Tracking research investments

Julia Lane

And many many other coauthors and contributors – particularly Jason Owen Smith, Bruce Weinberg, Nathan Goldschlag, Ron Jarmin, Nik Zolas Matt Ross, Reza Sattari, Akina Ikudo, Wei Chen, Evgeny Klochikhin, John Cuffe, Kaye Husbands Fealing, John King, Stan Johnson, and Rebecca Rosen
Key ideas

The ITG found that:

- There is a well developed body of social science knowledge that could be readily applied to the study of science and innovation.
- Although many Federal agencies have their own communities of practice, the collection and analysis of data about the science and scientific communities they support is heterogeneous and unsystematic.
- Agencies are using very different models, data and tools to understand their investments in science and technology.
- The data infrastructure is inadequate for decision-making.
Value of Science

1951: NSF established

The NSF “found a void in the basic data essential to sound planning. The first step toward policy formulation is necessarily the painstaking task of accumulating relevant data concerning the national effort in scientific research and development”

How much should a nation spend on science? What kind of science? How much from private versus public sectors? Does demand for funding by potential science performers imply a shortage of funding or a surfeit of performers?......A new “science of science policy” is emerging, and it may offer more compelling guidance for policy decisions and for more credible advocacy.
What not to do: self-evaluate

11-09-2017

The European Fas demonstrate outputs of ERC projects evalua report found th: projects and int

High-level peer reviewers evaluated a random sample of 155 concluded Starting and Advanced Grant projects. They found that a large majority generated very high scientific value: 73% of the projects have already made **breakthroughs or major scientific advances**. About 27% of the projects were incremental or, in a very few cases, did not make an appreciable scientific contribution. These findings by and large confirm the results of the pilot exercise, yet with a slight improvement. The study concludes that the ERC indeed funds **high-risk/high-gain** projects, in accordance with its mission, and that such projects are more likely to lead to breakthroughs. It also highlights the interdisciplinarity of many ERC projects.
What not to do: Ad-hoc approaches
What not to do: manual reporting
Conceptual Framework

Transmission of research ideas can occur through:
- People employed doing research (measured with grants)
- Placement of individuals (Oppenheimer – the best way to send knowledge is to wrap it up in a human being)
- Start up of businesses
- Through social networks

• Purchases of equipment and services
  - Consumer led innovation
  - Development of comparative advantage
  - Economies of scale
The data infrastructure

• What has been funded
  – Text documents
  – Text analysis

• Who has been funded
  – HR records (individual (plus job title) x grant x pay period)

• Inputs
  – Financial records (vendor x transaction x transaction period)

• What are the results
  – Economic – Census and USPTO data
  – Scientific – Pubs/scientific communications
Tracing across silos
What has been funded
Who has been funded

Agency Budget

Agency

Award

Institution

Disbursement

Financial System

Institutional Support

HR System

Procurement System

Subcontracting System

Personnel

Vendor

Contractor

Hire

Buy

Engage

Existing Institutional Reporting
The results

Did You Know?

• Fiscal 2015 IRIS data demonstrate that federal sponsored projects at 23 research universities employed more than 100,000 people, 43% of whom were students.

• IRIS institutions spent more than $2.2 million to purchase goods and services from vendors located in 1778 U.S. counties and all 435 U.S. Congressional Districts.

• Links to Census Bureau economic data document the career destinations of more than 100,000 people who worked on federal grants and then took jobs with other employers. 43% of those people remained in the state where they were trained.

• Three years after departing their universities 62% of graduate students worked in the private sector where they made an average of $91,820.
Assessing the Impact of Science Funding

Science supports are widely received in the process of generating social, political, and economic impact (ABEA). In the study (Quackenbush et al. 2019) presented to the National Science Foundation, the ABER support of research is both central and fundamental to understanding the future of science. The United States has a significant investment in research and development, and the ABER support of research is both central and fundamental to understanding the future of science.

Science Funding and Short-Term Economic Activity

Science funding and short-term economic activity are closely linked. The relationship between science funding and economic activity is complex and multifaceted. While science funding is often considered a driver of economic growth, the impact of science funding on economic activity is not always straightforward. In general, science funding can have a positive impact on economic activity by stimulating innovation and job creation. However, the effectiveness of science funding in stimulating economic activity can vary depending on a number of factors, including the type of funding, the area of research, and the regional context.

Measuring the Results of Science Investments

The challenge lies in the United States, where the results of science investments are often difficult to measure. The impact of science investments is often difficult to quantify, and the results of these investments can be delayed. In some cases, the results of science investments may not be apparent for many years. This makes it difficult to evaluate the effectiveness of science investments, and to determine whether the investments are achieving their intended goals.

Let's make science metrics more scientific

An open and transparent system for measuring academic performance, based on measured research, would benefit science, says Ken Davis. Science metrics are crucial for evaluating the impact of scientific research and for making decisions about funding and support. However, current metrics often fail to capture the full range of value that science brings to society. For example, scientific research is often undervalued in terms of its long-term impact, and the benefits of research are often not fully realized.

New listed data on research investments: Scientific workforce, productivity, and value

Julian Lunn, John Quen-Smith, Rebecca F. Stem, and Bruce R. Weinstein

The scientific workforce, productivity, and value are key indicators of the health and vitality of science. In this analysis, we explore the relationship between these metrics and the impact of research investments.

Science agencies and research institutions are increasingly relying on the metrics to evaluate the impact of their research investments. However, there are several challenges to using these metrics effectively. For example, the metrics may not fully capture the complexity and diversity of scientific research, and they may not accurately reflect the long-term impact of research.

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Wrapping it up in a person: Examining employment and earnings outcomes for Ph.D. recipients

Nikolas Zohas,1, Nathan Goldschlag,1 Ron Jarvis,1 Paula Stephan,2,3 Jason Owen-Smith,1 Rebecca P. Koen,1 Barbara McFadden Allen,1 Bruce A. Weinberg,1,4,5,6,7,8 Julia L. Land1,9,10

In the top 5% of all research outputs scored by Altmetric

All research outputs #4,175 of 4,800,035 outputs

Outputs from science #270 of 31,148 outputs

Outputs of similar age #403 of 191,677 outputs

Outputs of similar age from science #17 of 732 outputs

Altmetric has tracked 4,800,035 research outputs across all sources so far. Compared to these this one has done particularly well and is in the 99th percentile: it's in the top 5% of all research outputs ever tracked by Altmetric.

http://www.sciencemag.org/content/350/6266/1367.abstract

EMBARGOED UNTIL 2PM U.S. EASTERN TIME ON THE THURSDAY BEFORE THIS DATE:
Key ideas

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THE SCIENCE OF SCIENCE POLICY: A FEDERAL RESEARCH ROADMAP
Questions

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