Is Your Industry-Funded Research Reproducible? Experts Offer Insights

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Industry leaders frequently tie up with the academic community to conduct research. The partnership between the academe and industry sponsors seems like a perfect match: industry sponsors have resources and ideas, while academic researchers have the knowledge, skills, and creativity to conduct research that leads to innovation. According to Prof. Michael Junger, collaborations between academic researchers and industry sponsors is a “win-win situation.”

Public funding for academic research is decreasing and industry leaders are faced with the hefty cost of building and sustaining large, centralized R&D facilities. Thus, industry-funded research endeavors are becoming increasingly more stable and collaborative. *Nature Biotechnology* outlined the pros and cons of these partnerships, stating that industry partners benefit from cost-effective research, whereas academic partners benefit from funding. Academe and industry leaders can work together to support discovery and innovation. Unfortunately, in recent years, there has been a reproducibility crisis due to a lack of transparency in research. This has prompted

investigations into methodologies and research ethics.

The Reproducibility Crisis

In an ideal world, industry sponsors and academic researchers would have similar motivations, similar cultures/environments, and the same method for conducting research. However, as Jasny et al. note, “financial motivations driving product development have led to concerns that industry-sponsored research comes at the expense of transparency.” According to Jasny et al., industry researchers distrust the quality control in academic research and they question whether academic researchers value reproducibility as much as a rapid publication. Irreproducibility, in this sense, is the incomplete sharing of data, knowledge, techniques, and materials. The reproducibility crisis involves severe economic consequences.

Biopharma companies require reproducible results before finalizing research projects. However, there is a growing concern regarding irreproducibility in collaborations between industry leaders and academic researchers. Scientists at Bayer observed that over 66% of the 70 targets that they had to work on had irreproducible basic research data. Later on, Amgen confirmed these findings, revealing that only 11% of the 53 landmark studies could actually be reproduced. The reasons for the reproducibility crisis are numerous. These range from researchers refusing to share data/knowledge/techniques/material to the use of highly specialized chemicals, cell lines, or equipment that are not available to other researchers. Without reproducibility, venture companies simply cannot invest in research. Furthermore, scientific credibility gets questioned. How do we mitigate the reproducibility crisis? Some suggest that more collaboration is needed.

Improving Reproducibility

Studies have been conducted to explore the problem of reproducibility in industry-funded research. Iqbal et al. found that out of the 441 biomedical journal articles published between 2000 and 2014, only one study revealed the complete protocol and none included all raw data in the accepted publication. In addition, the majority of studies did not include statements about conflicts of interest or funding sources. Reproducibility is inextricably linked to transparency. Very rarely is irreproducibility a result of outright fraud. So what can we do to improve reproducibility? In the digital age, it seems that we have plenty of answers to address this problem.

Building better partnerships is at the core of improving reproducibility. All partners should be aware of any intellectual property (IP) concerns before commencing any work. Work boundaries should be carefully outlined (i.e. what can be shared, what can be done in-house, etc.). In cases where publication is desired, the industry partner’s jurisdiction over the manuscript should be clear. Partners should conduct meetings regularly to prevent misunderstandings and to meet expectations on a continual basis. In addition, all concerned partners should communicate openly. Partnerships between industry sponsors and researchers are effective for advancing science. However,

concerns about reproducibility and transparency are real and valid.

Ensuring Transparency in Research

Transparency in research is at the core of reproducibility. Scientific methods demand reproducibility under the premise that if all processes are logical and transparent, then any other person who conducts the same process will arrive at the same set of results. There are ways to improve transparency in research:

- Reward efficiency and encourage full commitment. Prior to receiving funding, scientists should commit their time to the study. This is beneficial for scientists because it forms the basis for innovation.
- Define objectives and use the most current technology.
- Identify the quality criteria for industry-funded research and make them public. Set distinct and unambiguous milestones.
- Mandate data sharing. Adopt mechanisms to share knowledge and promote reproducibility.
- Independently audit/validate data or seek oversight prior to release/publication.
- Make all the research output public.
- Ensure collaboration between academic and industry scientists. This creates a shared desire to reach research goals while creating a sense of ownership over the project.
- Provide oversight by an active governing body.

What's Next?

The reproducibility crisis is a serious threat to partnerships between the academic research community and industry sponsors. Transparency in research is one of the core attributes of the successful use of scientific methods. In addition, transparency is required to achieve reproducibility. However, industry-funded research is becoming less and less reproducible. It is vital that we adhere to rules and stipulations in order to mitigate this crisis. Scientific results need to be universally reproducible. More than economic losses, irreproducibility leads to distrust between industry leaders and the academe.

Is industry-sponsored research more susceptible to bias? Is there a clear conflict of interest involved? Please share your opinion by commenting in the section below.

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