

# Resource efficiency and productivity of Swedish higher education institutions in the Nordic countries

## Summary and recommendations

The Swedish National Audit Office has audited the resource efficiency and productivity of Nordic higher education institutions. The audit's overall conclusion is that the Swedish higher education institutions studied compare well with other higher education institutions in the Nordic countries with regard to resource efficiency and productivity. For some higher education institutions, however, there is greater potential for improvement for the entire period studied, 2011–2016. Compared with the NAO's previous audit of the efficiency of Swedish higher education institutions, the results of this audit show a similar potential for improvement. In the former audit, however, a comparison was only made of the Swedish higher education institutions, which is why the results are not entirely comparable.

### **Background and rationale**

Central government allocates large resources to higher education and research. In 2017, Swedish higher education institutions' total revenue was almost SEK 71 billion. Of this, almost SEK 56 billion were central government funds. In other Nordic countries as well, large resources are invested in higher education and research – almost 2 per cent of each country's GDP per year.

A previous audit from the Swedish NAO shows that some half of Swedish higher education institutions could be more efficient in their use of resources. In an increasingly globalised academic world that is more and more exposed to competition, it is interesting and relevant to compare the resource efficiency of Swedish higher education with that of higher education institutions of other countries. Consequently, the Swedish NAO, in collaboration with the Supreme Audit Institutions of the other Nordic countries, has audited the resource efficiency and productivity of higher education in the Nordic countries for the period 2011–2016.

The audit is limited to higher education institutions in the Nordic countries primarily due to access to statistics, but also because the educational systems of these countries are relatively similar. Comparative studies of this type may supplement other analyses and contribute to greater knowledge with regard to the use of resources at Swedish higher education institutions. The audit findings may thereby provide a basis for comparisons between higher education institutions both within Sweden and in the Nordic countries.

## **Purpose and method**

The purpose of the audit is to examine resource efficiency and productivity of Swedish higher education institutions compared with those of the other Nordic countries and whether there is scope for improving efficiency.

The measure of efficiency on which the audit is based is calculated using the Data Envelopment Analysis (DEA) method. This gives a relative measure which means that the inefficiency or scope for improvement of a higher education institution is defined based on what has been observed at other, comparable higher education institutions at a given point in time. According to the method, a higher education institution is efficient when there is no other comparable higher education institution that produces more, given the available resources. The measure thus says nothing about what may be possible to produce theoretically but is based only on what has been observed among the higher education institutions studied. Changes in efficiency over time, i.e. productivity, are studied using a productivity index that reflects greater or reduced production because of changes in efficiency and technology.

Resource efficiency in the audit is measured by relating the performance of higher education institutions (measured as the credits achieved by students, the number of doctorates and the number of research articles published, divided into highly cited and not highly cited) related to their investment in resources (measured as staff, undergraduates, doctoral students and office space). A total of 68 of the more than 160 Nordic higher education institutions are included in the audit, 27 of which are Swedish.

Within the framework of the audit, the Swedish NAO also undertook a study of student completion at a freestanding course and a degree programme at Swedish higher education institutions – the first-cycle course in English and the Bachelor of Science in Engineering, Mechanical Engineering. By providing examples of how the higher education institutions work on increasing student completion in this particular course and degree programme, the aim was to increase understanding of the factors that may explain differences in efficiency between these institutions.

## Audit findings and conclusions

### Danish higher education institutions are most efficient

The Danish higher education institutions included in the analysis had the highest average resource efficiency over the period 2011–2016. The Danish higher education institutions included in the audit have a relatively strong research profile. In comparison, the Swedish higher education institutions have a somewhat lower average level of efficiency than the Danish, but higher than the average in Norway and Finland. The average improvement potential for the Swedish higher education institutions amounts to some 7 per cent for the period 2011–2016. This means that the higher education institutions, given their resources, are able to increase their performance in terms of undergraduate and doctoral student completion rate and increase the number of (highly cited) research publications by, on average, 7 per cent.

If the improvement potential for 2016 is estimated, in a somewhat simplified manner, in terms of the number of annual performance equivalents, the Swedish NAO's estimates indicate that it would have been possible to produce a further 12 000 annual performance equivalents at Swedish higher education institutions that year. The potential for improvement is, however, not evenly distributed. Several Swedish higher education institutions are among the most resource-efficient institutions in the Nordic countries throughout the period studied. At the same time, there are some Swedish institutions that demonstrate a potential for improvement of over 20 per cent for the same period.

### High staff turnover at Swedish higher education institutions with a potential for improvement.

The Swedish NAO has tested several possible explanations for why some higher education institutions report a lower level of efficiency than others. The factors examined are:

- the proportion of staff with a PhD degree
- the proportion of new higher education entrants
- the proportion of distance students
- the proportion of students taking freestanding courses
- the higher education institution's staff turnover
- the higher education institution's level of specialisation
- the higher education institution's over-production of students
- the proportion of external funding.

The analysis shows that only staff turnover demonstrates a correlation with the efficiency scores. This correlation is negative: higher education institutions with high staff turnover have lower efficiency. The Swedish NAO's previous audit

showed a negative correlation between the number of distance students and the efficiency figures, but this audit does not establish any statistically significant correlation. This may have several causes, such as a shift towards more students in full programmes, improved technology and changes in working methods during the period. A number of mergers of higher education institutions has also taken place.

### Highest level of productivity growth at Danish and Finnish higher education institutions, 2011–2016

The overall picture of productivity is that it has developed positively, on analysis of the 68 Nordic higher education institutions. For the period 2011–2016, productivity improved by an average of just under 1 per cent per year. The Swedish higher education institutions have similar productivity growth over time, although somewhat lower. Denmark and Finland experienced the highest productivity growth of some 2 per cent per year. These are also the two countries that have had the most positive development within technology. At the Swedish higher education institutions, however, the level of technological development was the lowest, compared with the institutions of other Nordic countries.

### Swedish higher education institutions can improve their efforts to increase student completion

The Swedish NAO's study of student completion confirms the results of previous studies. The student completion rate is lower in the first-cycle course in English – a freestanding course with a large proportion of distance learning – and higher in the Bachelor of Science in Engineering, Mechanical Engineering. The differences between the higher education institutions are large for both the course and the degree programme.

The objectives of the Higher Education Act require high standards and efficiency in parallel with the requirement to broaden recruitment to higher education institutions. At the same time, the resource allocation system prioritises student completion, and compensation is largely the same, regardless of students' abilities. This poses a challenge for the higher education institutions. Apart from the resource allocation system, there are also other factors that are considered by higher education institutions to affect student completion negatively but are difficult for the higher education institutions to influence. This applies, for example, to declining numbers of students applying to higher education institutions and heterogeneous student groups.

A precondition for being able to introduce measures to improve student completion is that the higher education institutions have knowledge concerning student performance and dropping-out. The course and degree programme that we studied show that the higher education institutions monitor student

performance and completion to a varying extent, and that monitoring is not always systematic. Our survey shows that it is more difficult to monitor dropouts from freestanding courses and distance learning courses. The higher education institutions also take different measures to counteract dropping-out and to increase student completion. However, few higher education institutions follow up the impact of their measures.

## **Recommendations**

Based on the audit findings and conclusions, the Swedish National Audit Office makes the following recommendations:

- Higher education institutions that, according to the audit, show great potential for improvement should identify the factors that affect efficiency and productivity and then take suitable measures to improve the situation.
- Higher education institutions should systematically monitor student performance and completion and the effects of the measures that are being taken to increase student completion.