

Bibliometric analysis of publications by Austrian Universities of Applied Sciences (UAS) in the publication years 2013 to 2017 and 2018 to 2022

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Background

Austrian federal law requires teaching and research staff at universities of applied sciences (UAS) to carry out applied research and development (R&D) in order to achieve the objectives and principles of the UAS degree programmes. However, the federal government does not provide basic funding for research at UAS. It is the responsibility of the UAS providers to set research priorities and secure funding for the necessary research activities. As UAS in Austria do not have the right to award doctorates and cannot offer academic career paths for postdocs, the potential for academic research at UAS is limited. Nevertheless, according to data from Statistics Austria, R&D expenditure in the UAS sector has risen significantly from 77.4 million euros in 2011 to 164.6 million euros in 2021. This corresponds to an increase in the share of R&D expenditure by universities of applied sciences in the total R&D expenditure of the Austrian higher education sector from 3.7 % in 2011 to 5.4 % in 2021.

Is this increase in funding also reflected in the publication output, visibility and resonance of UAS publications in the scientific community? How are the co-publication activities of UAS with partners from science and practice developing? What about citations of UAS publications in patent documents, which could support the claim that UAS research is particularly application- and transfer-orientated?

Methodology

This analysis is based on data retrieved from The Lens Scholarly Works. For the Austrian UAS listed on the website of the Federal Ministry of Education, Science and Research (excluding Fachhochschule für angewandte Militärwissenschaften), all publications from the publication years 2013 to 2022 were identified in The Lens by searching for UAS names, name fragments and abbreviations in the affiliation fields of the publication records. We manually checked that the identified publications contained at least one author with an Austrian UAS affiliation.

Separately, we identified all Austrian publications from the publication years 2013 to 2022 in The Lens by searching in the country code field of the publication records for the code "AT" and in the affiliation fields for references to Austria. This search resulted in 329,737 documents. As not all publication records contain country information, the number of UAS publications identified by searching for UAS names is higher than the number of UAS publications in the Austrian publications dataset. Of the 7,706 UAS publications identified by searching for UAS names, 6,908 publications (89.6%) can also be found in the Austrian publications dataset. Hyper-authored publications with more than 50 authors were not included in the document counts or in the further analysis.

We used the SCImago Scientific Journal Ranking to assign the best subject quartile rank to each publication in our datasets by matching the ISSN information in the publication records of The Lens with the SCImago Scientific Journal Ranking records for each publication year separately. In the UAS publications dataset, we find 3,675 publications (47.7 %) in SCImago-listed sources. In the entire Austrian publications dataset 69.3 % of the publications are in SCImago-listed sources.

In the UAS publications dataset, we used the affiliation fields in the publication records to identify co-publications with science partners (i.e. other UAS, universities, public and private research institutes), with practice partners (i.e. companies, healthcare sector, public administration, foundations and associations) and international co-publications.

In order to calculate the citation impact of the UAS publications in comparison to the average Austrian publication, the publications in the Austrian publications dataset we distinguished between the document types "journal articles", "books/book chapters", "conference contributions" and "other". We used the first two digits of the *All Science Journal Classification (ASJC)* codes for the publications in the publication records for the subject area classification. We calculated the average citation rates for the publications of the same publication year, document type and subject area. In cases where there were fewer than 100 publications of the same publication year, document type and subject area, no average citation rates were calculated.

We calculated the Normalised Citation Impact (NCI) for each publication by dividing the number of citations of the individual publication by the average citation rate of publications of the same publication year, document type and subject area. The NCI of publications that belong two or more subject areas was calculated as the mean of the NCIs for all subject area values for this publication.

An NCI value of 2.0 means that the publication was cited twice as often as the average of Austrian publications of the same publication year, document type and subject area. An NCI value of 0.5 means that the publication was cited half as often as the average of Austrian publications of the same publication year, document type and subject area.

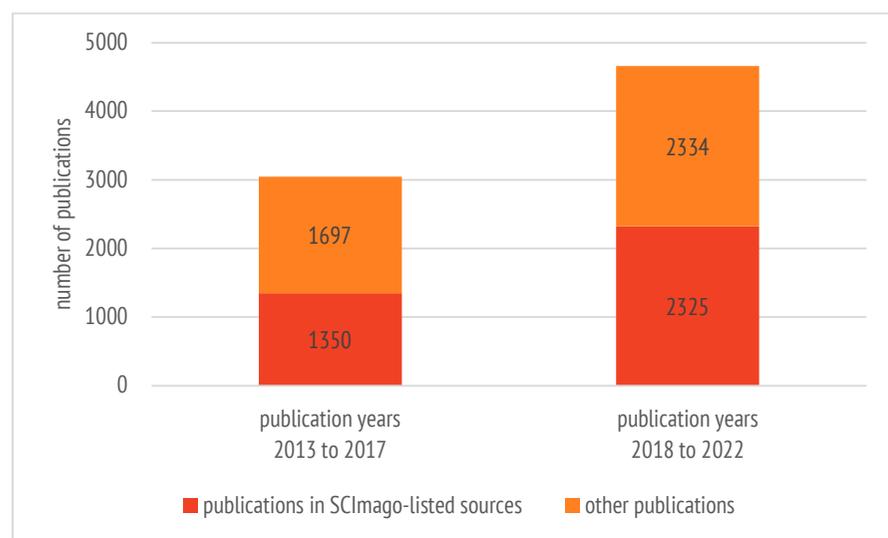
To calculate the Average Percentile values, all publications of the same year, document type and subject area (except for groups with less than 100 publications) were assigned their percentile rank according to the number of citations (calculated as the inverse rank of the publication divided by the total number of publications of the same publication year, document type and subject area multiplied by 100). The Average Percentile of publications assigned to two or more subject areas was calculated as the mean of the subject area Average Percentile values.

An Average Percentile value of more than 90 indicates that the publication belongs to the 10 % most cited Austrian publications of the same publication year, document type and subject area. Top 10 %-cited publications can be regarded as high impact publications which have met strong resonance in the scientific community.

Publication activity

The total number of UAS publications increased significantly from the first to the second publication period. While we find a total of 3,047 UAS publications for the publication years 2013 to 2017, the total number of UAS publications in the publication years 2018 to 2022 is 4,659.

Figure 1: Number of Austrian UAS publications



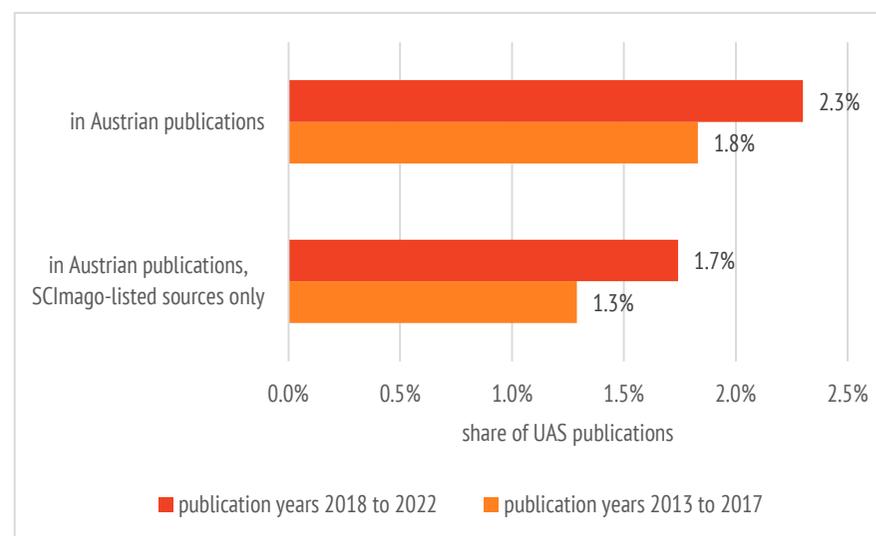
Source: The Lens Scholarly Works, SCImago Journal Ranking, own calculations

The share of UAS publications in the sources listed in the SCImago Journal Ranking - a proxy for scientifically orientated publications - rose from 44.3 % in the publication years 2013 to 2017 to 49.9 % in the publication years 2018 to 2022.

Share of publications in all Austrian publications

The share of UAS publications in all Austrian publications rose from 1.8 % in the publication years 2013 to 2017 to 2.3 % in the publication years 2018 to 2022. Although this rise in the UAS's contribution to the Austrian publication output, the UAS publication share was much lower than the UAS share in R&D expenditures of the Austrian higher education sector.

Figure 2: Share of UAS publications in all Austrian publications



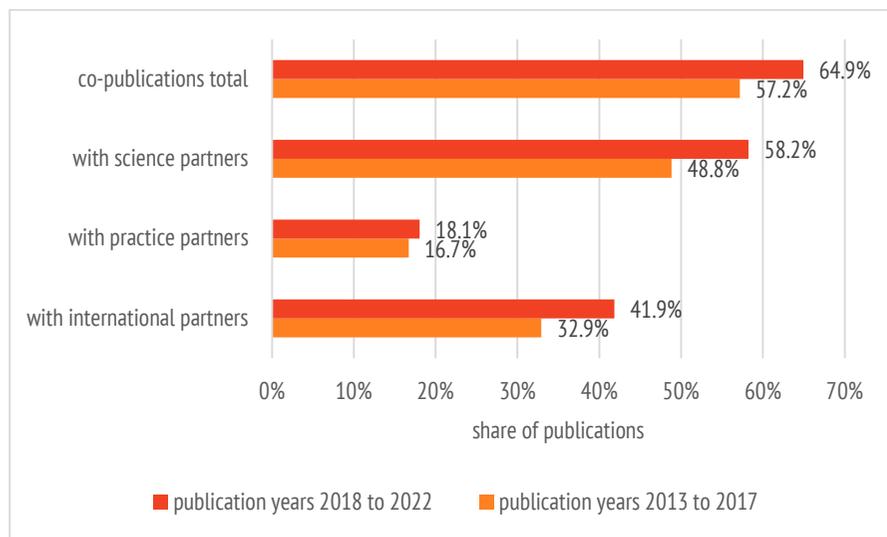
Source: The Lens Scholarly Works, SCImago Journal Ranking, own calculations

Among publications in SCImago-listed sources, the share of UAS publications in Austrian publications rose from 1.3 % in the publication years 2013 to 2017 to 1.7 % in the publication years 2018 to 2022.

Co-publications (1)

The share of UAS co-publications with partners increased from 57.2 % in the publication years 2013 to 2017 to 64.9 % in the publication years 2018 to 2022. Most of the UAS co-publications are published with science partners. Their share was 48.8 % of UAS publications in the publication years 2013 to 2017 and 58.2 % in the publication years 2018 to 2022. The share of co-publications with practice partners rose slightly from 16.7 % to 18.1 % from the first to the second publication period. The share of co-publications with international partners rose from 32.9 % to 41.9 % from the first to the second publication period.

Figure 3: Share of UAS co-publications



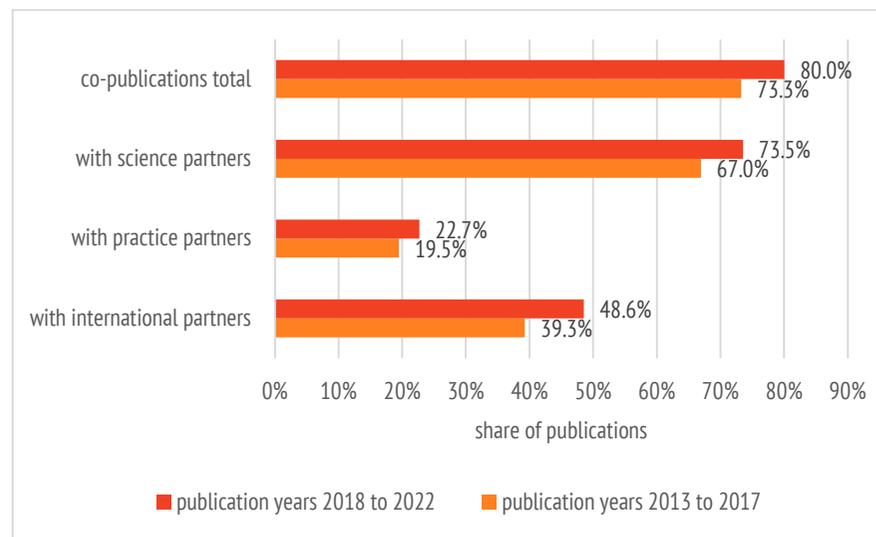
Source: The Lens Scholarly Works; own calculations

While less than a third of all UAS publications (32.9 %) were published with international partners in the publication years 2013 to 2017, their share rose to 41.9 % in the publication years 2018 to 2022.

Co-publications (2)

For publications in SCImago-listed sources, 80.0 % of UAS publications in the publication years 2018 to 2022 were co-publications, compared to 73.3 % in the publication years 2013 to 2017. Overall, 73.5 % of UAS publications in the publication years 2018 to 2022 were co-publications with science partners, compared to 67.0 % in the publication years 2013 to 2017. The share of co-publications with practice partners increased from 19.5 % to 22.7 % from the first to the second publication period.

Figure 4: Share of UAS co-publications, SCImago-listed sources only



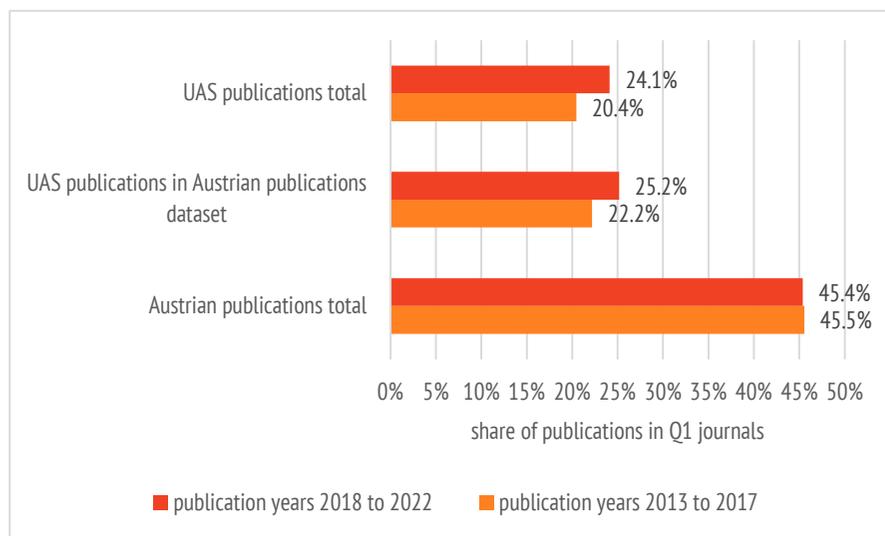
Source: The Lens Scholarly Works, SCImago Journal Ranking; own calculations

In the publication years 2013 to 2017 a share of 39.3 % of UAS publications in SCImago-listed sources were published with international partners, compared to 48.6 % in the publication years 2018 to 2022.

Share of publications in Q1 journals (1)

A total of 24.1 % of UAS publications from the publication years 2018 to 2022 were published in Q1 journals (i.e. journals that belong to the most-cited quartile of journals in at least one subject area according to the SCImago Journal Ranking), compared to 20.4 % of publications from the publication years 2013 to 2017.

Figure 5: Share of publications in Q1 journals



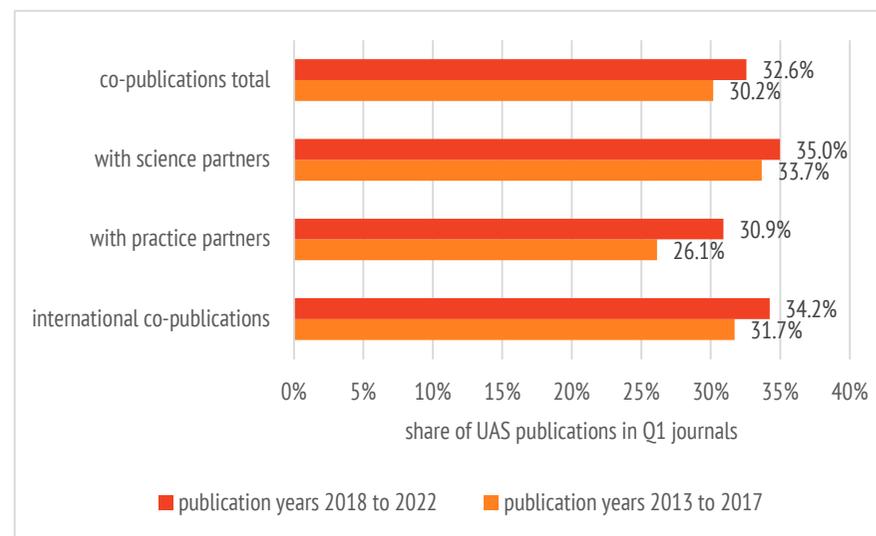
Source: The Lens Scholarly Works, SCImago Journal Ranking, own calculations

Looking only at the UAS publications that are also included in the all Austrian publications dataset, the Q1 share rose from 22.2 % to 25.2 % from the first to the second publication period. These figures are far below the Q1 share for all Austrian publications, which was 45.4 % in the publication years 2018 to 2017 and 45.5 % in the publication years 2013 to 2017.

Share of publications in Q1 journals (2)

UAS co-publications with partners were published more frequently in Q1 journals than individual UAS publications. In the publication years 2013 to 2017, the Q1 share in all UAS co-publications was 30.2 % and 33.7 % in co-publications with science partners, 26.1 % in co-publications with practice partners and 31.7 % in international co-publications.

Figure 6: Share of UAS co-publications in Q1 journals



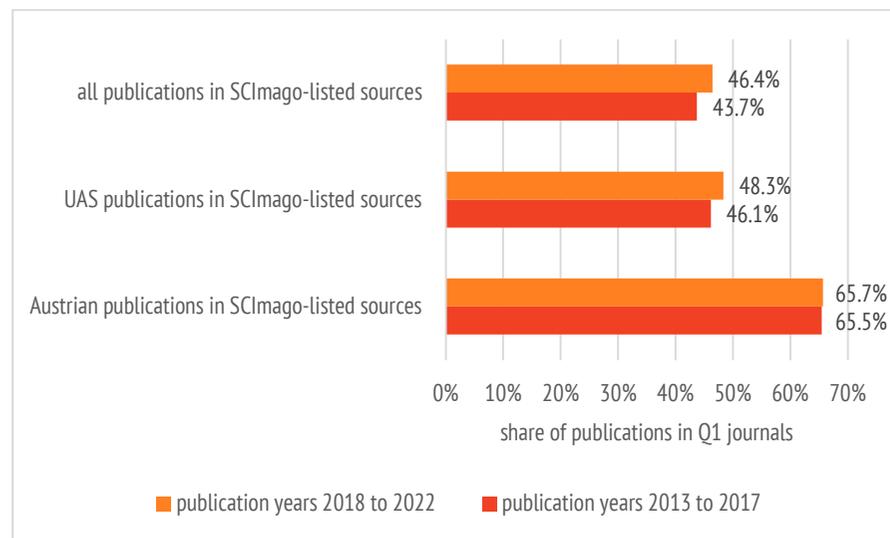
Source: The Lens Scholarly Works, SCImago Journal Ranking, own calculations

The Q1 shares for all co-publication types increased for the publication years 2018 to 2022. The Q1 share amounted to 32.6 % for all UAS co-publications, 35.0 % for co-publications with science partners, 30.9 % for co-publications with practice partners and 34.2 % for international co-publications in the second publication period.

Share of publications in Q1 journals (3)

How do the UAS shares of publications in Q1 journals compare to average values? In the publication years 2018 to 2022 a total 46.4 % of publications in SCImago-listed sources were published in Q1 journals. In the publication years 2013 to 2017, the Q1 share was 43.7 %. For UAS publications published in the sources listed in the SCImago Journal Ranking, the Q1 share was 48.3 % for the publication years 2018 to 2022 and 46.1 % for the publication years 2013 to 2017.

Figure 7: Share of publications in Q1 journals in SCImago-listed sources



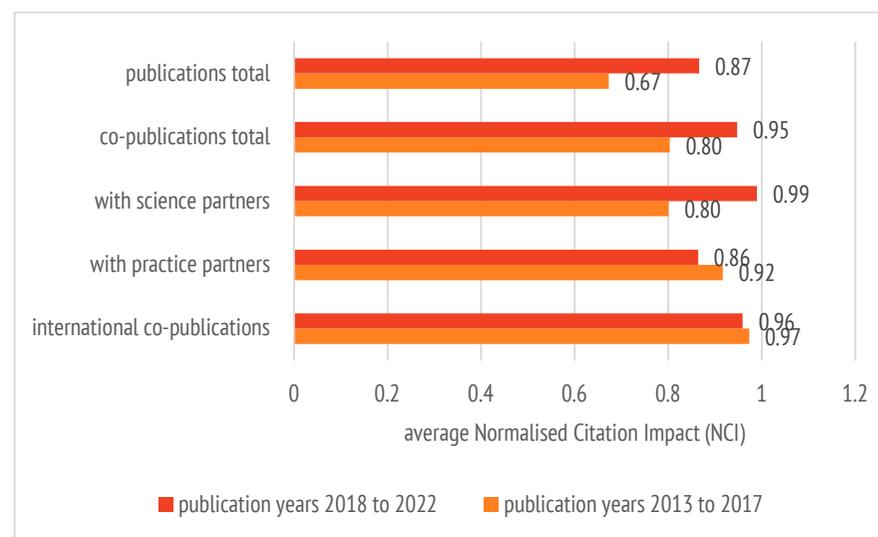
Source: The Lens Scholarly Works, SCImago Journal Ranking, own calculations

The share of UAS publications in Q1 journals was much lower than the Q1 share of all Austrian publications in the sources listed by SCImago Journal Ranking, which amounted to 65.7 % in the publication years 2018 to 2022 and 65.5 % in the publication years 2013 to 2017.

Normalised Citation Impact (NCI)

The average Normalised Citation Impact (NCI) of UAS publications compared to the “average” Austrian publication improved from substantially average NCI=0.67 for the publication years 2013 to 2017 to average NCI=0.87 for the publication years 2018 to 2022.

Figure 8: Average Normalised Citation Impact (NCI) of UAS publications



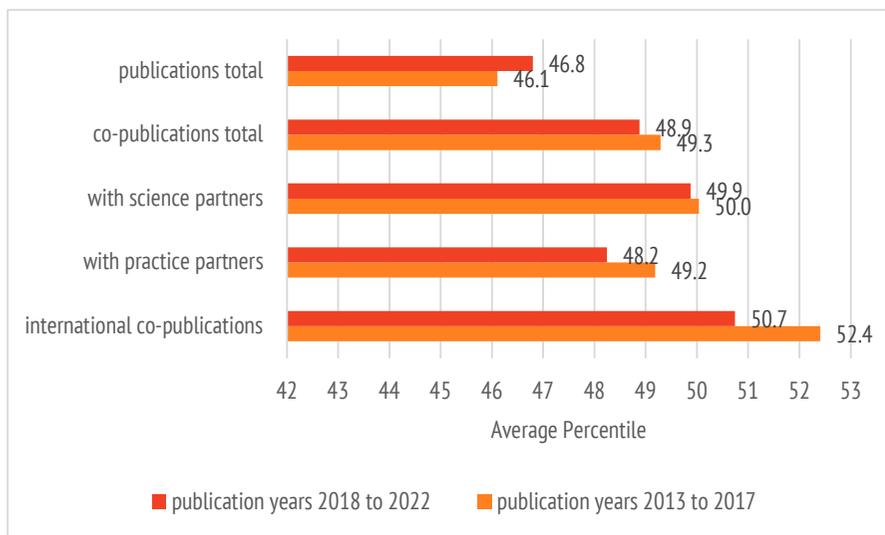
Source: The Lens Scholarly Works, own calculations

Co-publications with partners had a higher average NCI compared to UAS publications in general, except for co-publications with practice partners for the publication years 2018 to 2022. For all groups of co-publications, the average NCI was below the NCI of the “average” Austrian publication (i.e. NCI=1.00).

Average Percentile

The Average Percentile of UAS publications increased slightly to 46.8 for the publication years 2018 to 2022, compared to 46.1 for the publication years 2013 to 2017. This is despite the fact that the Average Percentile values for UAS co-publications fell slightly from the first to the second publication period.

Figure 9: Average Percentile of UAS publications



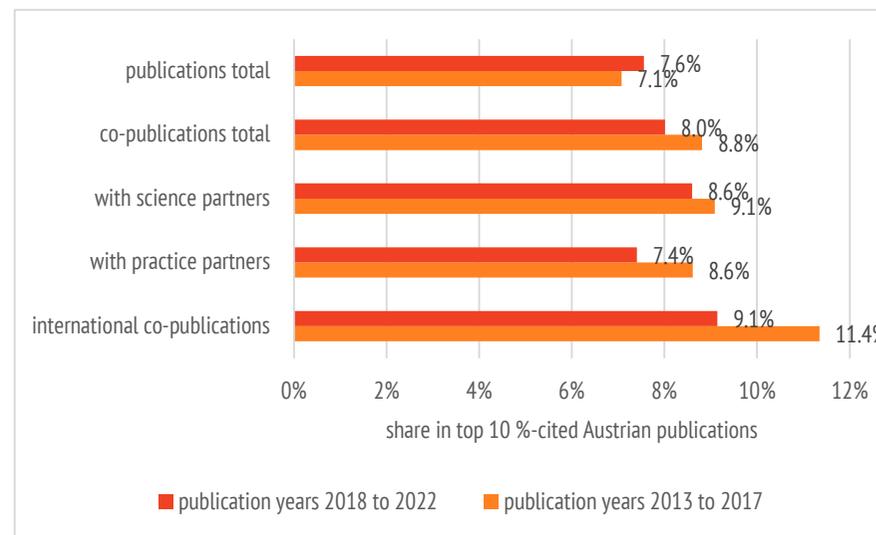
Source: The Lens Scholarly Works, own calculations

This finding can be explained by the higher share of UAS co-publications in combination with an improved Average Percentile value for individual UAS publications in the publication period 2018 to 2022.

Share in top 10 %-cited Austrian publications

A slight improvement can also be seen here: In the publication years 2018 to 2022, 7.6 % of UAS publications ranked among the 10 % most frequently cited Austrian publications of the same publication year, document type and research area. In the publication years 2013 to 2017, the corresponding share was 7.1 %.

Figure 10: UAS share in top 10 %-cited Austrian publications



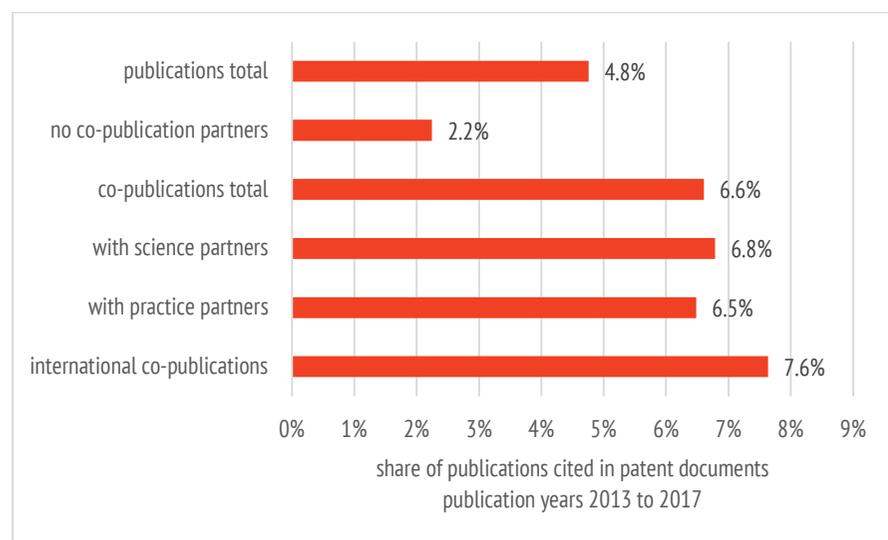
Source: The Lens Scholarly Works, own calculations

The share of UAS co-publications that belong to the group of top 10 %-cited Austrian publications declined in the publication years 2018 to 2022 compared to the publication years 2013 to 2017. At the same time, we see a much higher share of top 10 %-cited Austrian publications among UAS publications without partners, rising from 4.4 % in the publication years 2013 to 2017 to 6.6 % in the publication years 2018 to 2022.

Share of publications cited in patent documents

As an indicator of the economic relevance of publication activity, we calculated the share of UAS publications that were cited in patent documents. For this analysis, only UAS publications from the publication period 2013 to 2017 were considered in order to take into account the usually considerable time lag between the (scientific) publication of research results and the publication of patent documents citing the research.

Figure 11: Share of UAS publications cited in patent documents



Source: *The Lens Scholarly Works*, own calculations

Overall, 4.8 % of UAS publications from the publication years 2013 to 2017 have already been cited in patent documents, whereby the share is significantly higher for UAS co-publications (6.6 %). International co-publications were the most frequently cited group of co-publications in patent documents (7.6 %), while publications that were published without external partners were cited less frequently in patent documents (2.2 %).

Summary of findings

Publication activity

The bibliometric analysis shows that the UAS publication activity and the share of UAS publications in all Austrian publications increased significantly from the publication years 2013 to 2017 to the publication years 2018 to 2022).

Co-publication activity

The share of UAS co-publications increased significantly from the publication years 2013 to 2017 to the publication years 2018 to 2022. The largest increases in UAS co-publication activity can be found for scientific partners and with international partners.

Visibility of publications

Austrian UAS continued to publish the majority of their research results in sources that are not included in major scientifically oriented publication reference databases, although the share of UAS publications in sources listed in the SCImago Journal Ranking increased from the first to the second publication period.

The share of UAS publications published in Q1 journals increased slightly from the first to the second publication period. The share of publications in Q1 journals was much higher for UAS co-publications than for publications without a co-publication partner. Compared to Austrian publications in general, UAS publications were still less often published in Q1 journals.

Science impact

The average Normalised Citation Impact (NCI) of UAS publications compared to the “average” Austrian publication increased significantly from the first to the second publication period but was below the average citation impact of Austrian publications in both publication periods.

The Average Percentile and the share of the top 10%-cited Austrian publications in the UAS publications increased only slightly from the first to the second publication period.

The analysis shows particularly large increases in average NCI, Average Percentile and share of top 10%-cited publication for UAS publications without external co-publication partners, albeit from rather low initial values.

Patent impact

By February 2024, around one in twenty UAS publications from the publication years 2013 to 2017 was cited in a patent document.

Sources

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