2,4	2,3	2,1	1,9
Finnish Environment Institute	0,6	0,5	0,9	1,5	1,6	1,3	1,1	1,3	1,7
Joint university research institutes	0,9	1,1	1,2	1,5	1,6	1,8	1,7	1,9	1,7
Finnish Game and Fisheries Research Institute	3,7	3,6	4,6	4,0	4,0	2,8	2,2	1,5	1,5
Finnish Food Safety Authority Evira	1,4	1,2	1,3	1,8	2,1	2,3	2,2	2,0	1,4
Other health care units	0,5	1,0	1,0	1,3	1,1	1,3	1,1	1,1	1,2
Tampere University of Technology	0,8	1,4	1,1	1,2	1,3	1,6	2,1	1,6	1,2
University of Tampere	1,1	1,2	1,3	0,9	1,1	1,1	1,4	1,1	0,9
<b>Social sciences</b>									
Universities	67,6	65,3	62,6	62,6	61,8	63,1	64,8	66,6	67,8
Polytechnics	0,4	0,8	1,0	1,5	1,8	2,0	1,8	1,8	1,6
State research institutes	9,3	9,9	10,9	10,6	10,2	8,3	7,5	7,5	8,8
University hospitals	5,6	5,4	5,8	5,2	5,5	5,7	5,4	4,9	4,3
Other health care units	0,8	1,3	1,9	1,7	1,8	1,7	2,4	1,9	1,8
Companies	3,3	3,7	3,4	3,1	4,1	5,0	5,4	4,7	4,0
University of Helsinki	16,7	16,8	16,3	15,6	14,5	13,7	14,3	14,3	15,7
Aalto University	8,8	9,3	8,4	7,9	8,0	9,0	9,6	9,8	10,7
University of Jyväskylä	7,0	6,4	6,2	7,3	6,7	6,7	5,9	6,3	6,0
University of Oulu	6,1	5,4	5,1	4,6	5,0	4,8	4,9	5,8	5,6
University of Turku	7,6	7,3	6,7	7,5	7,6	7,9	6,4	5,9	5,1
University of Eastern Finland	4,2	3,9	3,6	2,7	2,8	3,3	3,8	3,8	4,5
University of Tampere	5,9	6,2	5,7	5,9	5,0	4,7	4,6	4,2	4,5
Tampere University of Technology	1,1	1,0	1,2	1,7	2,3	2,5	4,0	4,3	4,1

Research organization	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
Åbo Akademi University	4,3	3,9	4,2	4,0	3,4	3,3	3,6	3,8	3,5
Lappeenranta University of Technology	1,4	1,4	1,2	1,1	1,5	2,4	3,0	3,3	2,6
Hanken School of Economics	2,3	1,6	1,9	2,2	2,5	2,3	2,0	2,4	2,4
University of Vaasa	1,8	1,6	1,5	1,5	2,0	2,1	2,2	1,9	2,1
National Institute for Health and Welfare	2,9	2,9	2,7	2,2	2,1	1,9	1,9	1,7	2,0
Other health care units	0,8	1,3	1,9	1,7	1,8	1,7	2,4	1,9	1,8
Polytechnics	0,4	0,8	1,0	1,5	1,8	2,0	1,8	1,8	1,6
Joint university research institutes	1,1	1,2	1,1	1,3	1,4	1,5	1,6	1,4	1,5
Helsinki University Central Hospital	2,4	2,6	3,3	3,1	3,4	3,1	2,8	2,0	1,4
VTT Technical Research Center of Finland	2,0	1,9	2,0	1,8	1,8	1,5	1,2	1,2	1,3
Other health science research	1,0	1,1	1,4	1,7	1,7	1,8	1,5	1,5	1,1
Institute of Occupational Health	1,3	1,3	1,8	2,0	1,7	1,0	0,8	0,7	0,6
<b>Humanities</b>									
Universities	75,3	67,9	67,3	70,9	71,6	70,6	69,6	72,6	75,9
Polytechnics	0,0	0,0	0,0	0,0	0,1	0,1	0,5	0,4	0,4
State research institutes	1,7	3,7	5,5	4,4	5,9	4,5	4,6	5,0	6,5
University hospitals	1,7	2,2	2,5	1,4	1,4	3,3	3,4	4,1	2,8
Other health care units	0,0	0,7	1,0	0,9	0,5	0,3	0,6	0,4	1,9
Companies	0,7	8,3	7,5	5,6	3,3	3,5	4,4	1,9	1,6
University of Helsinki	35,1	30,0	29,2	30,2	28,6	27,0	26,1	27,7	27,6
Aalto University	4,0	4,4	3,1	2,5	2,3	5,3	7,1	6,6	9,2
University of Jyväskylä	5,0	4,2	5,3	7,2	7,6	8,0	6,3	8,4	8,3
University of Oulu	4,1	6,1	7,1	5,9	5,9	5,3	6,1	6,4	7,3
University of Turku	8,7	7,5	9,2	10,6	12,3	11,1	9,2	7,7	7,1
University of Eastern Finland	7,0	6,6	5,8	2,7	1,1	1,3	2,3	2,8	3,9
University of Tampere	5,9	4,5	4,2	5,6	6,3	5,9	5,0	4,4	3,5
Åbo Akademi University	3,1	3,6	3,0	3,2	3,2	2,3	1,9	2,7	3,3
Tampere University of Technology	1,9	0,7	0,1	2,0	2,8	2,3	3,1	3,2	3,0
VTT Technical Research Center of Finland	0,4	0,5	0,5	0,2	0,2	0,8	1,1	1,6	1,8
University of the Arts Helsinki	0,0	0,0	0,0	0,3	0,6	0,7	0,7	0,9	1,1
National Institute for Health and Welfare	0,0	0,1	0,8	1,1	2,4	1,6	1,3	0,3	1,1
Helsinki University Central Hospital	1,2	1,6	2,1	1,3	1,3	3,1	3,2	2,7	0,7
Yliopistojen yht. tutkimuslaitokset	1,1	2,0	1,3	1,0	0,3	1,1	1,2	1,1	0,6

Appendix Table 2 b (Scopus). Relative citation indices by research organizations and disciplines in the years 2000–2010

Research organization	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
<b>Main scientific disciplines total</b>									
Universities	1,13	1,12	1,13	1,13	1,14	1,14	1,15	1,16	1,17
Polytechnics	-	-	-	0,84	0,87	0,96	0,99	1,15	1,17
State research institutes	1,09	1,08	1,11	1,12	1,16	1,15	1,17	1,15	1,13
University hospitals	1,20	1,19	1,18	1,22	1,20	1,20	1,18	1,22	1,22
Other health care units	1,15	1,15	1,21	1,19	1,24	1,23	1,25	1,21	1,19
Companies	0,95	1,02	1,02	1,02	0,97	0,96	0,96	0,99	1,01
University of Helsinki	1,24	1,22	1,24	1,22	1,20	1,15	1,21	1,24	1,30
Aalto University	1,14	1,15	1,16	1,13	1,17	1,20	1,18	1,17	1,14
University of Oulu	0,97	1,00	1,04	1,04	1,09	1,10	1,14	1,10	1,12
University of Eastern Finland	1,23	1,22	1,20	1,20	1,26	1,18	1,14	1,15	1,19
University of Turku	1,10	1,09	1,05	1,01	1,06	1,04	1,07	1,07	1,12
Helsinki University Central Hospital	1,22	1,20	1,21	1,28	1,25	1,25	1,22	1,25	1,27
University of Jyväskylä	1,08	1,01	1,03	1,10	1,11	1,11	1,07	1,09	1,10
Åbo Akademi University	1,06	1,05	1,11	1,17	1,15	1,15	1,13	1,16	1,15
Other health care units	1,15	1,15	1,21	1,19	1,24	1,23	1,25	1,21	1,19
Tampere University of Technology	0,83	0,89	0,87	0,96	1,02	1,11	1,05	1,07	1,01
National Institute for Health and Welfare	1,46	1,42	1,23	1,25	1,26	1,28	1,33	1,33	1,36
Joint university research institutes	1,21	1,24	1,21	1,20	1,25	1,26	1,22	1,27	1,31
University of Tampere	1,14	1,11	1,11	1,06	1,04	1,08	1,11	1,12	1,10
VTT Technical Research Center of Finland	0,85	0,90	1,02	1,11	1,21	1,16	1,18	1,09	1,08
Other health science research	1,33	1,25	1,16	1,23	1,26	1,30	1,27	1,30	1,30
Tampere University Hospital	1,10	1,16	1,14	1,12	1,07	1,11	1,11	1,16	1,12
Turku University Central Hospital	1,32	1,26	1,10	1,18	1,20	1,19	1,18	1,17	1,19
Lappeenranta University of Technology	0,97	0,97	1,06	1,02	1,15	1,12	1,03	1,02	1,01
Kuopio University Hospital	1,21	1,15	1,21	1,26	1,29	1,25	1,29	1,32	1,33
Oulu University Hospital	1,14	1,19	1,12	1,12	1,08	1,10	1,03	1,10	1,11
The Finnish Meteorological Institute	0,96	0,92	1,10	1,26	1,44	1,44	1,35	1,27	1,24
Finnish Forest Research Institute	1,27	1,14	1,08	0,89	0,96	0,98	1,02	0,96	0,85
MTT Agrifood Research Finland	1,08	1,09	1,23	1,07	0,98	0,98	1,05	1,17	1,19
Institute of Occupational Health	1,12	1,15	1,09	1,06	1,03	1,02	1,04	1,02	1,03



Research organization	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
<b>Natural sciences I</b>									
Universities	1,06	1,05	1,04	1,02	1,06	1,06	1,11	1,11	1,14
Polytechnics	-	-	-	-	-	-	-	-	-
State research institutes	0,85	0,82	0,93	0,91	1,06	1,11	1,16	1,08	1,03
University hospitals	-	0,97	1,12	1,16	1,22	1,06	1,01	0,99	1,00
Other health care units	-	-	-	-	-	-	-	-	-
Companies	0,82	0,84	0,85	0,80	0,85	0,90	0,97	0,95	0,98
Aalto University	1,21	1,21	1,22	1,12	1,15	1,19	1,13	1,10	1,03
University of Helsinki	1,25	1,18	1,13	1,14	1,16	1,10	1,34	1,37	1,54
University of Oulu	0,74	0,80	0,81	0,88	0,94	0,97	1,01	1,10	1,21
University of Jyväskylä	1,10	0,93	0,87	0,95	0,99	0,98	0,98	0,97	1,00
University of Turku	0,88	0,91	0,93	0,89	0,94	0,94	0,95	0,87	0,84
Tampere University of Technology	0,84	0,91	0,71	0,76	0,82	1,06	1,01	1,05	0,98
Åbo Akademi University	1,00	0,99	1,00	1,05	1,13	1,22	1,12	1,05	0,96
University of Eastern Finland	0,96	0,95	1,25	1,11	1,18	0,96	1,00	1,09	1,19
VTT Technical Research Center of Finland	0,88	0,81	0,91	0,91	1,15	1,14	1,24	1,14	1,24
Joint university research institutes	1,11	1,14	0,95	0,91	1,00	1,06	0,93	0,86	0,84
Helsinki University Central Hospital	-	-	-	-	-	-	1,03	1,07	1,04
The Finnish Meteorological Institute	-	-	-	-	-	1,25	1,18	1,06	1,02
Lappeenranta University of Technology	-	-	-	-	-	-	-	-	0,67
University of Tampere	-	-	-	-	-	-	1,13	1,16	-
National Institute for Health and Welfare	-	-	-	-	-	-	-	-	-
<b>Natural sciences II</b>									
Universities	1,06	1,04	1,05	1,01	1,04	1,04	1,07	1,08	1,11
Polytechnics	-	-	-	-	-	-	-	-	-
State research institutes	1,09	1,04	1,03	1,08	1,11	1,10	1,08	1,09	1,07
University hospitals	1,07	1,08	1,06	1,07	1,04	1,07	1,11	1,17	1,24
Other health care units	-	-	-	-	-	-	-	-	-
Companies	1,06	1,07	1,00	0,96	0,94	0,97	0,89	0,91	0,87
University of Helsinki	1,16	1,14	1,16	1,10	1,12	1,12	1,17	1,20	1,25
University of Eastern Finland	1,01	1,03	1,08	1,09	1,12	1,01	1,05	1,04	1,08
Aalto University	1,03	0,90	0,86	0,81	1,02	1,13	1,12	1,04	1,02
University of Oulu	0,90	0,95	1,00	1,02	1,05	1,01	0,99	0,99	1,01
University of Turku	1,03	1,02	0,99	0,92	0,90	0,90	0,91	0,97	1,01
University of Jyväskylä	1,07	1,02	1,04	1,02	1,02	1,06	1,06	1,04	1,02
Joint university research institutes	1,10	1,12	1,17	1,10	1,14	1,17	1,29	1,39	1,44
Åbo Akademi University	-	-	0,93	0,98	0,93	0,88	0,94	1,02	1,13
Helsinki University Central Hospital	1,14	1,14	1,14	1,11	1,06	1,16	1,18	1,20	1,13
National Institute for Health and Welfare	1,25	1,18	1,06	0,98	1,06	-	-	1,44	1,51
VTT Technical Research Center of Finland	1,12	-	-	-	-	1,16	1,03	-	-
Tampere University of Technology	-	-	-	-	-	-	-	-	-
Finnish Forest Research Institute	1,12	-	-	-	-	0,98	0,96	-	-

All disciples total	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
University of Tampere	-	-	0,91	-	0,82	-	-	-	-
MTT Agrifood Research Finland	-	-	-	-	-	-	-	-	-
Finnish Environment Institute	-	-	-	-	-	-	-	-	-
Other health science research	-	-	-	-	-	-	-	-	-
Tampere University Hospital	-	-	-	-	-	-	-	-	-
Turku University Central Hospital	-	-	-	-	-	-	-	-	-
Oulu University Hospital	-	-	-	-	-	-	-	-	-
Kuopio University Hospital	-	-	-	-	-	-	-	-	-
Finnish Game and Fisheries Research Institute	-	-	-	-	-	-	-	-	-
Institute of Occupational Health	-	-	-	-	-	-	-	-	-
<b>Natural sciences total</b>									
Universities	1,06	1,05	1,05	1,02	1,05	1,05	1,09	1,10	1,12
Polytechnics	-	-	-	-	-	-	-	-	-
State research institutes	0,98	0,94	0,99	1,00	1,09	1,11	1,12	1,08	1,05
University hospitals	1,06	1,05	1,08	1,10	1,10	1,07	1,07	1,09	1,13
Other health care units	-	1,08	1,04	0,99	1,03	1,05	1,13	1,11	1,13
Companies	0,92	0,94	0,91	0,87	0,89	0,93	0,94	0,93	0,94
University of Helsinki	1,20	1,15	1,15	1,11	1,14	1,11	1,24	1,27	1,38
Aalto University	1,18	1,14	1,13	1,04	1,12	1,17	1,13	1,09	1,03
University of Oulu	0,81	0,88	0,90	0,94	0,98	0,99	1,00	1,05	1,12
University of Eastern Finland	0,99	1,00	1,14	1,10	1,14	0,99	1,03	1,06	1,13
University of Jyväskylä	1,09	0,98	0,94	0,98	1,00	1,01	1,01	1,00	1,01
University of Turku	0,96	0,97	0,96	0,91	0,92	0,92	0,93	0,91	0,91
Åbo Akademi University	0,99	0,98	0,97	1,02	1,05	1,08	1,05	1,04	1,02
Tampere University of Technology	0,87	0,89	0,72	0,79	0,85	1,03	1,00	1,01	0,95
Joint university research institutes	1,10	1,13	1,07	1,02	1,08	1,12	1,12	1,13	1,13
Helsinki University Central Hospital	1,11	1,08	1,13	1,12	1,11	1,14	1,11	1,14	1,08
VTT Technical Research Center of Finland	0,98	0,88	0,90	0,96	1,14	1,15	1,16	1,10	1,17
National Institute for Health and Welfare	1,14	1,03	0,98	0,99	1,07	1,05	1,20	1,25	1,32
University of Tampere	1,02	1,00	0,93	0,85	0,82	0,90	1,04	1,10	1,16
The Finnish Meteorological Institute	0,91	0,87	1,03	1,19	1,41	1,36	1,21	1,10	1,03
Lappeenranta University of Technology	-	-	-	-	-	-	0,72	0,72	0,70
Finnish Forest Research Institute	1,09	0,94	0,89	0,93	1,04	1,04	1,03	0,96	0,86
Other health science research	-	0,81	0,84	1,03	1,11	1,16	1,23	1,38	-
MTT Agrifood Research Finland	1,22	-	-	-	1,03	0,96	1,00	1,10	-
Tampere University Hospital	-	-	-	-	-	0,81	-	0,94	-

All disciples total	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
<b>Technology</b>									
Universities	1,09	1,07	1,19	1,22	1,31	1,25	1,22	1,19	1,20
Polytechnics	-	-	-	-	-	-	-	-	-
State research institutes	1,00	1,13	1,37	1,36	1,27	1,11	1,07	0,98	0,96
University hospitals	-	-	-	-	-	-	-	-	-
Other health care units	-	-	-	-	-	-	-	-	-
Companies	0,68	0,81	0,85	0,80	0,76	0,80	0,79	0,78	0,72
Aalto University	1,14	1,19	1,21	1,19	1,20	1,21	1,23	1,26	1,27
Tampere University of Technology	0,75	0,85	0,91	1,03	1,12	1,12	1,04	1,04	0,98
University of Helsinki	1,26	1,18	1,35	1,29	1,44	1,27	1,29	1,15	1,16
University of Oulu	1,21	0,96	1,06	1,06	1,29	1,19	1,16	0,97	1,00
Åbo Akademi University	1,21	1,17	1,51	1,72	1,60	1,52	1,43	1,42	1,34
VTT Technical Research Center of Finland	0,98	1,13	1,45	1,39	1,19	0,99	1,00	0,95	0,93
University of Eastern Finland	-	-	-	-	-	-	-	-	-
Lappeenranta University of Technology	-	-	-	-	-	1,21	-	-	-
University of Jyväskylä	-	-	-	-	-	-	-	-	-
University of Turku	-	-	-	-	-	-	-	-	-
Joint university research institutes	-	-	-	-	-	-	-	-	-
Helsinki University Central Hospital	-	-	-	-	-	-	-	-	-
National Institute for Health and Welfare	-	-	-	-	-	-	-	-	-
<b>Medical and health sciences</b>									
Universities	1,27	1,29	1,28	1,29	1,25	1,22	1,22	1,24	1,26
Polytechnics	-	-	-	-	-	-	-	-	-
State research institutes	1,43	1,46	1,35	1,27	1,21	1,20	1,24	1,26	1,27
University hospitals	1,23	1,22	1,20	1,26	1,24	1,24	1,20	1,24	1,24
Other health care units	1,16	1,17	1,26	1,26	1,32	1,28	1,27	1,20	1,17
Companies	1,36	1,41	1,46	1,54	1,43	1,25	1,20	1,28	1,36
University of Helsinki	1,36	1,37	1,42	1,44	1,35	1,26	1,23	1,27	1,30
Helsinki University Central Hospital	1,25	1,22	1,23	1,33	1,31	1,30	1,26	1,29	1,33
University of Oulu	1,09	1,18	1,18	1,16	1,11	1,15	1,31	1,28	1,29
University of Eastern Finland	1,68	1,63	1,33	1,35	1,43	1,40	1,30	1,32	1,35
National Institute for Health and Welfare	1,59	1,63	1,36	1,33	1,27	1,28	1,33	1,39	1,44
Turun yliopisto	1,24	1,23	1,19	1,19	1,21	1,22	1,22	1,17	1,16
Other health science research	1,48	1,39	1,24	1,27	1,29	1,34	1,26	1,25	1,23
Aalto University	1,08	1,12	1,21	1,24	1,20	1,17	1,18	1,18	1,21
Joint university research institutes	1,32	1,32	1,33	1,40	1,45	1,42	1,33	1,39	1,41
Turku University Central Hospital	1,37	1,37	1,14	1,28	1,21	1,16	1,13	1,19	1,24
Tampere University Hospital	1,14	1,20	1,16	1,12	1,08	1,19	1,18	1,22	1,14
University of Tampere	1,17	1,20	1,24	1,20	1,13	1,13	1,12	1,16	1,13
Kuopio University Hospital	1,21	1,16	1,23	1,26	1,30	1,28	1,26	1,28	1,22
University of Jyväskylä	1,26	1,23	1,23	1,28	1,20	1,18	1,10	1,10	1,13

<b>All disciplines total</b>	<b>2000-02</b>	<b>2001-03</b>	<b>2002-04</b>	<b>2003-05</b>	<b>2004-06</b>	<b>2005-07</b>	<b>2006-08</b>	<b>2007-09</b>	<b>2008-10</b>
Oulu University Hospital	1,16	1,22	1,16	1,17	1,09	1,12	1,00	1,12	1,11
Åbo Akademi University	-	-	-	-	-	1,10	1,14	1,28	1,35
Tampere University of Technology	-	-	-	-	-	-	1,24	1,40	1,35
Institute of Occupational Health	1,10	1,16	1,07	1,03	0,93	0,97	1,02	1,02	0,99
VTT Technical Research Center of Finland	-	-	-	-	-	1,40	1,34	1,17	1,02
<b>Agricultural and forestry sciences</b>									
Universities	1,27	1,29	1,31	1,31	1,27	1,25	1,24	1,18	1,16
Polytechnics	-	-	-	-	-	-	-	-	-
State research institutes	0,85	0,77	0,83	0,93	1,14	1,19	1,24	1,35	1,34
University hospitals	-	-	-	-	-	-	-	-	-
Other health care units	-	-	-	-	-	-	-	-	-
Companies	-	-	-	-	-	-	-	-	-
University of Helsinki	1,35	1,46	1,50	1,43	1,30	1,21	1,23	1,23	1,22
University of Eastern Finland	-	-	-	-	-	-	-	-	-
Aalto University	-	-	-	-	-	-	-	-	-
MTT Agrifood Research Finland	0,92	-	-	-	-	-	-	-	-
Finnish Forest Research Institute	-	-	-	-	-	-	-	-	-
University of Turku	-	-	-	-	-	-	-	-	-
University of Oulu	-	-	-	-	-	-	-	-	-
University of Jyväskylä	-	-	-	-	-	-	-	-	-
Åbo Akademi University	-	-	-	-	-	-	-	-	-
VTT Technical Research Center of Finland	0,35	0,31	0,34	-	-	-	-	-	-
National Institute for Health and Welfare	-	-	-	-	-	-	-	-	-
Helsinki University Central Hospital	-	-	-	-	-	-	-	-	-
Finnish Environment Institute	-	-	-	-	-	-	-	-	-
Joint university research institutes	-	-	-	-	-	-	-	-	-
Finnish Game and Fisheries Research Institute	-	-	-	-	-	-	-	-	-
Finnish Food Safety Authority Evira	-	-	-	-	-	-	-	-	-
Other health care units	-	-	-	-	-	-	-	-	-
Tampere University of Technology	-	-	-	-	-	-	-	-	-
University of Tampere	-	-	-	-	-	-	-	-	-
<b>Social sciences</b>									
Universities	0,96	1,00	0,96	1,03	1,03	1,09	1,05	1,09	1,08
Polytechnics	-	-	-	-	-	-	-	-	-
State research institutes	-	1,13	1,14	1,09	1,16	1,17	1,18	1,01	0,95
University hospitals	-	-	-	-	-	1,18	1,28	1,30	1,27
Other health care units	-	-	-	-	-	-	-	-	-
Companies	-	-	-	-	-	-	0,83	0,98	1,03
University of Helsinki	0,80	0,83	0,85	0,97	0,96	1,00	0,94	1,00	0,98
Aalto University	-	1,22	1,26	1,39	1,34	1,34	1,21	1,21	1,20
University of Jyväskylä	-	-	-	0,92	0,93	1,11	1,06	1,25	1,21

All disciples total	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
University of Oulu	-	-	-	-	-	-	1,04	0,85	0,79
University of Turku	-	-	-	0,88	0,93	0,92	0,99	1,28	1,52
University of Eastern Finland	-	-	-	-	-	-	-	-	0,91
University of Tampere	-	-	-	-	-	-	1,12	1,02	0,94
Tampere University of Technology	-	-	-	-	-	-	-	0,80	0,80
Åbo Akademi University	-	-	-	-	-	-	-	-	-
Lappeenranta University of Technology	-	-	-	-	-	-	-	-	-
Hanken School of Economics	-	-	-	-	-	-	-	-	-
University of Vaasa	-	-	-	-	-	-	-	-	-
National Institute for Health and Welfare	-	-	-	-	-	-	-	-	-
Other health care units	-	-	-	-	-	-	-	-	-
Polytechnics	-	-	-	-	-	-	-	-	-
Joint university research institutes	-	-	-	-	-	-	-	-	-
Helsinki University Central Hospital	-	-	-	-	-	-	-	-	-
VTT Technical Research Center of Finland	-	-	-	-	-	-	-	-	-
Other health science research	-	-	-	-	-	-	-	-	-
Institute of Occupational Health	-	-	-	-	-	-	-	-	-
<b>Humanities</b>									
Universities	-	-	-	0,89	0,93	0,99	1,14	1,36	1,49
Polytechnics	-	-	-	-	-	-	-	-	-
State research institutes	-	-	-	-	-	-	-	-	-
University hospitals	-	-	-	-	-	-	-	-	-
Other health care units	-	-	-	-	-	-	-	-	-
Companies	-	-	-	-	-	-	-	-	-
University of Helsinki	-	-	-	-	-	-	-	-	-
Aalto University	-	-	-	-	-	-	-	-	-
University of Jyväskylä	-	-	-	-	-	-	-	-	-
University of Oulu	-	-	-	-	-	-	-	-	-
University of Turku	-	-	-	-	-	-	-	-	-
University of Eastern Finland	-	-	-	-	-	-	-	-	-
University of Tampere	-	-	-	-	-	-	-	-	-
Åbo Akademi University	-	-	-	-	-	-	-	-	-
Tampere University of Technology	-	-	-	-	-	-	-	-	-
VTT Technical Research Center of Finland	-	-	-	-	-	-	-	-	-
University of the Arts Helsinki	-	-	-	-	-	-	-	-	-
National Institute for Health and Welfare	-	-	-	-	-	-	-	-	-
Helsinki University Central Hospital	-	-	-	-	-	-	-	-	-
Joint university research institutes	-	-	-	-	-	-	-	-	-

Appendix Table 3 b (Scopus). Share of international co-publications of all publications by research organizations

All disciplines total	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
<b>Organization</b>									
Universities	35	36	40	43	43	44	45	47	49
Polytechnics	25	30	30	31	32	34	35	37	41
State research institutes	32	34	38	41	41	42	44	47	49
University hospitals	27	29	33	36	36	37	38	39	41
Other health care units	23	26	28	30	29	31	31	34	36
Companies	28	32	35	38	37	39	38	40	41
Aalto University	35	34	36	38	39	40	42	45	47
University of Helsinki	38	40	43	46	45	45	46	47	50
University of Eastern Finland	29	33	35	38	40	41	41	40	45
University of Jyväskylä	38	36	39	41	43	44	45	45	46
University of Lapland	49	50	52	51	44	41	49	42	45
Lappeenranta University of Technology	17	30	35	39	36	37	37	40	43
University of Oulu	35	37	39	42	41	42	42	45	47
University of the Arts Helsinki	0	0	0	0	0	0	17	13	10
Svenska Handelshögskolan	44	46	43	41	38	42	43	45	45
Tampere University of Technology	28	31	35	37	36	37	39	41	43
University of Tampere	27	29	32	33	33	35	40	42	42
University of Turku	33	32	36	41	43	42	42	43	45
University of Vaasa	33	39	38	34	41	45	46	42	38
Åbo Akademi University	34	35	36	40	42	46	45	48	49
Joint university research institutes	39	40	42	47	47	47	48	49	52
Finnish Food Safety Authority Evira	27	32	34	33	36	34	38	40	48
Finnish Geodetic Institute	22	27	39	37	36	37	39	36	55
Geological Survey of Finland	38	42	44	41	43	43	53	45	44
The Finnish Meteorological Institute	58	55	56	52	54	56	58	59	59
MTT Agrifood Research Finland	27	27	35	39	39	35	34	36	38
Finnish Forest Research Institute	23	27	30	29	30	34	38	39	40
Finnish Game and Fisheries Research Institute	24	27	32	36	39	40	45	54	49
Finnish Environment Institute	26	38	43	43	42	38	41	43	48
Radiation and Nuclear Safety Authority	42	48	43	40	41	41	49	48	50
National Institute for Health and Welfare	37	38	41	44	42	41	43	49	52
Institute of Occupational Health	28	28	33	34	37	37	38	39	40
VTT Technical Research Center of Finland	28	32	35	40	40	43	44	46	48
Other state research institutes	34	32	38	41	48	49	47	45	50

All disciples total	2000-02	2001-03	2002-04	2003-05	2004-06	2005-07	2006-08	2007-09	2008-10
Helsinki University Central Hospital	29	31	35	37	37	38	39	41	43
Kuopio University Hospital	25	28	30	32	34	33	32	32	34
Oulu University Hospital	19	25	29	34	33	33	35	37	37
Tampere University Hospital	25	26	29	31	34	35	37	37	40
Turku University Central Hospital	25	26	25	28	29	32	33	36	39
Other health science research	32	34	31	33	33	38	39	41	44

## Classification of disciplines

WoS category	Main scientific discipline
<b>Mathematics</b>	
Mathematics	Natural sciences
Mathematics, Applied	Natural sciences
Mathematics, General	Natural sciences
Mathematics, Interdisciplinary Applications	Natural sciences
Logic	Natural sciences
Statistics & Probability	Natural sciences
<b>Computer Science</b>	
Computer Science, Artificial Intelligence	Natural sciences
Computer Science, Cybernetics	Natural sciences
Computer Science, Information Systems	Natural sciences
Computer Science, Interdisciplinary Applications	Natural sciences
Computer Science, Software Engineering	Natural sciences
Computer Science, Theory & Methods	Natural sciences
Computer Applications & Cybernetics	Natural sciences
<b>Physics</b>	
Acoustics	Natural sciences
Imaging Science & Photographic Technology	Natural sciences
Instruments & Instrumentation	Natural sciences
Mechanics	Natural sciences
Nanoscience & Nanotechnology	Technology
Nuclear Science & Technology	Natural sciences
Optics	Natural sciences
Physics, Applied	Natural sciences
Physics, Atomic, Molecular & Chemical	Natural sciences
Physics, Condensed Matter	Natural sciences
Physics, Fluids & Plasmas	Natural sciences
Physics, Mathematical	Natural sciences
Physics, Multidisciplinary	Natural sciences
Physics, Nuclear	Natural sciences
Physics, Particles & Fields	Natural sciences
Spectroscopy	Natural sciences
Astronomy & Astrophysics	Natural sciences
Remote Sensing	Natural sciences
<b>Chemistry</b>	
Chemistry, Analytical	Natural sciences
Chemistry, Applied	Natural sciences
Chemistry, Inorganic & Nuclear	Natural sciences
Chemistry, Multidisciplinary	Natural sciences
Chemistry, Organic	Natural sciences
Chemistry, Physical	Natural sciences
Crystallography	Natural sciences
Electrochemistry	Natural sciences
Polymer Science	Natural sciences

<b>Earth Sciences</b>	
Geochemistry & Geophysics	Natural sciences
Geography	Biological and environmental sciences
Geography, Physical	Biol. and environm.sc.
Geology	Natural sciences
Geosciences, Multidisciplinary	Natural sciences
Meteorology & Atmospheric Sciences	Natural sciences
Mineralogy	Natural sciences
Oceanography	Natural sciences
Paleontology	Natural sciences
Soil Science	Natural sciences
Water Resources	Natural sciences
Environmental Sciences	Biol. and environm.sc.
<b>Biology</b>	
Biology	Biol. and environm.sc.
Biology, Miscellaneous	Biol. and environm.sc.
Biodiversity Conservation	Biol. and environm.sc.
Ecology	Biol. and environm.sc.
Entomology	Biol. and environm.sc.
Evolutionary Biology	Biol. and environm.sc.
Limnology	Biol. and environm.sc.
Marine & Freshwater Biology	Biol. and environm.sc.
Mycology	Biol. and environm.sc.
Ornithology	Biol. and environm.sc.
Zoology	Biol. and environm.sc.
<b>Microbiology</b>	
Biochemistry & Molecular Biology	Biol. and environm.sc.
Biochemical Research Methods	Biol. and environm.sc.
Biophysics	Biol. and environm.sc.
Cell Biology	Biol. and environm.sc.
Mathematical & Computational Biology	Biol. and environm.sc.
Microscopy	Biol. and environm.sc.
Biotechnology & Applied Microbiology	Biol. and environm.sc.
Microbiology	Biol. and environm.sc.
Plant Sciences	Biol. and environm.sc.
Virology	Biol. and environm.sc.
Developmental Biology	Biol. and environm.sc.
Genetics & Heredity	Biol. and environm.sc.
Reproductive Biology	Biol. and environm.sc.



WoS category	Main scientific discipline		
<b>Engineering</b>			
Architecture	Technology	Pharmacology & Pharmacy	Medical and health sc.
Construction & Building Technology	Technology	Toxicology	Medical and health sc.
Engineering, Civil	Technology	Cell and Tissue Engineering	Biol. and environm. sc.
Transportation	Technology	Materials Science, Biomaterials	Technology
Transportation Science & Technology	Technology	Allergy	Medical and health sc.
Agricultural Engineering	Technology	Andrology	Medical and health sc.
Engineering, Aerospace	Technology	Cardiac & Cardiovascular System	Medical and health sc.
Engineering, Industrial	Technology	Dermatology	Medical and health sc.
Engineering, Manufacturing	Technology	Endocrinology & Metabolism	Medical and health sc.
Engineering, Mechanical	Technology	Gastroenterology & Hepatology	Medical and health sc.
Metallurgy & Mining	Technology	Geriatrics and Gerontology	Medical and health sc.
Metallurgy & Metallurgical Engineering	Technology	Gerontology	Medical and health sc.
Thermodynamics	Technology	Hematology	Medical and health sc.
<b>Electrical Engineering</b>		Integrative & Complementary Medicine	Medical and health sc.
Automation & Control Systems	Technology	Medicine, General & Internal	Medical and health sc.
Engineering, Electrical & Electronic	Technology	Peripheral Vascular Disease	Medical and health sc.
Robotics	Technology	Rehabilitation	Medical and health sc.
Computer Science, Hardware & Architecture	Technology	Respiratory System	Medical and health sc.
Telecommunications	Technology	Rheumatology	Medical and health sc.
<b>Materials Sciences</b>		Urology & Nephrology	Medical and health sc.
Engineering, Chemical	Technology	Oncology	Medical and health sc.
Materials Science, Ceramics	Technology	Obstetrics & Gynecology	Medical and health sc.
Materials Science, Characterization, Testing	Technology	Pediatrics	Medical and health sc.
Materials Science, Coatings & Films	Technology	Clinical Neurology	Medical and health sc.
Materials Science, Composites	Technology	Audiology, Speech-Language Pathology	Medical and health sc.
Materials Science, Multidisciplinary	Technology	Psychiatry	Medical and health sc.
Materials Science, Paper & Wood	Technology	Psychology, Clinical	Social sciences
Materials Science, Textiles	Technology	Ophthalmology	Medical and health sc.
Energy & Fuels	Technology	Otorhinolaryngology	Medical and health sc.
Engineering, Environmental	Technology	Anesthesiology	Medical and health sc.
Engineering, Geological	Technology	Critical Care Medicine	Medical and health sc.
Engineering, Marine	Technology	Emergency Medicine	Medical and health sc.
Engineering, Ocean	Technology	Orthopedics	Medical and health sc.
Engineering, Petroleum	Technology	Radiology, Nuclear Medicine & Medical Imaging	Medical and health sc.
Mining & Mineral Processing	Technology	Surgery	Medical and health sc.
Computer Critical Reviews	Technology	Transplantation	Medical and health sc.
Engineering, Multidisciplinary	Technology	Dentistry, Oral Surgery & Medicine	Medical and health sc.
<b>Biomedicine</b>		Ergonomics	Medical and health sc.
Engineering, Biomedical	Medical and health sc.	Infectious Diseases	Medical and health sc.
Medical Laboratory Technology	Medical and health sc.	Medical Ethics	Medical and health sc.
Anatomy & Morphology	Medical and health sc.	Nutrition & Dietetics	Medical and health sc.
Cytology & Histology	Medical and health sc.	Parasitology	Medical and health sc.
Immunology	Medical and health sc.	Substance Abuse	Medical and health sc.
Medical Informatics	Medical and health sc.	Tropical Medicine	Medical and health sc.
Medicine, Research & Experimental	Medical and health sc.	Public, Environmental & Occupational Health	Medical and health sc.
Pathology	Medical and health sc.	Sport Sciences	Medical and health sc.
Physiology	Medical and health sc.	Health Care Sciences & Services	Medical and health sc.
Neuroimaging	Medical and health sc.	Health Policy & Services	Medical and health sc.
Neurosciences	Biol. and environm. sc.	Primary Health Care	Medical and health sc.
Chemistry, Medicinal	Medical and health sc.	Nursing	Medical and health sc.
		Medicine, Legal	Medical and health sc.
		Medicine, Miscellaneous	Medical and health sc.

WoS category	Main scientific discipline
<b>Agricultural Sciences</b>	
Agricultural Economics & Policy	Social sciences
Agriculture, Soil Science	Agricult.and forestry sc.
Agronomy	Agricult.and forestry sc.
Fisheries	Agricult.and forestry sc.
Horticulture	Agricult.and forestry sc.
Forestry	Agricult.and forestry sc.
Agriculture, Dairy & Animal Science	Agricult.and forestry sc.
Veterinary Sciences	Medical and health sc.
Agriculture, Multidisciplinary	Agricult.and forestry sc.
Food Science & Technology	Agricult.and forestry sc.
<b>Business and Management</b>	
Economics	Social sciences
Social Sciences, Mathematical Methods	Social sciences
Business	Social sciences
Business, Finance	Social sciences
Management	Social sciences
Operations Research & Management Science	Social sciences
Demography	Social sciences
Family Studies	Social sciences
History of Social Sciences	Social sciences
Social Sciences, Interdisciplinary	Social sciences
Sociology	Social sciences
History & Philosophy of Science (Social Sciences)	Social sciences
Industrial Relations & Labor	Social sciences
Social Issues	Social sciences
Social Sciences, Biomedical	Medical and health sc.
Social Work	Social sciences
Communication	Social sciences
Information Science and Library Science	Social sciences
Environmental Studies	Biol. and environm. sc.
Hospitality, Leisure, Sport & Tourism	Humanities, Arts
Urban Studies	Biol. and environm. sc.
Psychology	Social sciences
Psychology, Multidisciplinary	Social sciences
Psychology, Applied	Social sciences
Psychology, Biological	Social sciences
Psychology, Developmental	Social sciences
Psychology, Educational	Social sciences
Psychology, Experimental	Social sciences
Psychology, Mathematical	Social sciences
Psychology, Psychoanalysis	Social sciences
Psychology, Social	Social sciences
Psychiatry (Social Sciences)	Social sciences
Behavioral Sciences	Biol. and environm. sc.
Education & Educational Research	Social sciences
Education, Scientific Disciplines	Social sciences
Education, Special	Social sciences

Criminology & Penology	Social sciences
Law	Social sciences
International Relations	Social sciences
Planning & Development	Social sciences
Political Science	Social sciences
Public Administration	Social sciences
Ethics	Humanities, Arts
History & Philosophy of Science	Humanities, Arts
Philosophy	Humanities, Arts
Religion	Humanities, Arts
Applied Linguistics	Humanities, Arts
Language & Linguistics Theory	Humanities, Arts
Linguistics	Humanities, Arts
Classics	Humanities, Arts
Literary Reviews	Humanities, Arts
Literary Theory & Criticism	Humanities, Arts
Literature	Humanities, Arts
Literature, African, Australian, Canadian	Humanities, Arts
Literature, American	Humanities, Arts
Literature, British Isles	Humanities, Arts
Literature, German, Dutch, Scandinavian	Humanities, Arts
Literature, Romance	Humanities, Arts
Literature, Slavic	Humanities, Arts
Poetry	Humanities, Arts
Dance	Humanities, Arts
Music	Humanities, Arts
Theater	Humanities, Arts
Art	Humanities, Arts
Film, Radio, Television	Humanities, Arts
Archaeology	Humanities, Arts
History	Humanities, Arts
Medieval & Renaissance Studies	Humanities, Arts
Anthropology	Humanities, Arts
Cultural Studies	Humanities, Arts
Oriental Studies	Humanities, Arts
Area Studies	Humanities, Arts
Asian Studies	Humanities, Arts
Ethnic Studies	Humanities, Arts
Folklore	Humanities, Arts
Humanities, Multidisciplinary	Humanities, Arts

## Scopus

ASJC Scientific discipline	Main scientific discipline in standard report		
<b>Agricultural and Biological Sciences (all)</b>	Agricult. and forestry sc.	<b>Business, Management and Accounting (all)</b>	Social sciences
Agricultural and Biol. Sciences (miscellaneous)	Agricult. and forestry sc.	Business, Management and Accounting (misc.)	Social sciences
Agronomy and Crop Science	Agricult. and forestry sc.	Accounting	Social sciences
Animal Science and Zoology	Biol. and environm. sc.	Business and International Management	Social sciences
Aquatic Science	Agricult. and forestry sc.	Management Information Systems	Social sciences
Ecology, Evolution, Behavior and Systematics	Biol. and environm. sc.	Management of Technology and Innovation	
Food Science	Agricult. and forestry sc.	Marketing	Social sciences
Forestry	Agricult. and forestry sc.	Organizational Behavior and Human	Social sciences
Horticulture	Agricult. and forestry sc.	Resource Management	Social sciences
Insect Science	Biol. and environm. sc.	Strategy and Management	Social sciences
Plant Science	Biol. and environm. sc.	Tourism, Leisure and Hospitality Management	Social sciences
Soil Science	Natural sciences	Industrial relations	Social sciences
<b>Arts and Humanities (all)</b>	Humanities, Arts	<b>Chemical Engineering (all)</b>	Technology
Arts and Humanities (miscellaneous)	Humanities, Arts	Chemical Engineering (miscellaneous)	Technology
History	Humanities, Arts	Bioengineering	Biol. and environm. sc.
Language and Linguistics	Humanities, Arts	Catalysis	Technology
Archaeology	Humanities, Arts	Chemical Health and Safety	Technology
Classics	Humanities, Arts	Colloid and Surface Chemistry	Technology
Conservation	Humanities, Arts	Filtration and Separation	Technology
History and Philosophy of Science	Humanities, Arts	Fluid Flow and Transfer Processes	Technology
Literature and Literary Theory	Humanities, Arts	Process Chemistry and Technology	Technology
Museology	Humanities, Arts	<b>Chemistry (all)</b>	Natural sciences
Music	Humanities, Arts	Chemistry (miscellaneous)	Natural sciences
Philosophy	Humanities, Arts	Analytical Chemistry	Natural sciences
Religious studies	Humanities, Arts	Electrochemistry	Natural sciences
Visual Arts and Performing Arts	Humanities, Arts	Inorganic Chemistry	Natural sciences
<b>Biochemistry, Genetics and Molecular Biology (all)</b>	Biol. and environm. sc.	Organic Chemistry	Natural sciences
Biochemistry, Genetics and Molecular Biology (miscellaneous)	Biol. and environm. sc.	Physical and Theoretical Chemistry	Natural sciences
Ageing	Biol. and environm. sc.	Spectroscopy	Natural sciences
Biochemistry	Biol. and environm. sc.	<b>Computer Science (all)</b>	Natural sciences
Biophysics	Biol. and environm. sc.	Computer Science (miscellaneous)	Natural sciences
Biotechnology	Biol. and environm. sc.	Artificial Intelligence	Natural sciences
Cancer Research	Medical and health sc.	Computational Theory and Mathematics	Natural sciences
Cell Biology	Biol. and environm. sc.	Computer Graphics and	
Clinical Biochemistry	Medical and health sc.	Computer-Aided Design	Natural sciences
Developmental Biology	Biol. and environm. sc.	Computer Networks and Communications	Technology
Endocrinology	Medical and health sc.	Computer Science Applications	Natural sciences
Genetics	Biol. and environm. sc.	Computer Vision and Pattern Recognition	Natural sciences
Molecular Biology	Biol. and environm. sc.	Hardware and Architecture	Technology
Molecular Medicine	Medical and health sc.	Human-Computer Interaction	Natural sciences
Physiology	Medical and health sc.	Information Systems	Natural sciences
Structural Biology	Biol. and environm. sc.	Signal Processing	Technology
		Software	Natural sciences

ASJC Scientific discipline	Main scientific discipline in standard report
<b>Decision Sciences (all)</b>	Social sciences
Decision Sciences (miscellaneous)	Social sciences
Information Systems and Management	Social sciences
Management Science and Operations Research	Social sciences
Statistics, Probability and Uncertainty	Natural sciences
<b>Earth and Planetary Sciences (all)</b>	Natural sciences
Earth and Planetary Sciences (misc.)	Natural sciences
Atmospheric Science	Natural sciences
Computers in Earth Sciences	Natural sciences
Earth-Surface Processes	Natural sciences
Economic Geology	Natural sciences
Geochemistry and Petrology	Natural sciences
Geology	Natural sciences
Geophysics	Natural sciences
Geotechnical Engineering and Engineering Geology	Technology
Oceanography	Natural sciences
Palaeontology	Natural sciences
Space and Planetary Science	Natural sciences
Stratigraphy	Natural sciences
<b>Economics, Econometrics and Finance (all)</b>	Yhteiskuntatieteet
Economics, Econometrics and Finance (miscellaneous)	Social sciences
Economics and Econometrics	Social sciences
Finance	Social sciences
<b>Energy (all)</b>	Technology
Energy (miscellaneous)	Technology
Energy Engineering and Power Technology	Technology
Fuel Technology	Technology
Nuclear Energy and Engineering	Technology
Renewable Energy, Sustainability and the Environment	Technology
<b>Engineering (all)</b>	Technology
Engineering (miscellaneous)	Technology
Aerospace Engineering	Technology
Automotive Engineering	Technology
Biomedical Engineering	Medical and health sc.
Civil and Structural Engineering	Technology
Computational Mechanics	Technology
Control and Systems Engineering	Technology
Electrical and Electronic Engineering	Technology
Industrial and Manufacturing Engineering	Technology
Mechanical Engineering	Technology
Mechanics of Materials	Technology
Ocean Engineering	Technology
Safety, Risk, Reliability and Quality	Technology
Media Technology	Technology
Building and Construction	Technology
Architecture	Technology

<b>Environmental Science (all)</b>	Biol. and environm. sc.
Environmental Science (miscellaneous)	Biol. and environm. sc.
Ecological Modelling	Biol. and environm. sc.
Ecology	Biol. and environm. sc.
Environmental Chemistry	Biol. and environm. sc.
Environmental Engineering	Technology
Global and Planetary Change	Natural sciences
Health, Toxicology and Mutagenesis	Biol. and environm. sc.
Management, Monitoring, Policy and Law	Social sciences
Nature and Landscape Conservation	Biol. and environm. sc.
Pollution	Biol. and environm. sc.
Waste Management and Disposal	Biol. and environm. sc.
Water Science and Technology	Biol. and environm. sc.
<b>Immunology and Microbiology (all)</b>	Medical and health sc.
Immunology and Microbiology (misc.)	Medical and health sc.
Applied Microbiology and Biotechnology	Biol. and environm. sc.
Immunology	Medical and health sc.
Microbiology	Biol. and environm. sc.
Parasitology	Medical and health sc.
Virology	Biol. and environm. sc.
<b>Materials Science (all)</b>	Technology
Materials Science (miscellaneous)	Technology
Biomaterials	Medical and health sc.
Ceramics and Composites	Technology
Electronic, Optical and Magnetic Materials	Technology
Materials Chemistry	Natural sciences
Metals and Alloys	Technology
Polymers and Plastics	Technology
Surfaces, Coatings and Films	Technology
<b>Mathematics (all)</b>	Natural sciences
Mathematics (miscellaneous)	Natural sciences
Algebra and Number Theory	Natural sciences
Analysis	Natural sciences
Applied Mathematics	Natural sciences
Computational Mathematics	Natural sciences
Control and Optimization	Natural sciences
Discrete Mathematics and Combinatorics	Natural sciences
Geometry and Topology	Natural sciences
Logic	Natural sciences
Mathematical Physics	Natural sciences
Modelling and Simulation	Natural sciences
Numerical Analysis	Natural sciences
Statistics and Probability	Natural sciences
Theoretical Computer Science	Natural sciences

ASJC Scientific discipline	Main scientific discipline in standard report
<b>Medicine (all)</b>	Medical and health sc.
Medicine (miscellaneous)	Medical and health sc.
Anatomy	Medical and health sc.
Anesthesiology and Pain Medicine	Medical and health sc.
Biochemistry, medical	Medical and health sc.
Cardiology and Cardiovascular Medicine	Medical and health sc.
Critical Care and Intensive Care Medicine	Medical and health sc.
Complementary and alternative medicine	Medical and health sc.
Dermatology	Medical and health sc.
Drug guides	Medical and health sc.
Embryology	Medical and health sc.
Emergency Medicine	Medical and health sc.
Endocrinology, Diabetes and Metabolism	Medical and health sc.
Epidemiology	Medical and health sc.
Family Practice	Medical and health sc.
Gastroenterology	Medical and health sc.
Genetics(clinical)	Medical and health sc.
Geriatrics and Gerontology	Medical and health sc.
Health Informatics	Medical and health sc.
Health Policy	Medical and health sc.
Hematology	Medical and health sc.
Hepatology	Medical and health sc.
Histology	Medical and health sc.
Immunology and Allergy	Medical and health sc.
Internal Medicine	Medical and health sc.
Infectious Diseases	Medical and health sc.
Microbiology (medical)	Medical and health sc.
Nephrology	Medical and health sc.
Clinical Neurology	Medical and health sc.
Obstetrics and Gynaecology	Medical and health sc.
Oncology	Medical and health sc.
Ophthalmology	Medical and health sc.
Orthopedics and Sports Medicine	Medical and health sc.
Otorhinolaryngology	Medical and health sc.
Pathology and Forensic Medicine	Medical and health sc.
Pediatrics, Perinatology, and Child Health	Medical and health sc.
Pharmacology (medical)	Medical and health sc.
Physiology (medical)	Medical and health sc.
Psychiatry and Mental health	Medical and health sc.
Public Health, Environmental and Occupational Health	Medical and health sc.
Pulmonary and Respiratory Medicine	Medical and health sc.
Radiology Nuclear Medicine and imaging	Medical and health sc.
Rehabilitation	Medical and health sc.
Reproductive Medicine	Medical and health sc.
Reviews and References, Medical	Medical and health sc.
Rheumatology	Medical and health sc.
Surgery	Medical and health sc.
Transplantation	Medical and health sc.
Urology	Medical and health sc.

<b>Neuroscience (all)</b>	Biol. and environm. sc.
Neuroscience (miscellaneous)	Biol. and environm. sc.
Behavioral Neuroscience	Biol. and environm. sc.
Biological Psychiatry	Medical and health sc.
Cellular and Molecular Neuroscience	Biol. and environm. sc.
Cognitive Neuroscience	Medical and health sc.
Developmental Neuroscience	Biol. and environm. sc.
Endocrine and Autonomic Systems	Biol. and environm. sc.
Neurology	Medical and health sc.
Sensory Systems	Medical and health sc.
<b>Nursing (all)</b>	Medical and health sc.
Nursing (miscellaneous)	Medical and health sc.
Advanced and Specialised Nursing	Medical and health sc.
Assessment and Diagnosis	Medical and health sc.
Care Planning	Medical and health sc.
Community and Home Care	Medical and health sc.
Critical Care	Medical and health sc.
Emergency	Medical and health sc.
Fundamentals and skills	Medical and health sc.
Gerontology	Medical and health sc.
Issues, ethics and legal aspects	Medical and health sc.
Leadership and Management	Medical and health sc.
LPN and LVN	Medical and health sc.
Maternity and Midwifery	Medical and health sc.
Medical–Surgical	Medical and health sc.
Nurse Assisting	Medical and health sc.
Nutrition and Dietetics	Medical and health sc.
Oncology(nursing)	Medical and health sc.
Pathophysiology	Medical and health sc.
Pediatrics	Medical and health sc.
Pharmacology (nursing)	Medical and health sc.
Phychiatric Mental Health	Medical and health sc.
Research and Theory	Medical and health sc.
Review and Exam Preparation	Medical and health sc.
<b>Pharmacology, Toxicology and Pharmaceutics (all)</b>	Medical and health sc.
Pharmacology, Toxicology and Pharmaceutics (miscellaneous)	Medical and health sc.
Drug Discovery	Medical and health sc.
Pharmaceutical Science	Medical and health sc.
Pharmacology	Medical and health sc.
Toxicology	Medical and health sc.

ASJC Scientific discipline	Main scientific discipline in standard report
<b>Physics and Astronomy (all)</b>	Natural sciences
Physics and Astronomy (miscellaneous)	Natural sciences
Acoustics and Ultrasonics	Natural sciences
Astronomy and Astrophysics	Natural sciences
Condensed Matter Physics	Natural sciences
Instrumentation	Natural sciences
Nuclear and High Energy Physics	Natural sciences
Atomic and Molecular Physics, and Optics	Natural sciences
Radiation	Natural sciences
Statistical and Nonlinear Physics	Natural sciences
Surfaces and Interfaces	Natural sciences
<b>Psychology (all)</b>	Social sciences
Psychology (miscellaneous)	Social sciences
Applied Psychology	Social sciences
Clinical Psychology	Medical and health sc.
Developmental and Educational Psychology	Social sciences
Experimental and Cognitive Psychology	Social sciences
Neuropsychology and	
Physiological Psychology	Social sciences
Social Psychology	Social sciences
<b>Social Sciences (all)</b>	Social sciences
Social Sciences (miscellaneous)	Social sciences
Archaeology	Humanities, Arts
Development	Social sciences
Education	Social sciences
Geography, Planning and Development	Social sciences
Health (social science)	Social sciences
Human Factors and Ergonomics	Medical and health sc.
Law	Social sciences
Library and Information Sciences	Social sciences
Linguistics and Language	Humanities, Arts
Safety Research	Medical and health sc.
Sociology and Political Science	Social sciences
Transportation	Technology
Anthropology	Humanities, Arts
Communication	Social sciences
Cultural Studies	Social sciences
Demography	Social sciences
Gender Studies	Social sciences
Life-span and Life-course Studies	Social sciences
Political Science and International Relations	Social sciences
Public Administration	Social sciences
Urban Studies	Social sciences
<b>Veterinary (all)</b>	Agricult. and forestry sc.
Veterinary (miscellaneous)	Agricult. and forestry sc.
Equine	Agricult. and forestry sc.
Food Animals	Agricult. and forestry sc.
Small Animals	Agricult. and forestry sc.

Dentistry (all)	Medical and health sc.
Dentistry (miscellaneous)	Medical and health sc.
Dental Assisting	Medical and health sc.
Dental Hygiene	Medical and health sc.
Oral Surgery	Medical and health sc.
Orthodontics	Medical and health sc.
Periodontics	Medical and health sc.
<b>Health Professions(all)</b>	Lääke- ja terveystieteet
Health Professions (miscellaneous)	Medical and health sc.
Chiropractics	Medical and health sc.
Complementary and Manual Therapy	Medical and health sc.
Emergency Medical Services	Medical and health sc.
Health Information Management	Medical and health sc.
Medical Assisting and Transcription	Medical and health sc.
Medical Laboratory Technology	Medical and health sc.
Medical Terminology	Medical and health sc.
Occupational Therapy	Medical and health sc.
Optometry	Medical and health sc.
Pharmacy	Medical and health sc.
Physical Therapy, Sports Therapy and Rehabilitation	Medical and health sc.
Podiatry	Medical and health sc.
Radiological and Ultrasound Technology	Medical and health sc.
Respiratory Care	Medical and health sc.
Speech and Hearing	Medical and health sc.



## Research organisations by organisation type

Organisation/organisation group	Organisation category
Aalto University	Universities
University of Helsinki	Universities
University of Eastern Finland	Universities
University of Jyväskylä	Universities
University of Lapland	Universities
Lappeenranta University of Technology	Universities
University of Oulu	Universities
Hanken School of Economics	Universities
University of the Arts Helsinki	Universities
Tampere University of Technology	Universitiest
University of Tampere	Universities
University of Turku	Universities
University of Vaasa	Universities
Åbo Akademi University	Universities
Helsinki University Central Hospital	University hospitals
Kuopio University Hospital	University hospitals
Oulu University Hospital	University hospitals
Tampere University Hospital	University hospitals
Helsinki University Central Hospital	University hospitals
Other hospital districts	Other hospital districts
Finnish Food Safety Authority Evira	State research institutes
Finnish Geodetic Institute	State research institutes
Geological Survey of Finland	State research institutes
Finnish Meteorological Institute	State research institutes
MTT Agrifood Research Finland	State research institutes
Finnish Forest Research Institute (Metla)	State research institutes
Finnish Game and Fisheries Research Institute	State research institutes
Finnish Environment Institute	State research institutes
STUK – Radiation and Nuclear Safety Authority	State research institutes
Finland National Institute for Health and Welfare	State research institutes
Institute of Occupational Health	State research institutes
VTT Technical Research Centre of Finland	State research institutes
Other state research institutes	State research institutes
Universities of applied sciences	Universities of applied sciences
Companies	Companies

## The data sets and data processing

### The data

This report is based on two international publication and citation databases: the three-part Science Citation Index Expanded / Social Sciences Citation Index / Arts & Humanities Citation Index (published by Thomson Reuters) and Scopus Custom Data (published by Elsevier). Because the former in practice contains the same information as the Web of Science online service, it will be referred to by means of the abbreviation WoS. For the second of the two, the report uses the shorter form, Scopus. Both databases contain references to millions of scientific publications, such as the publication's name, its authors, their affiliations, the disciplines a publication represents, the type of publication, the year it appeared and the sources used. This information serves to calculate indicators, based on publication and reference numbers that can be used to assess the scope and impact of the scientific publishing activity of research organisations. The review is restricted to the period 2000–2010.

International publication databases cannot reach key scientific output entirely in all disciplines. Coverage is good in natural sciences and medical sciences, but in social sciences and the humanities the data is often incomplete and may only cover some narrow specialist areas. Because the dominant language of science is English, the databases tend to contain references to publications in that language.

### Methods

In the analyses that are undertaken in the report, each publication represents one or more scientific disciplines, as defined by the publisher, of which there are several hundred in number. A single publication is fractionalised equally among all the disciplines it represents. So that the number of disciplines that the report deals with might remain reasonable, and for the numbers of publications under scrutiny to be sufficiently large for bibliometric purposes, the publishers' disciplines are grouped further under seven main disciplines. Those used to report results are natural sciences, biological and environmental sciences, engineering and technology, medical and health sciences, agricultural and forestry sciences, social sciences and the humanities.

For the purposes of country-specific comparisons, the addresses of the authors of publications are indicated as the countries in which their affiliations are to be found (i.e. information on the research organisation the author works for or whose activities the author's publication mainly relates to). Each publication is divided equally among all the countries found under the addresses. A publication counts as being Finnish, at least partly, whenever one of the authors has given an address with the Finnish country code (usually FINLAND). The data does not allow for the identification of a single author's affiliation for the entire period under review

	Thomson Reuters WoS	Elsevier Scopus
Total number of publications 2000–2010	16,6 million	18,7 million
Finnish publications 2000–2010	121 000	122 000
Scientific disciplines 2000–2010	255	332



(2000–2010), so fractionalisation among the various countries according to the numbers of employed authors is not an option. Nor may fractionalisation be undertaken reliably with regard to numbers of affiliations located in different countries, because the data on affiliation has a relatively large number of errors or omissions, and the actual number of affiliations associated with a publication may not be read directly from the data. The country codes, however, are almost always correct.

Reliable results are obtained for Finnish affiliations, as the organisations associated with all the Finnish addresses in both databases are checked and, if necessary, corrected as comprehensively as possible. Among the Finnish organisations, publications are fractionalised on the same principle as at international level with respect to countries: each organisation mentioned in the publication's address data receives an equal share of the publication.

Regarding publication types, the examination is limited to three: *Article*, *Letter* and *Review*. The identification of a publication type relies on the publisher's classification, and in practice the same publication may be indicated as a different type in the separate databases.

The extent of the publication output for the units examined (depending on the situation, country, organisation or organisation group) is described in the report by means of two indicators: *fractionalised number of publications* and *non-fractionalised number of publications*. The fractionalised number of publications is obtained by adding together the unit's contributions to all publications it has been involved with. The non-fractionalised number of publications, on the other hand, is established by calculating the total number of publications (with no fractionalisation among the other units) that the unit has been involved with. Non-fractionalised publication numbers do not add up naturally, so, for example, the non-fractionalised number of publications for the Finnish university sector cannot be calculated as a total from the non-fractionalised number of publications for individual universities, because then the co-publications among several universities would be included in the end result over and over again.

For the purposes of citation analyses assessing the scientific impact of research, the publications

are first divided into basic categories comprising the publications representing all the same scientific discipline, publication type and year of publication. If the calculations and comparisons between basic categories are to have any meaning, the number of citations obtained for each publication must be normalised within its own basic category. The results presented in this report are based on a simple normalisation process, where the number of citations for a publication is divided by the average figure for all publications in the same basic category. This method of normalisation takes no account of the differences in the distortion of the distributions of the numbers of citations, though in practice it leads to very much the same results as more advanced normalisation processes. Where the normalised number of citations for a publication is greater than 1.0, it has attracted more references than the other publications in the same basic category, on average.

In calculating the average citation values for the data overall, excluded are those publications whose metadata makes no mention of any country (and in such cases there is also missing data on the authors). The aim has been to delete the references made by researchers to their own earlier publications. As the data does not offer any reliable means of identifying researchers, this procedure relies on the names of the authors of a publication.

The relative citation index reflecting the scientific impact of the publishing activities of a research unit is obtained by calculating the fractionalisation-weighted arithmetic mean for all the normalised numbers of citations for the publications produced by the unit. Because publications have been fractionalised among the disciplines and the units in such a way that the sum of the parts of an individual publication is always 1.0, the relative citation index obtains the value 1.0 if a unit's publications have, on average, attracted the same number of references in its own fields as all the publications in the corresponding basic categories that have been released all over the world. A relative citation index with a value greater than 1.0 means that there are more than the average number of references to a unit's publications than to similar publications produced elsewhere, and a value less than 1.0 indicates that a unit's publications have attracted less attention.

When the values for a relative citation index are being interpreted, it needs to be remembered that the distribution of references for publications is highly distorted, and the average figure alone is not enough to describe the situation accurately. A research unit whose relative citation index is high also always produces many publications that have no citations whatsoever. Equally, a unit with a low relative citation index may employ research groups that repeatedly publish a large number of articles that attract citations. The Top10 index is used to assess the contribution made by these top publications. To estimate it, the most cited tenth of publications in each basic category, as referred to above, is looked for, and these publications are given a category-specific non-zero score, with all the other publications in the category receiving a score of 0. The score for top publications is selected in such a way that the average score in each basic category is exactly 1.0. After that the parts-weighted arithmetic mean for the scores for each research unit's publications is recalculated, though now of course only the publications in the most cited tenth produce a result for the units. As with the relative citation index, a Top10 index value of 1.0 also means that the share of top publications in the research unit's output is equal to the world average (10%), and index values greater than 1.0 mean that the share of top publications in its output is greater than 10%.

With the indices describing impact, the principle followed has been that the results are not reported when the number of publications for a unit being analysed is fewer than 100. Indicators for small units can fluctuate greatly from one year to the next, for example when one publication among a whole group attracts a large number of citations.

Bibliometric calculations are performed in accordance with two fundamental principles. Firstly, all calculation algorithms must be generally symmetric with parameters in a similar position. This means that, for example, all disciplines are dealt with identically, and the same is true for all countries. Finland, especially, is therefore not a country in any special situation, even though Finnish affiliations can be identified more reliably

than foreign ones. Furthermore, at the organisation level, all Finnish organisations are treated identically. Although the goal is symmetry with respect to methods used, it nevertheless needs to be remembered that the data available is not symmetric for disciplines any more than it is for countries or organisations.

Secondly, the results must be consistent with regard to aggregations for publication categories. If the smaller publication categories are combined into bigger entities, the number of publications associated with the combined category must be the sum total for publications for the smaller categories, and each citation indicator value in the combined category should always be within the range of variation for the values calculated in the smaller categories for the same indicator. A significant exemption from the consistency principle is the use of non-fractionalised publication numbers. Citation indicators are always based on fractionalised publication numbers, so they are consistent. At the global level, consistency means that the average for each citation indicator (weighted by numbers of publications) across all countries in the world receives the value 1.0.

### Indicator calculation formulae

For the purposes of country-specific analyses, each publication is fractionalised evenly with regard to all the disciplines it represents and the countries mentioned in its address information. If a publisher has given a publication  $D$  x scientific fields, with the authors coming from  $M$  different countries, the contribution made by one country in one field is  $f=1/(M*K*D)$ . For a comparison of Finnish organisations, the Finnish national contribution is still fractionalised evenly among all the identified organisations. If there are  $N$  organisations, the contribution by just one organisation in one field is  $f=1/(M*D*N)$ .

When calculating the relative citation index, a publication is dealt with fractionalised. Let the index group for the fractionalised publications of a research unit under scrutiny be  $I$ . One bona fide publication may thus appear in this group more than once, if it represents several different fields. For a publication

in a field represented by its  $i \in I$ , first the normalised citation figure is calculated for the citation figure  $r_i$  by dividing the number of citations  $c_i$  derived from it by the average number of citations for the basic category  $G_i$  determined for the same field, year of publication and publication type  $a_p$ , thus  $r_i = c_i / a_p$ . Now let the discipline-specific contribution calculated in the way shown above for a publication be  $f_i$ . The relative citation index for research unit  $\rho$  is obtained by calculating the arithmetic mean weighted by contributions for the normalised citation values for all a unit's publications:  $\rho = \sum_{i \in I} f_i * r_i / \sum_{i \in I} f_i$ .

The Top10 index is calculated along the same lines, but now the normalised citation figure  $r_i$  is replaced by the score  $p_i > 0$ , if the publication is included in the most cited tenth for basic category  $G_i$ , and, if not, with the value 0. A figure's  $p_i$  value depends on the size of the category  $G_i$  and on the number of publications in the category's most cited tenth, and is selected in each category in such a way that the category's score will be exactly 1.0.

- 1 Toiminta- ja taloussuunnitelma 2014–2017
- 2 Liikuntatoimi tilastojen valossa;  
Perustilastot vuodelta 2011
- 3 Sivistystä vapaasti kaikille? Tutkimus kansalaisopistojen ja kansanopistojen esteettömyydestä
- 4 Yliopistojen tieteellinen ja taiteellinen toiminta sekä yhteiskunnallinen vaikuttavuus vuonna 2011. Yhteenveto yliopistoilta kerätyistä julkaisutiedoista
- 5 Taidetta arkeen; Selvitys valtion keinoista edistää prosenttiperiaatetta osana julkista rakentamista
- 6 Matkailu ja kulttuurin syke; Kulttuurin matkailullinen tuotteistaminen -toimintaohjelman 2009–2013 loppuraportti
- 7 Perusopetuksen laatutyö. Erilaisia tapoja ottaa laatuksiteerit hallintaan
- 8 Koulujen alueelliset haasteet ja rahoituksen kohdentuminen
- 9 Opetus- ja kulttuuriministeriön älystrategia; OKM-KIDE
- 10 Mediakasvatus kuntien varhaiskasvatuksessa
- 11 Hyvä medialukutaito; Suuntaviivat 2013–2016
- 15 Linjaukset liikuntatutkimuksen tukemiseksi vuoteen 2017; Liikuntatutkimuksen suunta-asiakirja
- 16 Systemaattista suunnitelmallisuutta. Opetustoimen henkilöstökoulutuksen tila, haasteet ja kehittämistarpeet
- 17 WoS vai Scopus? Suomalaisen tutkimuksen tila 2010-luvun alussa kansainvälisten viiteaineistojen mukaan
- 19 Kansainvälisen aikuistutkimuksen ensituloksia, PIAAC 2012
- 20 PISA12 ensituloksia



Opetus- ja kulttuuriministeriö

Undervisnings- och kulturministeriet

Ministry of Education and Culture

Ministère de l'Éducation et de la culture

ISBN 978-952-263-235-7 (PDF)  
ISSN-L 1799-0343  
ISSN 1799-0351 (PDF)

Helsinki 2013

