Introduction

A custom analytical report service for measuring research and funding program performance

Elsevier’s Analytical Services provides accurate, unbiased research and funding program performance analysis by combining our high quality data sources with technical and metric expertise formed from over 130 years as a journal publisher. Our team is experienced in serving funders, policy makers and academic and corporate research institutions around the world.

We offer two levels of analysis for funding bodies. The first level provides funding program-specific analysis at the program level (see Section 1 in this brochure). The funding program-specific reports provide you with in-depth insights combined with our expert analysis to meet your needs for designing and assessing your funding programs. We customize our methodology based on the unique features of your programs to provide the most helpful findings. The second level is the general performance analysis at country or institutional level (see Section 2 in this brochure). The general performance reports provide an overview of research performance of countries and institutions funded by your programs and help you understand the research development, trends and strengths of countries and institutions where you implement your funding activities. We also offer a range of options to allow these reports to better fit your priorities.

Not just data, but insights

The indicators presented in our analytical reports are metric aggregations of publication and citation data, full-text article downloads, and macroeconomic data, derived from high-quality sources such as Scopus®, ScienceDirect®, TotalPatent®, your institution’s own data and external sources.

The Analytical Services team adds value to the data through careful analysis and the creation of reports which present clients with data-driven key findings and insights. The resulting insights answer pressing questions relevant to funding policies, priorities and strategies, and inform decisions related to funding allocations, efforts to foster research and engagement with key partners.

The Analytical Services Catalog of Offerings for Funders provides various available analytical reports, their standard specifications, and options for customization.

In order to provide the best solution, Elsevier’s Analytical Services takes a consultative approach to understand your information needs. We take the time to understand your goals and interests in order to provide the most appropriate analysis. Please consult your local Elsevier sales team or contact us via elsevier.com/research-intelligence/analytical-services to discuss how we can meet your specific needs.
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1. Program-Specific Analysis

In this section, we present the analytical reports that are specific to funding programs.

They assess the output, return on investment and research performance of applicants, as well as successful applicants for particular funding programs. These reports provide you with in-depth insights to design and assess your funding programs.

For the reports presented in Section 1.1-1.4, we offer the following standard specifications (unless otherwise specified):

### Deliverable formats
- A written report in pdf, with text and commentary (AND/OR)
- An Excel spreadsheet, with annotations and visualizations (AND/OR)
- A Powerpoint presentation, with notes and commentary

### Time period
Indicators based on max five years of Scopus data and max 300 author profiles

### Delivery
25 days after receiving complete input data from funding body

We are open to discuss any possible adjustments to these reports that you may require. Some examples might be:

- Different time period
- Normalized indicators to report on program efficiency:
  - Number of researchers involved in the program(s)
  - Funding of the program(s) ($, €, etc.)
- Data on normalization factors can be drawn from:
  - Publicly available sources (e.g., NSF NCSES, IPEDS, and BLS(US), HESA(UK), Statistics Canada, OECD, UNESCO, etc.)
  - Funding body’s own data: our flexible systems are fully capable of integrating your data to complement our analyses
- Stand-alone visualizations

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1.1 Funding Program Output

This report provides a list of program-generated publications.

- How many publications are generated from your funding programs?
- Who produced them?
- Where are they published?
- How often are they cited?

Identifying the publications generated from a funding program is often a technical challenge since authors do not always acknowledge the source and program of funding in their publications. We can use the Elsevier Fingerprint Engine to help you identify these publications.

The following information from the program-generated publications will be provided:

- Article title
- Authors and author affiliations
- Publication Year
- Source title
- Volume, issue and pages
- Number of citations

The Elsevier Fingerprint Engine scans abstracts from Scopus and extracts meaningful concepts (so-called “fingerprints”). A variety of thesauri, spanning all major disciplines, along with Natural Language Processing techniques are used to scan and analyze the information contained in the publication data such as an abstract, in order to identify and assign a weight to the key concepts in the text. Each document is assigned a collection of key concepts which represent that document. In the case of groups of publications, such as those belonging to one author, groups of authors, or a co-citation network, an algorithm is applied to identify the key concepts which co-occur most often in that particular group of documents. The advantage of using key concepts based on Fingerprint technology is that they are of higher quality and representativeness than standard sets of keywords which often suffer from problems such as duplicates, synonyms, and inclusion of irrelevant terms.
1.2 Overview of Funding Program(s) and Return on Investment

This report provides an overview of the research performance of the publications generated from your funding programs.

- How many publications are generated from your funding programs?
- What is their citation impact and how often are they downloaded and cited in patent citations?
- To what extent do these publications involve international collaboration?
- What is the return on investment of your funding programs?

The most direct output of your funding programs is program-generated scientific publications. If you have a complete list of such publications, we will match them to Scopus data and provide research performance metrics such as citations and downloads. Alternatively, if such a list does not exist, we can combine data for you based on descriptions of your program and information on researchers who received the grant, by using fingerprinting techniques (see section 1.1) and Scopus Author Profiles.

Below are some examples of analysis.

- **Output, Impact & Return on Investment Analysis**
  An overview of the publications generated from the funding program(s). Metrics include publication counts, shares, field-weighted citation impact (see also 2.1), and the number of publications relative to the amount of funding.

- **Research Excellence Analysis**
  As a measure of research excellence, we look at the share of program-generated publications that belong to the top 1% and 5% most highly cited articles, and the number of most cited articles relative to the amount of funding.

- **Collaboration**
  An overview is presented of the institutional, national or international collaboration of program-generated publications and their effects on citation impact.

- **Usage**
  As a measure of research usage, we look at downloads – full-text PDF and full-text HTML views – and patent citations of program-generated articles. Metrics include the number and shares of downloads, as well as field-weighted download impact and a breakdown per sector.

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This figure shows the performance of several countries relative to Wales. Reference: The International Comparative Performance of the Welsh Research Base 2013.

Similar figures can be provided where the lines in the figure denote different funding programs.
1.3 Applicant Analysis: Assessment of Program Attractiveness

This report analyzes the profile of applicants of your funding programs and compares them to the benchmarks you choose.

- How good is the research performance of the applicants of your funding programs?
- Are your funding programs attracting the best researchers in the subject area?

Good researchers are more likely to generate fruitful research outputs with funding. It is therefore important to analyze the profiles of your applicants and benchmark them against the whole pool. The analysis will provide insights into the quality level of applicants to identify their strengths and weaknesses and to assess the attractiveness of the programs to researchers. We combine data from you on applicants with Scopus Author Profile data to give you the most comprehensive analysis of the human capital of your programs.

The analysis includes:
- Total number of publications, citations, H-index, field-weighted citation impact, percentage of top 1% and 5% most highly cited articles of applicants compared to benchmarks
- The number of received downloads and patent citations of applicants’ publications compared to benchmarks
- Relative seniority and productivity of applicants compared to benchmarks
- Percentage of your applicants’ publications that belong to each collaboration type, i.e. institutional, national or international
- Network and mobility of your applicants, e.g. co-author counts, affiliation counts, and the number of international moves

This report analyzes the profile of applicants of your funding programs and compares them to the benchmarks you choose.

This figure shows migration and collaboration types for European countries and US states. Reference: The Comparative Benchmarking of European and US Research Collaboration and Researcher Mobility. Similar figures can be provided where the color of the bubbles in the figure distinguishes applicants and benchmarks.
1.4 Successful Applicants: Who Received the Grant?

This report analyzes the profile of successful applicants of your funding programs and compares them to unsuccessful applicants and other benchmarks you choose.

- How good is the research performance of the successful applicants of your funding programs?
- Are you awarding the best applicants?

Grant application process largely relies on the expert refereeing of grant applications. This report provides a quantitative and objective review of the profiles of your successful and unsuccessful applicants from a research metrics point of view. We combine data from you on successful and unsuccessful applicants with our Scopus Author Profile data to give you a comprehensive analysis of the results of the refereeing process of your programs.

The analysis includes:
- Total number of publications, citations, H-index, field-weighted citation impact, percentage of top 1% and 5% most highly cited articles of successful and unsuccessful applicants and selected benchmarks
- The number of received downloads and patent citations of successful and unsuccessful applicants and selected benchmarks
- Relative seniority and productivity of successful and unsuccessful applicants and selected benchmarks
- Percentage of successful applicants’ publications that belong to each collaboration type, i.e. institutional, national or international
- Network and mobility of successful applicants, e.g. co-author counts, affiliation counts, and the number of international moves

The figure shows articles per researcher of each selected country. Reference: The International Comparative Performance of the UK Research Base 2013. Similar figures can be provided where the lines in the figure denoting successful and unsuccessful applicants and benchmarks.
2. General Performance Analysis

In this section, we present the analytics reports that provide general performance analysis of the countries or institutions funded by your programs.

These reports help you understand the research development, trends and strengths of countries and institutions where you implement your funding activities.

For the reports presented in Section 2.1-2.4, we offer the following standard specifications (unless otherwise specified):

**Deliverable formats**
- A written report in pdf, with text and commentary (AND/OR)
- An Excel spreadsheet, with annotations and visualizations (AND/OR)
- A Powerpoint presentation, with notes and commentary

**Time period**
Most recent 5 full years of Scopus data

**Peers**
4 selected comparators

**Benchmark**
1 (either global or regional)

**Subject areas**
27 Scopus subject areas

**Delivery**
20 days after signature

Combinations of the standard reports are offered as well.
We are open to discuss any possible adjustments to these analyses that you may require. Some examples might be:

- Different time periods (default: 5 most recent full years)
- Custom subject area mapping to an existing subject classification (default: Scopus subject areas). We can also offer OECD subject categories or even produce customized mapping
- Defining your own subject areas (e.g. water research). We can use our fingerprint engine to define customized subject areas based on your documented description of the subject areas
- Other comparator entities (default: institutions or countries)
  - Groups of institutions (e.g. Russell Group, Ivy League)
  - Large Regions (e.g. Northeast US, Western Europe)
  - Cities/Metropolitan regions (e.g. Tokyo, London, NYC)

- Normalized indicators to report on institutional efficiency:
  - Institution size (FTE)
  - Research funding ($, €, etc.)
- Data on normalization factors can be drawn from:
  - Publicly available sources (e.g. NSF NCSES, IPEDS, and BLS (US), HESA(UK), Statistics Canada, OECD, UNESCO, etc.)
  - Institution’s own data: our flexible systems are fully capable of integrating your institution’s data to complement our analyses
- Stand-alone visualizations
- Heat maps of where research is being produced, downloaded, or cited

The figure shows the global download shares of different countries.
This report presents an overview of the scientific performance of the countries or institutions funded by your programs. It identifies their strengths, weaknesses and performance relative to peers.

- How does their publication output, growth and citation impact compare to the world benchmark?
- How does it compare to selected peers?
- Which subject fields show remarkably high output and/or exceptionally high citation impact?
- In which subject areas is the strongest growth observed?

In this report, the performance will be benchmarked against the world or relevant region and selected comparators for any of the following metrics:

- Output metrics, including the absolute number of publications, the article share, and the Compound Annual Growth Rate (CAGR)
- Field-Weighted Citation Impact (FWCI). As one of the most sophisticated indicators in the modern research metrics toolkit, this indicator of citation impact allows one to compare the impact of articles across different document types (article, review or conference proceeding paper), publication years, and subject fields.
2.2 Researcher Mobility: Focus on Your People

This report analyzes the mobility of researchers in a specific country or internationally.

If you are a national funder:
- How attractive is your country for researchers?
- Where are you losing your talented people to?

If you are a multinational or international funder:
- How well are you stimulating knowledge exchange through mobility of researchers?

In the past, researcher mobility was looked at in terms of “Brain Gain” or “Brain Drain”, suggesting a rather black-and-white scenario with ‘winners’ and ‘losers’. We have given way to the more nuanced concept of “Brain Circulation”. In this view, the skills and networks built by researchers while abroad accrue benefits to their home country’s research base when they eventually return, and often even if they do not return but remain instead as a diaspora.

In our report, we distinguish the following types of mobility:
- Outflow: researchers leaving from a country or institution and not returning
- Inflow: foreign researchers moving into a country or institution and not leaving
- Transitory: researchers who moved into a country or institution, stayed for a short period (two years or less) and moved on to a different country or institution
- Returnees outflow: researchers who left a country or institution and returned
- Returnees inflow: foreign researchers who moved into a country or institution and returned to their originating country or institution
- Sedentary: researchers who do not appear to leave their country or institution at all

For each of the categories listed above we include statistics on the percentage of researchers, their relative productivity, relative seniority, and citation impact.

These data provide valuable insights on the attractiveness of a research environment. By highlighting which type of researcher the institution or country attracts most, and which type does or doesn’t leave, this analysis can reveal potential barriers to researcher mobility. This in turn may assist funding bodies in deciding where and how to stimulate researcher mobility, e.g. by setting up collaboration programs or via strategic funding.

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Standard specifications for this analysis:
- Time period: 16 years of Scopus data (1996-2012)
- Peers: 5 selected comparators
- Extras: Top 10 countries inflow/ outflow
2.3 Collaboration: Building and Improving Partnerships

This report analyzes the extent of a country’s or institution’s collaboration and the effects of different types of collaboration on citation impact.

In addition, the top 20 most prolific collaboration partners are provided and analyzed according to the effect of the collaboration on both partners’ citation impact.

- To what extent do the countries or institutions funded by your programs collaborate with each other and the outside world?
- How does the collaboration pattern relate to your funding activities?
- Are there needs to stimulate certain types of collaboration in a specific subject or within a strategic country or region?

Research collaboration is significantly and positively associated with the citation impact of resulting publications. Collaborating on a study can increase the overall performance of an institution or a country as well as its visibility across borders. Collaboration is also essential for knowledge exchange among researchers, production of scientific outputs with high social and economic impact and dissemination of knowledge. Therefore, understanding current collaboration patterns is crucial toward maximizing the returns to collaboration.

This report provides a high-level overview of current collaboration of different types, then a closer look at the actual collaboration partners. The research informs which collaborations are beneficial to the target country/institution and the collaboration partner, which are beneficial to neither, and which are beneficial to only one of them.

For our analyses we distinguish the following levels of authorship:
- **Single author publications**: no collaboration
- **Institutional collaboration**: all authors are from the same institution
- **National collaboration**: authors are from different institutions, but within the same country
- **International collaboration**: at least one author is from an institution of a different country

This figure shows what percentage of a region's total research output belongs to different types of collaboration. Reference: The International Comparative Performance of the Welsh Research Base 2013.

In addition, the top 20 most prolific collaboration partners are provided and analyzed according to the effect of the collaboration on both partners’ citation impact.

This figure shows which collaborations are most beneficial (both for a region and its partners) based on calculating the average field-weighted citation impact of those collaborations. Reference: The International Comparative Performance of the Welsh Research Base 2013.
2.4 Research Usage: Usage of Academic Publications

This report offers a complementary view on research performance to the more traditional citation analysis by analyzing downloads of academic articles and citations of publications in patent applications.

- How well are the research outputs produced by countries and institutions funded by your programs used in particular by the corporate sector?
- Is the usage linked to your funding activities?

Citation impact is by definition a lagging indicator; it takes time for newly-published articles to accrue citations, varying from six months to several years for different subject areas. Investigating downloads has become an appealing alternative, since it is possible to start counting downloads of full-text articles immediately upon publication and to derive robust indicators over windows of months rather than years. Moreover, such usage-driven research metrics are particularly useful indicators of performance for subject areas where publications are generally not cited as often, such as Arts & Humanities. Citations in patent applications provide another important angle of the usage of scientific publications.

This analysis offers insight into the use being made of the research by providing:
- Total number of downloads for an entity and for comparators, as well as relative shares of downloads
- Field-weighted download impact: a measure similar to field-weighted citation impact, normalizing the downloads per article for subject specific download behavior
- Downloads by different sectors, such as industry, government, and academia
- Total number of patent citations for an entity and for comparators as well as relative shares of patent citations

This figure shows field-weighted download impact.

References

1. The International Comparative Performance of the Welsh Research Base 2013
http://www.elsevier.com/online-tools/research-intelligence/research-initiatives/wales2013

2. The Comparative Benchmarking of European and US Research Collaboration and Researcher Mobility
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3. The International Comparative Performance of the UK Research Base 2013
http://www.elsevier.com/online-tools/research-intelligence/research-initiatives/BIS2013
For more information about Analytical Services, please visit: elsevier.com/research-intelligence/analytical-services