Introduction

Analytical reports and services for measuring research performance

Elsevier’s Analytical Services provide accurate, unbiased analyses on research performance by combining high quality data sources with technical and research metrics expertise accrued over Elsevier’s 130 years in academic publishing. Our analytics team is experienced in serving policymakers, funders, and academic and corporate research institutions around the world.

Our offerings range from standard, targeted reports (see Section 1) to new analysis (see Section 2) as well as data delivery and web integration services to meet your research management needs. All reports can be combined to form comprehensive, multidimensional studies.

Get access to key statistics of the world’s top 70 research nations

Learn about your country’s research performance through findings on:

- R&D investment and human capital
- Patents filed and granted
- Researcher mobility
- Top institutions’ output, growth, and impact
- Scholarly output and impact
- International and domestic collaboration
- Disciplinary strengths or weaknesses
- Downloads or publication views

Elsevier Analytical Services are proud to present the World of Research 2015, a magnificent 350 pages hardcover book that provides a snapshot of essential research indicators for the most prolific countries or regions in the world.

The book contains over 70 national profiles at your fingertips and comprises general statistics and graphs along with analyses and interpretations.

Learn more about the World of Research 2015 and order your copy now!

elsevier.com/solutions/analytical-services/wor2015

Not just data, but insights

The indicators presented in our analytical reports are based on publication and citation data, full text article downloads, Mendeley data, and macroeconomic data. These are derived from high quality sources such as Scopus®, ScienceDirect®, Mendeley, Total Patent®, your institution’s own data, and external sources.

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

The Analytical Services Catalog provides various analytical reports that are currently available, their standard specifications, and options for customization (see Section 3). In order to provide the best solution for each customer, and provide the most appropriate analysis, Elsevier’s Analytical Services take a consultative approach to understand your goals and interests. Please consult your local Elsevier sales team or contact us via elsevier.com/research-intelligence to discuss how we can meet your specific needs.
Contents

Introduction 3

1. Standard Analyses 6
   1.1 Output, Growth, & Impact 7
   1.2 Researcher Mobility: Focus on your people 8
   1.3 Collaboration: Building and improving partnerships 10
   1.4 Knowledge Exchange: Economic development 12

2. Beyond the standard reports 14
   2.1 City Area Report 14
   2.2 Research Area Report 16
   2.3 Emerging Topics 18
   2.4 Inter-disciplinary Research Report 20
   2.5 Department Performance Analysis 22
   2.6 Alumni database 24

3. Additional Customizations 25
1. Standard Analyses

What are the most widely-accepted and used measures of research performance? Standard analyses provide key metrics along various dimensions and can be divided into four groups.

The first group is focused on measuring the output and impact of scientific publications in order to create an overview of an entity’s strengths and weaknesses. It is an essential part of most performance evaluations.

The second group of metrics revolves around researcher mobility, measuring the inflow and outflow of knowledge. In addition to quantity, these analyses look at the quality of research of each subject, allowing you to identify where the most productive, the most senior, and the most impactful researchers are going to or coming from.

The third group of our Standard Analyses focuses on collaboration amongst researchers. Are they co-authoring publications with others, and if so, are these collaborators geographically close or do their networks span the entire globe? This analysis further highlights which collaborations are the most beneficial to an entity and its partners.

The fourth group investigates to what extent research output is used, in particular by the corporate sector. Furthermore, the report tracks the collaboration and researcher mobility between this sector and academia.

Standard specifications for the analyses presented in Section 1 (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**
  - 5 years of Scopus data (2009-2013)

- **Peers**
  - 4 selected comparators

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

- **Subject areas**
  - 27 Scopus subject areas

- **Delivery**
  - 20 days after signature

1.1 Output, Growth, & Impact

These analyses provide an overview of your country or institution’s scientific performance. Identify your strengths, weaknesses, and performance relative to peers.

- How does your publication output, growth, and citation impact compare to rest of the world and to selected peers?
- Which subject fields show remarkably high output and/or exceptionally high citation impact?
- Which subject areas have the strongest growth?

This report benchmarks your performance against the world or a relevant region, and selected comparators for any of the following metrics:

- Output metrics include the absolute number of publications, the relative article share, and the Compound Annual Growth Rate (CAGR).
- The most important impact metric used in this report is field-weighted citation impact. 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.

**Recommended Recurrence/Update**

- Annual update for up to 2 years (e.g., 3-year contract)
1.2 Researcher Mobility: Focus on Your People

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

- How attractive is your country or institution for researchers?
- From and to where do your talented researchers come and go?

In the past, researcher mobility has been framed in terms of "Brain Gain" or "Brain Drain", suggesting a rather black-and-white scenario with "winners" and "losers". This perspective has given way to the more nuanced concept of "Brain Circulation". In this view, the skills and networks built by researchers while abroad provide benefits to their home country's research base both if they eventually return and even if they do not return but remain abroad as a collaborative diaspora.

In our report, we distinguish the several types of mobility categories:

- **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 (2 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 organization and returned to their originating country or organization
- **Sedentary**: researchers who do not appear to leave their country or institution at all

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

This report provides valuable insights on the attractiveness of a research environment. By analyzing the performance of your institution or your country's researchers with different mobility types, this report highlights which types of researcher mobility are beneficial to your institution or your country. This in turn may assist policy makers in deciding which types of researcher mobility to stimulate and what the best stimulation strategies are, e.g., by setting up collaboration programmes or via strategic funding.

Non-standard specifications for this analysis

- **Time period**: Over 18 years of Scopus data (1996-present)
- **Peers**: 5 selected comparators
- **Extras**: Top 10 countries or institutions for inflow/outflow

**Recommended Recurrence/Update**

- Two biennial (once every two years) updates (e.g., 5-year contract)
1.3 Collaboration: Building and Improving Partnerships

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

- In what areas does your country or institution collaborate the most internationally? How much is that as a percentage of your country or institution’s total output?
- Who are your top 20 most prolific collaboration partners and what are the effects of these collaborations on each partner’s citation impact?

Research collaboration is significantly and positively associated with the citation impact of the resulting publications. Collaborating on a study can increase the overall performance of your institution or country as well as its visibility across borders. Therefore understanding current collaboration patterns is crucial toward maximizing the benefits of 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 between the following types 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

Non-standard specifications for this analysis

Regional collaboration
We explore collaboration among authors from multiple countries in the region (e.g., Europe, Middle East, Africa).

Collaboration network
We use a network map to show which countries/institutions/researchers are collaborating closely among each other.

Field-weighted internationalization score
We normalize collaboration rate by field average to enhance comparison of the internationalization of institutions with different subject focuses.

Recommended Recurrence/Update

Annual update for up to 2 years (e.g., 3-year contract)
1.4 Knowledge Exchange: Economic Development

The knowledge exchange report combines different views on the collaboration between the academic and industry sectors.

Economic development, as analyzed in this report, is characterized by knowledge exchange: a two-way transfer of ideas and information between academia and industry. Since knowledge resides with people and not in documents, much knowledge is tacit or difficult to articulate. Consideration is given here to indicators of explicit (codified and transferable) academic-industry knowledge exchange such as co-authored publications, citations to research in patents, cross-sector article downloads and researcher mobility.

The aim is to provide academic institutions with insights in the usage of their output by the industry sector, the impact of their collaboration with corporate institutions, and whether their research has led to innovation.

Institutions can use insights and findings from this report to find industry partners to fund mutually beneficial projects, or commercialize academic research.

A Knowledge Exchange report includes the following analyses:
- Cross-sector co-authorship
- Cross-sector researcher mobility
- Research usage: Patent citations
- Research usage: Downloads by sector (i.e., academic, corporate, government and medical)
- Research usage: Mendeley readership

Recommended Recurrence/Update

Annual update for up to 2 years (e.g., 3-year contract)

This figure shows a breakdown per subject of academic-corporate co-authored publications.

These figures show relative patent citation shares for several countries, and the cross-sector researcher mobility of Germany and Japan. Reference: The International Comparative Performance of the UK Research Base 2013.
2. Beyond the standard reports

The analyses presented in this section are our latest efforts to innovate and adapt to our clients’ needs. They feature novel methods of analysis (such as Fingerprinting) or target entities (metropolitan areas).

2.1 City Area Report

While standard analyses or reports tend to focus on an institution or country, in some situations it may be insightful to widen or narrow the scope to a particular region.

Cities around the world compete to attract talent, jobs, and investment. How well they define and communicate their competitive advantages will determine whether the future is one of growth and prosperity or one of decline and difficulty.

The City area report explores how a city area is building its future on a foundation of research and innovation to create a sustainable knowledge economy and identifies its strength for attracting investment.

City and comparator areas can be defined using existing classifications or include all institutions within an X-mile radius of a city center.

A City Area report includes the following analyses:
- Output & Impact, overall, by subject, and by sector
- Cross-sector collaboration, overall and breakdown by within-city area versus outside-city area
- Academic collaboration, including a percentage of intra-city area collaboration versus other types of collaboration
- Research usage: Patent citations and downloads of publications

Recommended Recurrence/Update

Annual update for up to 2 years (e.g., 3-year contract)
There are often strategic reasons to investigate one or more research areas in greater detail. This may be because they play an essential role in a country or institution’s research profile, they attract great interest from academic communities, or they influence the development of other research areas.

Elsevier employs various ways to define research areas, ranging from using pre-defined journal categories to searching for keywords, and to applying our sophisticated Fingerprint technique. The best way depends on the features of the research areas and the available inputs for the study.

This report covers the following standard reports:

• Output, Growth, & Impact,
• Collaboration,
• Knowledge transfer,

and can be naturally combined with the report Emerging Topics (see Section 2.3).

Non-standard specifications for this analysis

Outward focus: Coverage of publications of these research areas across journal categories.

Wider academic impact of research: Extent to which the research in these particular areas are citing or being cited by publications from other research fields

Recommended Recurrence/Update

Annual update for up to 2 years (e.g., 3-year contract)

This figure shows the field-weighted citation impact and compound annual growth rate in a research area and its sub-themes. Reference: Stem Cell Research: Trends and Perspectives on the Evolving International Landscape 2013.

The world map depicts top corporate institutions collaborating with the selected comparator countries in one research area. Reference: Brain Science: Mapping the Landscape of Brain and Neuroscience Research 2014.
2.3 Emerging Topics

Science is a dynamic enterprise, and in order for researchers and institutions to stay at the forefront, they need insights on the newest emerging trends.

For example, prior to 1999 and the full sequencing of the human genome, whole areas of study such as genomics and epigenetics did not exist. Today, they are amongst the largest growing subfields in biology.

This report helps identify, for a given discipline (e.g. Mathematics, Agriculture, etc.), emerging trends and trendsetters:
- What are the top clusters of keywords being downloaded?
- What are the top clusters being cited?
- Which institutions are publishing the most articles related to these trends?

Combining the power of the Elsevier Fingerprint Engine, ScienceDirect download data, and Scopus citation data, we identify the top keywords and concepts in a given discipline for the most recent years. Through analyzing this data, the report provides more granular details on both the source of and the audiences for these top trends.

Moreover, by drawing on both traditional (citations) and alternative metrics (usage downloads), this report provides multiple perspectives on the current trends in research. Elsevier’s Fingerprint Engine uses natural language processing techniques and thesauri to analyse the information contained in textual publication data such as title and abstract, and assigns to each publication a collection of key concepts that represent it. Key concepts based on Fingerprint technology are of higher quality and more representative than standard sets of keywords which often suffer from problems such as duplicates, synonyms, and inclusion of irrelevant terms.

Semantic maps using advanced co-occurrence or co-citation analysis will then be used to cluster key concepts to identify emerging topics to inform researchers, research managers, and funding bodies on the newest trends.

Recommended Recurrence/Update

- Annual update for up to 2 years (e.g., 3-year contract)
Collaboration among multiple research areas is a growing trend in research nowadays. By gathering and integrating the knowledge from multiple research areas, the collaboration is believed to increase the citation impact of the research and stimulate the generation of breakthroughs in research.

We use a novel method to define inter-disciplinary research. The method relies on the central principle that if an article is cited by or references articles that are relatively ‘far’ from the article itself, it is an indication of interdisciplinarity. If an article is cited by or references articles that are relatively ‘close’ to the article itself, this is indication of mono-disciplinarity.

In this way, the method does not rely on pre-defined subject areas. It also takes into consideration that the research landscape is dynamic: what is considered inter-disciplinary today may be disciplinary tomorrow.

This report covers the following topics:

- Output, Growth, and Impact in inter-disciplinary research
- Collaboration in inter-disciplinary research

Non-standard specifications for this analysis

- Knowledge exchange in inter-disciplinary research
- Top institutions conducting inter-disciplinary research
- Main subject areas of the authors involved in inter-disciplinary research (e.g., whether physicists frequently collaborate with chemists in inter-disciplinary research)

Recommended Recurrence/Update

Annual update for up to 2 years (e.g., 3-year contract)

The figure shows the percentage of country’s total publications that belong to world top 10% most inter-disciplinary research.
2.5 Department Performance Analysis

Institutions may need to obtain a deep understanding of their department or faculty’s research performance at different levels by analysing their research output, impact, and growth at different levels of aggregation.

This report is structured to provide a comprehensive view of the research performance of a department in its area of focus by incorporating a wide range of indicators. Beyond department-level metrics, the report also analyses the performance of individual researchers in the department, providing the department’s state of research from a human capital perspective.

Departments’ research are typically highly focussed in a particular field, hence the department can define their research area by making a selection of Scopus subject areas in which peer institutions can be compared against. In addition to quantitative analysis of research output, impact and excellence, a high-level comparison of competency maps can show the different research focus between the department and its peer institutions, in that particular field.

The author profiles of researchers in the department can be refined through the Profile Refinement Service. The resulting publication lists will allow for the generation of accurate author-level metrics such as publication output, h-index, field-weighted citation impact, number of highly-cited articles, and more. We encourage the department to augment the author metrics we generate with the researchers’ birthdates so that we can provide the distribution analysis of the age group of researchers versus their research output and impact.

Non-standard specifications for this analysis
- Research area definition by journal selection
- Research area definition by keyword searches
- Author Profile Refinement Service

Institutions may need to obtain a deep understanding of their department or faculty’s research performance at different levels by analysing their research output, impact, and growth at different levels of aggregation.
Collaboration across institutions, at a national or international level, is of great importance to institutions given the usually greater impact that their outputs yield. Sometimes a personal touch may be of great help in establishing a connection or strengthening a relationship with another institute.

The database contains data for all who have at least listed the target institution once as their affiliation in a Scopus-indexed publication since 1978. Data for each of the thus identified Scopus Author Profiles is extracted, aggregated, linked, and incorporated into the alumni database, which is fully searchable via a user-friendly interface.

One can easily identify researchers who have been affiliated with one’s institution and have moved on to a specific foreign university. It’s also possible to see which researchers currently at an institute have previously been affiliated with a corporate institution in another country.

For instance, a Research Manager at a Chinese institution wishing to improve collaboration with a specific institution in the United Kingdom can use the database to identify existing ties. Have any current researchers at the Chinese institution ever published under this UK affiliation? They can leverage connections at their previous UK institute to increase collaboration. Have any past researchers at the Chinese Institutions moved on to a UK affiliation? They can be a first point of contact to discuss collaboration opportunities. Or perhaps a pharmaceutical company may be keen to increase collaboration between its Japanese branch and local universities. Again they can easily look up which of their present staff has ever published under a Japanese affiliation, or which of their past staff now publishes under a Japanese institution. Such people can act as a gateway into the desired partner’s organisation, help establish collaborative relationships with the desired entities, and provide the personal touch that so often transforms collaboration ideas into fruitful partnerships.

3. Additional Customizations

Naturally, we are open to discuss any possible adjustments to these analyses that you may require. Some examples might be:

- Different time period (default: most recent 5 years)
- Custom subject area mapping (default: ASJC). We can also offer OECD subject categories or even produce a customized mapping.
- Other comparator entities (default: institutions or countries)
  - Groups of institutions (e.g. Russell Group, Ivy League)
  - Large Regions (e.g. Middle East)
  - Cities/Metropolitan regions (e.g. London, Paris, NUTS regions)
- External data sources:
  - Publicly available sources (e.g. NSF NCSES, IPEDS, and BLS (US), HESA (UK), Statistics Canada, OECD, UNESCO, EuroStat, etc.)
  - Institution's own data: we are fully capable of integrating your institution's data to complement our analyses
- Stand-alone visualizations

References
