Analysis of the publication activity of agricultural universities

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Abstract. For the analysis of publication activity there scientometric databases. The most famous international scientometric databases are the Web of Science and Scopus. These databases allow analyzing the publication activity of a scientist, scientific groups. Scopus and Web of Science allow you to conduct a scientific search on topics of interest, provide information on the citation of articles, include profiles of organizations. The article discusses the main scientometric indicators. The main scientometric indicators include H-index, SJR, SNIP, Impact Factor, CiteScore, Citation Count, Field-Weighted Citation Impact (FWCI). According to these indicators, the activities of both the individual scientist and the organization as a whole are evaluated. The article reveals topical issues of the state of publication activity of agrarian universities. The goal of the study is to analyze the number of publications by authors of leading universities in scientific journals, indexed in Scopus and the Web of Science, and the distribution of the number of publications in scientific fields to identify the main trends in the development of science in the agricultural sector. The leading universities selected for the study are QS World University Rankings by Subject: Agriculture & Forestry and Veterinary Science. The study analyzes the publication activity of agricultural universities. A model for assessing the quality of publications of a particular scientist or/and scientific groups has been developed. This model is designed to develop adequate measures to stimulate publication activity. The model allows to develop a strategy of publication activity aimed at achieving high places in international rankings of higher educational institutions. The paper proposes a risk classification of assessing the publication activity of a scientist.

Keywords: Agricultural Science, Ranking, Publication Activity.

Introduction

Recently, competition between universities is growing, not only domestically, but throughout the world. Higher education institutions are forced to be competitive. One of the tools for assessing the competitiveness of higher education are international rankings. With the help of international university rankings, students can compare and choose a place to study abroad. The most popular world university rankings are QS and THE.

The QS rating assesses more than 3 thousand universities around the world and makes a list of the best every year. QS experts compare universities by 6 indicators: academic reputation, reputation of university graduates among employers, the ratio of students to faculty members, the number of citations, the number of international students and the number of international staff of the university.
The THE ranking evaluates universities in terms of teaching quality, research influence (FWCI), and the university’s international popularity. Total rating evaluates 13 different indicators. The THE ranking also annually publishes a useful ranking of young universities. This list includes top universities younger than 50 years old.

More valuable for many students are subject QS ratings. Subject rankings will allow you to find the best universities in the field in which the current entrant wants to become a specialist. There are universities that do not fall into the overall ranking of QS World, but they may be the best in their narrow area (subject). Subject QS ratings assess academic reputation, employer reputation, quoting, the subject H-index. The article will consider the subject rating QS Subject Agriculture & Forestry.

**Publishing Activity of Agrarian Universities**

Subject ratings QS Subject Agriculture & Forestry assesses academic reputation (50%), employers’ reputation (10%), quoting for an article (20%), subject area H-index (20%) (Fig.1). In the article, we consider the publication activity of the subject rating QS Subject Agriculture & Forestry. QS analyzes 954 universities worldwide in this subject area and publishes the top 300. In Table 1 (www.topuniversities.com/subject-rankings/2019) are shown the best universities in the opinion of QS and their scores for publication activity. Analysis of publication activity is carried out at the expense of the analytical tool SciVal. For the comparative analysis, 10 universities from the TOP-50 were selected from Table 1.

![Figure 1](image-url)  
**Figure 1** QS World University Rankings by Subject Agriculture & Forestry

| 2019 | 2018 | Institution | Location       | Citations | H     |
|------|------|-------------|----------------|-----------|-------|
| 1    | 1    | Wageningen University | Netherlands    | 90,8      | 100,0 |
| 2    | 2    | University of California, Davis (UCD) | United States | 90,2      | 96,3  |
| 3    | 4    | Swedish University of Agricultural Sciences | Sweden        | 89,1      | 91,9  |
| 4    | 10   | Agro, ParisTech | France         | 76,4      | 68,5  |
| 5    | 11   | ETH Zurich (Swiss Federal Institute of Technology) | Switzerland   | 91,9      | 88,4  |
| 6    | 3    | Cornell University | United States | 90,8      | 95,6  |
| 7    | 5    | University of California, Berkeley (UCB) | United States | 95,0      | 95,2  |
| 8    | 7    | University of Wisconsin-Madison | United States | 89,3      | 91,1  |
| 9    | 6    | University of Reading | United Kingdom | 91,0      | 79,8  |
| 10   | 16   | China Agricultural University | China         | 78,9      | 81,6  |
| 11   | 8    | Michigan State University | United States | 88,4      | 92,9  |
| 12   | 9    | Purdue University | United States | 85,6      | 83,1  |
| Rank | Institution                                                      | Country     | Publication Rate |
|------|------------------------------------------------------------------|-------------|-----------------|
| 12=  | University of Copenhagen                                         | Denmark     | 89.0            |
|      | 17= Norwegian University of Life Sciences (UMB)                  | Norway      | 85.1            |
| 15=  | Universitàt Hohenheim                                            | Germany     | 84.2            |
|      | 12= University of British Columbia                               | Canada      | 91.0            |
| 17   | 25= The University of Queensland (UQ)                            | Australia   | 87.6            |
| 18   | 13= Iowa State University                                         | United States| 86.4            |
| 19=  | 19= Texas A&M University                                          | United States| 81.6            |
|      | 17= University of Guelph                                         | Canada      | 86.2            |
| 21   | 40= University of Ghent                                           | Belgium     | 88.6            |
| 22   | 14= The University of Tokyo                                       | Japan       | 82.8            |
| 23   | 22= Oregon State University                                       | United States| 87.3            |
| 24   | 48= Georg-August-Universität Göttingen                            | Germany     | 88.0            |
| 25   | 47= Nanjing Agricultural University                              | China       | 81.7            |
| 26   | 49= Technische Universität München                                | Germany     | 88.7            |
| 27=  | 21= University of Illinois at Urbana-Champaign                    | United States| 84.6            |
|      | 27= Warsaw University of Life Sciences                             | Poland      | 74.4            |
| 29   | 27= North Carolina State University                               | United States| 84.8            |
| 30   | 22= Massey University                                             | New Zealand | 84.4            |
| 31   | 34= Seoul National University (SNU)                               | South Korea | 82.5            |
| 32   | 24= Pennsylvania State University                                 | United States| 88.1            |
| 33=  | 39= Universität für Bodenkultur Wien                               | Austria     | 87.3            |
|      | 33= University of Florida                                          | United States| 84.0            |
| 35   | 45= Aarhus University                                             | Denmark     | 86.4            |
| 36   | 51-100= Sup Agro, Montpellier                                    | France      | 74.0            |
| 37   | 30= Ohio State University, Columbus                              | United States| 87.2            |
| 38   | 28= The University of Melbourne                                    | Australia   | 88.2            |
| 39   | 37= University of Minnesota                                       | United States| 88.8            |
| 40   | 30= Kyoto University                                              | Japan       | 79.2            |
| 41   | 19= Australian National University (ANU)                          | Australia   | 90.6            |
| 42   | 32= The University of Western Australia (UWA)                     | Australia   | 89.3            |
| 43   | 51-100= University of Helsinki                                   | Finland     | 86.4            |
| 44   | 29= Washington State University                                   | United States| 84.8            |
| 45=  | 51-100= Kansas State University                                   | United States| 83.7            |
| 45=  | 51-100= McGill University                                         | Canada      | 91.0            |
| 45=  | 51-100= South China Agricultural University                      | China       | 75.3            |
| 48   | 51-100= Universitàt di Bologna (UNIBO)                            | Italy       | 82.2            |
| 49   | 36= Universidade de São Paulo (USP)                               | Brazil      | 78.2            |
| 50=  | 51-100= Tokyo University of Agriculture and Technology            | Japan       | 72.9            |
| 50=  | 51-100= University of Massachusetts, Amherst                      | United States| 89.0            |
| 50=  | 51-100= Zhejiang University                                       | China       | 84.5            |

Analysis of publication activity by the indicator "number of articles" is presented in Table 2.
Evaluation of citations for publication. In the analysis, we will exclude the self-citation of publications. This indicator shows how, on average, the articles of scientists of these universities are cited. How many citations per one article. At the same time, in the analysis it is necessary to remember that the last year is always quoted worse, because articles just published. University of Swiss Federal Institute of Technology Zurich from the selected group shows the best positions in terms of citation on publications and rapid growth in the ranking. Over the year, his position improved by 7 places.

Table 3. Citations per Publication

| Name                                      | Overall | 2014 | 2015 | 2016 | 2017 | 2018 |
|-------------------------------------------|---------|------|------|------|------|------|
| China Agricultural University (10)        | 4.2     | 8.7  | 6.2  | 4.5  | 2.4  | 0.7  |
| Kyoto University (40)                     | 4.3     | 7.6  | 6.3  | 4.3  | 2.5  | 0.7  |
| Swiss Federal Institute of Technology Zurich (5) | 10.1    | 20.3 | 15.9 | 9    | 5    | 1.4  |
| Texas A and M University (19)             | 5.3     | 10.8 | 7.6  | 5.2  | 3.1  | 0.7  |
| Universidade de Sao Paulo (49)            | 3.8     | 7.7  | 5.6  | 3.7  | 2.1  | 0.6  |
| University of Bologna (48)                | 5.7     | 11.4 | 8.5  | 5.2  | 2.9  | 0.7  |
| University of Guelph (19)                 | 6.3     | 12.7 | 9.4  | 5.5  | 3    | 1    |
| University of Hohenheim (15)              | 5.7     | 11.4 | 8.8  | 4.9  | 3.2  | 0.9  |
| Wageningen University & Research (1)      | 8       | 14.5 | 12.2 | 7.7  | 4.3  | 1.2  |
| Warsaw University of Life Sciences (27)   | 3.4     | 7.6  | 5.3  | 4    | 1.7  | 0.5  |

Estimation of weighted average FWCI. Despite the fact that the FWCI indicator in the QS rating is not evaluated, we have compared these data. This indicator shows how much better or worse cited articles of scientists of a particular university are relative to the whole world.

Table 4. Field-Weighted Citation Impact

| Name                                      | Overall | 2014 | 2015 | 2016 | 2017 | 2018 |
|-------------------------------------------|---------|------|------|------|------|------|
| China Agricultural University (10)        | 0.82    | 0.84 | 0.77 | 0.83 | 0.84 | 0.83 |
| Kyoto University (40)                     | 0.87    | 0.75 | 0.8  | 0.92 | 0.96 | 0.89 |
| Swiss Federal Institute of Technology Zurich (5) | 1.75    | 1.87 | 1.91 | 1.64 | 1.75 | 1.61 |
| Texas A and M University (19)             | 1.02    | 1.03 | 1.05 | 0.99 | 1.13 | 0.93 |
| Universidade de Sao Paulo (49)            | 0.75    | 0.79 | 0.75 | 0.75 | 0.75 | 0.73 |
| University of Bologna (48)                | 1.05    | 1.18 | 1.17 | 1.04 | 1.06 | 0.83 |
| University of Guelph (19)                 | 1.19    | 1.19 | 1.2  | 1.27 | 1.16 | 1.11 |
| University of Hohenheim (15)              | 1.11    | 1.15 | 1.09 | 1.02 | 1.11 | 1.18 |
| Wageningen University & Research (1)      | 1.57    | 1.59 | 1.68 | 1.49 | 1.61 | 1.47 |
| Warsaw University of Life Sciences (27)   | 0.67    | 0.79 | 0.75 | 0.72 | 0.58 | 0.57 |
H5-indices. The h5-indices are calculated using a 5-year time window and the chart plots the latest year from the range. E.g. the data point for 2017 is the h5-index range of 2013-2017 (https://service.elsevier.com/app/answers/detail/a_id/27764/kw/h5/supporthub/scival/).

| Name                                                         | Overall | 2013 | 2014 | 2015 | 2016 | 2017 |
|--------------------------------------------------------------|---------|------|------|------|------|------|
| China Agricultural University (10)                          | 49      | 39   | 44   | 44   | 46   | 49   |
| Kyoto University (40)                                        | 41      | 43   | 44   | 46   | 42   | 41   |
| Swiss Federal Institute of Technology Zurich (5)            | 63      | 54   | 55   | 61   | 61   | 63   |
| Texas A and M University (19)                                | 47      | 45   | 48   | 46   | 48   | 47   |
| Universidade de Sao Paulo (49)                              | 53      | 42   | 44   | 45   | 50   | 53   |
| University of Bologna (48)                                  | 42      | 31   | 33   | 36   | 38   | 42   |
| University of Guelph (19)                                   | 49      | 44   | 45   | 47   | 47   | 49   |
| University of Hohenheim (15)                                | 38      | 35   | 36   | 33   | 38   | 38   |
| Wageningen University & Research (1)                        | 78      | 70   | 73   | 76   | 79   | 78   |
| Warsaw University of Life Sciences (27)                      | 29      | 20   | 23   | 24   | 26   | 29   |

Conclusion

On the basis of data on the analysis of the publication activity of a university, it is possible to develop a policy for assessing the quality of publications of a particular scientist or scientific groups. Many countries now have university support programs and competitiveness programs. Such programs help to attract the best scientists in the world and the best students. Evaluation of publication activity, which uses the rating model, may be designed to develop adequate measures to stimulate publication activity. The rating model can also be used to develop a publishing strategy aimed at achieving high places in international rankings of higher educational institutions.

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