Everything you always wanted to know about research impact…

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Chapter

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Everything you always wanted to know about research impact...

Academics and universities worldwide have increasingly been subjected to monitoring and evaluation of research outputs. Research impact has become a buzzword and the use of metrics for research evaluation has become an integral part of the academic landscape. The adverse impact of this “audit culture” is well documented (Adler & Harzing, 2009; Mingers & Willmott, 2013). A reversal of this trend, however, is unlikely; it is therefore important for academics to be aware of these debates. This chapter therefore provides a brief introduction into research impact, based on my academic research in the area, 12.5 years of user support for Publish or Perish (Harzing, 2007) - a free software program for citation analysis - and my presentations and blogposts on the topic.

What is research impact and how is it measured?

Like many questions, the answer depends on whom you ask. Ask a bibliometrician and they’ll likely tell you it’s the extent to which an academic publication is cited by other academics. This is what we refer to as academic impact, the way in which our research influences the research of other academics. Ask a Research Dean in the UK involved in a REF [Research Excellence Framework] submission and they’ll instantly refer to Impact Case Studies that show how academic research impacts on the world outside academia. This non-academic impact might be felt in industry, public policy, as well as society as a whole. Ask an academic who is passionate about teaching and they are likely to mention the way our teaching impacts the lives of our students. Of course, all three of them are right: impact is all of these things. Ideally, any academic should have an impact in every one of these areas, although possibly with a different level of emphasis for different career trajectories and different career stages. This chapter, however, centres on academic impact, which is typically operationalized as citations. Chapter ... [editors to add] in this volume focuses on other elements of research impact, such as ... [editors to add]
What is that thing called the h-index?

Beyond citations, the research metric that is most commonly used to measure academic impact is the h-index. It is defined as follows (Hirsch, 2005:16569):

A scientist has index h if h of his/her Np papers have at least h citations each, and the other (Np-h) papers have no more than h citations each.

An h-index of 20 thus means that 20 of the articles that an academic [or journal] has published have at least 20 citations each. The advantage of the h-index is that it combines an assessment of quantity (number of papers) and quality (impact, or citations to these papers). An academic cannot have a high h-index without publishing a substantial number of papers. However, this is not enough. These papers need to be cited in order to count for the h-index.

As such the h-index is said to be preferable over the total number of citations as it corrects for “one hit wonders”, i.e. academics who might have authored (or even co-authored) one or a limited number of highly cited papers, but have not shown a sustained and durable academic performance. It is also preferable over the number of papers as it corrects for papers that are not cited. Hence the h-index favours academics that publish a continuous stream of papers with lasting and above-average impact. Although by no means an undisputed (see e.g. Costas & Fransen, 2018) measure of academic impact, it has become quite influential.

Why should I be bothered with citation impact?

So why should you even care if other scholars cite your work? Well, I would ask: why publish if nobody cites your work? To me, not publishing is a bit like being mute, not being cited is a lot like talking without anybody actually listening. Of course, your academic work might be used by students, managers, or other academics that do not publish themselves. In my view, however, academic research should also aim to contribute to the academic discourse in a particular field of knowledge.

Knowing how much and where your work is cited also helps you to prepare for your confirmation or tenure application, your promotion application, your yearly performance appraisal, or more generally your case for academic impact. Being familiar with citation analysis also makes it easier to “educate” your Dean – or other senior academics that might influence your future – on this topic.

Most importantly, by paying attention to your citations you can learn who is building on your research. Depending on their level of engagement with your work - granted some citations can be pretty superficial or even completely incorrect (see Harzing, 2002) - these people might well be future collaborators. It is also exciting to see how others are using your research; you might get new ideas for research through it. Finally, citations - which will typically occur far more frequently than publications - are a nice ego boost. We don’t get much positive feedback in academia and it is nice to know someone has, presumably, read your work and found it important enough to refer to it.

How can I improve my citation impact?

There are quite a lot of things individual academics can do to improve the chances of their work being cited. Please note that this doesn’t mean adopting an instrumental, let alone an unethical, approach to getting cited. It simply means ensuring that your academic publications - which have taken you a lot of “blood, sweat and tears” to complete - achieve the impact they deserve. Although this chapter deals solely with academic impact, many of the recommendations below are also likely to help you achieving greater societal impact. You can
increase the likelihood that your academic work is cited by paying attention to what I have called the four C’s of citations: competence, collaboration, care and communication (Harzing, 2017d).

**Competence, collaboration, and care**

First of all, impact starts with competence: publishing high-quality work. Although all of us can name exceptions, as a general rule of thumb shoddy work will attract few citations and high-quality, meaningful work is more likely to be cited.

Second, collaborate! Collaboration not just makes doing research more fun. It often leads to better quality research, especially if you ensure your collaborators have complementary skills in areas where you are not that strong. Having a co-author also means that there is always someone to read your paper critically before it is subjected to the, oftentimes harsh, journal review process, thus again improving its quality. Not unimportantly, it ensures more motivation to finish your papers. Procrastination is harder to justify to someone else! Apart from the quality boost and thus indirect positive citation effect, there is another reason why co-authored papers are often cited more. Each author has their own network of academics that follow and potentially cite their work. In addition, your collaborators are likely to cite your co-authored work in their other projects.

Third, care. Care for your own academic reputation and never engage in questionable research practices. Nobody wants to cite the work of someone they don’t respect. Don’t think nobody will notice, academia is a small world and academics gossip just as much as the next person. Most importantly, care for others. Building high quality networks based on trust and reciprocity (rather than instrumentality) helps the dissemination of your research. This means not rejecting review requests unless you really have to, keeping the promises you make at conferences, alerting collaborators and academic friends to useful information, and congratulating them on their achievements. In short: being a good academic citizen!

**Communication**

Fourth and finally: communicate. This is probably the most important aspect of getting cited. (see also Harzing, 2018a) It makes sense, doesn’t it? Academics can’t read and cite your work if they can’t find it. So why do some academics make it so terribly difficult to find their work? This might have been excusable in the days before the Internet, but these days there are so many ways in which you can make your work available.

*Create a personal website.* I have been running one since 1999 and it is the best thing I have ever done. You can put pre-preprints of all your papers online, provide an up-to-date list of publications and offer an accessible write-up of your research programs. Having a good online presence ensures that your papers are found easily when someone searches for a topic relating to your research in Google. Obviously, you need a content-rich website to achieve this and you can’t build this up in just a few years, so start early in your career.

If having your own website sounds like too much work, *listing your work in online repositories* is an excellent alternative. This could be your own university repository, ResearchGate, SSRN, arXiv, or Academia.edu. You don’t need to use all of these services, just pick one or two and make sure you keep them up-to-date. If you don’t, people might assume you haven’t published anything for years… Having no profile is almost better than an out-of-date publication list that gives an “in press” designation for articles published 5 years ago.

At the very least *create a Google Scholar Citation profile* (GSC). Unless your name is very
common, it only takes a few minutes to set it up and it ensures that everyone can find an up-to-date list of your publications. This is even more important if you have a common name as most citation databases have really poor author disambiguation (Harzing, 2015). Make sure you keep your profile clean and up-to-date. A very easy way to clean up a messy GSC profile is to use Publish or Perish to search for your GSC profile (see Harzing, 2018b). By sorting the results in a variety of ways you can easily spot mistakes or inconsistencies that you can then fix in your profile.

**Attend conferences, present your work and talk to people.** Don’t just hang out with your friends. Volunteer to participate in, or even organize, Professional Development Workshops, act as a discussant, or as a session chair. It gives you the opportunity to introduce yourself to a dedicated and captive audience, give them a few lines about your own research and impress them with your comments and organizational skills. This is particularly important for young academics that need to gain name recognition.

Does all this conference networking sound too hard for you? Are you a strong introvert? [Don’t forget that most academics are introverts, they are just pretending to be extraverts for the duration of the conference!] Or are you unable to travel for family or financial reasons? In that case, **being active on social media** can be a good alternative (see Harzing, 2018c, Harzing, 2019). Consider using Twitter to get relevant information in your field and to tweet about any new research findings or publications. Yes, originally I also thought Twitter was utterly stupid; it certainly does have its limitations. However, I have picked a lot of useful information through it that would have taken me a lot longer to gather through other sources. Tweeting about my papers and blog posts typically increases readership at least five or ten-fold, sometimes MUCH more. Not bad for a 2-minute, 280 character post!

If you are really keen, **start writing blogposts about your research.** It can be really enjoyable to write up the key findings of your research in a format that is accessible to a larger audience than just your own “micro-tribe”. Especially if you have accumulated a body of work on a certain topic, this can be a really good way to diffuse it more widely. As an example, refer to my blog post on “**Challenges in International survey research: illustrations and solutions**” (Harzing, 2017b). Don’t think you need to be a senior academic to do this. Two of my junior co-authors - Helene Tenzer and Shea Fan - wrote great guest posts about their research on managing multi-lingual teams and expatriate identity respectively (Tenzer, 2016, Fan, 2018). They are now approaching companies for new research projects and are using these blogposts to give them an accessible summary of their academic work. Needless to say this works much better than sending them long emails or - horror of horrors - actual journal articles.

Finally, there is nothing wrong with the “old-fashioned” way of communicating about your research, i.e. **sending an email.** Are you reading an unusually interesting paper in your own field? Email the author to tell them what you liked about it and send them one or two of your own related papers. Don’t be shy to send academics your own papers; most of them appreciate it, as it is hard for everyone to keep up-to-date with the literature. Make sure you don’t become an “academic spammer” though (Harzing, 2016).

If all of this sounds “unfair” to you and makes you think “but surely if my work is good academics should read and cite it?” and “why should publicity and name recognition matter?”, I can only agree wholeheartedly. But the days that academics had the time and ability to keep up with all of the good work published in their field are well and truly behind us. Most academics have a pressured existence and the volume of publications is rising rapidly. Marketing, publicity, and reputation are important in almost any area of life these days and I am afraid academ-
ia is no exception. Yes, most academics still appreciate and recognise substance over packaging, but why not make it easier for them to appreciate the substance of your work?

**How do I get access to citation data?**

Until 2004 there was only one way to get access to citation data: consult the Web of Science, also known as ISI, a subscription-based database originally established by Eugene Garfield and later run by Thomson, before morphing into Thomson-Reuters, and now reincarnated as Clarivate Analytics. Many academics, especially those who have “grown up” in academia at a time when the Web of Science was the only “name in the game”, are still firmly wedded to this data source. The problem is, as we will see below, that its level of coverage is very different across academic disciplines; it is much more comprehensive in the Life and Natural Sciences than in the Social Sciences and Humanities, with coverage in Engineering in between these two extremes.

In 2004, two new data sources were launched: Scopus and Google Scholar. Scopus, provided by Elsevier, is subscription-based and, like the Web of Science, relies on “manual” data curation, i.e. journals need to be selected to be included in these data sources. Although initially its coverage only went back to 1996, it has since dramatically expanded its back-catalogue and now typically provides a better coverage than the Web of Science, especially for the Social Sciences and Humanities.

Google Scholar was launched in 2004 as the academic equivalent of the Google search engine and allows users to search the academic literature. Google Scholar crawls academic websites and indexes the full text or metadata of academic publications. As a result, some non-scholarly citations, such as student handbooks, library guides or editorial notes may slip through, and there might be some overestimation of the number of scholarly citations in Google Scholar. However, in my view this is preferable to the very significant and systematic under-estimation of scholarly citations in the Web of Science or Scopus for many disciplines (see Harzing, 2017a). In 2012 Google Scholar introduced Google Scholar Profiles, which allows academics to create and curate an online profile with their publications (see Harzing, 2018b).

In the last few years, the research evaluation landscape has been constantly evolving and new, largely free, sources of citation data are launched nearly every year. The most important of these free data sources are Crossref, Microsoft Academic (Harzing, 2017c) and Dimensions. Just like Google Scholar these data sources retrieve their publication and citation data from sources that are available online. This means that their level of accuracy might be slightly lower than the “manually” curated databases Scopus and the Web of Science. However, I have found all three to provide “cleaner” data than Google Scholar.

All of these data sources are accessible through Publish or Perish (Harzing, 2007), making it easy to compare metrics across data-sources. Table 1 provides an overview of how metrics might differ across data sources, using my own publication record as an example. For Google Scholar I used my manually curated Google Scholar Profile in which I have merged stray citations with my master record¹ and removed non-scholarly records. The column “Other” includes working papers, white papers, blog posts, professional articles, software and data.

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¹ It is important to note that stray citation records are not unique to Google Scholar. They are for instance prevalent in the Web of Science as well if you use the “Cited Reference” search function [which includes references to books and non-ISI listed journals] rather than the general search function. I need to submit data change reports to Clarivate nearly every single week to ask them to merge stray citations for my work in their relevant master records. Likewise, Scopus has well over 400 secondary document results for my name, so many that I don’t usually bother to submit data change reports.
### Table 1: Research metrics across data sources [Feb 2019]

<table>
<thead>
<tr>
<th>Data source</th>
<th>Citations</th>
<th>h-index</th>
<th># Journal articles</th>
<th># Books</th>
<th># Book Chapters</th>
<th># Conference papers</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>CrossRef</td>
<td>5,323</td>
<td>39</td>
<td>84</td>
<td>1</td>
<td>11</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Dimensions</td>
<td>5,758</td>
<td>39</td>
<td>83</td>
<td>1</td>
<td>4</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Google Scholar Profile</td>
<td>15,722</td>
<td>58</td>
<td>84</td>
<td>5</td>
<td>24</td>
<td>17</td>
<td>21</td>
</tr>
<tr>
<td>Microsoft Academic</td>
<td>13,756</td>
<td>55</td>
<td>84</td>
<td>4</td>
<td>11</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>Scopus*</td>
<td>5,852</td>
<td>39</td>
<td>80</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Web of Science*</td>
<td>3,558</td>
<td>32</td>
<td>61</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

* General search option, i.e. only includes publications listed in these data-sources.

### How do citation levels differ by career stage and discipline?

Both overall citation levels and summary statistics such as the h-index increase with age. It can easily take 5 to 10 years after an academic’s first publication before seeing a significant number of citations materialise. This is particularly true for the Social Sciences and Humanities, where the publication process is generally more drawn-out than in the other disciplines, with many rounds of revisions. Even accepted publications can take years to finally appear in print. Taking my own case as an example, my current Web of Science citation record puts me in the top 0.2% most cited academics in my field. However, my citations took rather a long time to take off. My first publication appeared in 1995; by 2000 I had about a dozen publications printed or in press. However, at the start of 2000 I only had nine Web of Science citations (with 20 new citations in 2000 and 27 new citations in 2001). If I had been asked to make my tenure case after just 5 years I wouldn’t have had much to show for in terms of citation impact!

Moreover, citation levels are typically substantially higher in the Life Sciences and the Natural Sciences than in Engineering, the Social Sciences and Humanities. This is partly caused by the lack of comprehensive coverage of publications in the latter three disciplines in the two most commonly used databases: the Web of Science and Scopus. As we will see below, disciplinary differences in citation levels are much smaller in Google Scholar. Most of the differences in citation [and publication] levels are caused simply by differences in publication patterns. Academics in the Life Sciences and Natural Sciences typically publish significantly more papers than academics in the other disciplines. However, these papers are typically shorter, have a much less tortuous review process, and have significantly more co-authors. Therefore, professional bibliometricians typically work with field-corrected citation data.

### Can I compare citation levels across career stages and disciplines?

Unfortunately, the field-corrected citation data that are used by professional bibliometricians are not typically available to individual academics. Therefore, Harzing, Alakangas & Adams (2014) introduced an easily accessible h-index variant that corrects for differences both across career stages and across disciplines: the hI,annual (or hIa for short). It is calculated as follows and is one of the standard metrics reported by Harzing’s Publish or Perish (2007):

- **hIa**: \( \frac{hI,\text{norm}}{\text{academic age}} \)
  - **hI,\text{norm}**:
    - normalize the number of citations for each paper by dividing the number of citations by the number of authors for that paper, and then calculate the h-index of the normalized citation counts
  - **academic age**: number of years elapsed since first publication

The hIa-index thus measures the average number of single-author equivalent h-index points.
that an academic has accumulated in each year of their academic career. A hIa of 1.0 means that an academic has consistently published one article per year that, when corrected for the number of co-authors, has accumulated enough citations to be included in the h-index. For most academics the hIa will be below 1.0 as it is difficult to keep up a stream of high-impact publications over a sustained period of time. Based on two studies of high-performing academics Harzing & Mijnhardt (2015), suggest that a hIa above 1.0 should be considered to reflect excellent performance. A hIa above 1.5 might be considered to reflect outstanding performance, whereas a hIa above 2.0 can be seen as truly exceptional. Someone who co-publishes with others will not need to publish more articles to achieve the same hIa as an academic who publishes single-authored articles. However, the co-authored articles will need to gather more citations to become part of the hIa, as the article’s citations will be divided by the number of co-authors.

Harzing, Alakangas & Adams (2014) and Harzing & Alakangas (2016) illustrate the use of the hIa in a study of 146 academics at the Associate or Full Professor level in 37 different sub-disciplines in the Life Sciences, Sciences, Engineering, Social Sciences, and Humanities. To demonstrate the effect of the hIa in terms of correcting for career length differences, Table 1 ranks the top-10 most highly ranked academics for both the h-index and the hIa. The top-10 by h-index includes mainly full professors, with an average academic age of 34.4 years. The top-10 by hIa is perfectly balanced in terms of level of appointment and the average academic age is much shorter at 20.7 years. This demonstrates that the h-index is strongly influenced by longevity, whereas the hIa provides a more level playing field for younger academics.

Table 1: Level of appointment (Full Prof/Assoc Prof) and academic age of the top-10 academics ranked by h-index & hIa-index. Adapted from Harzing, Alakangas & Adams (2014)

<table>
<thead>
<tr>
<th></th>
<th>Top-10 by h-index</th>
<th>Top-10 by hIa-index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td>Years</td>
<td>Level</td>
</tr>
<tr>
<td>Prof</td>
<td>21</td>
<td>Prof</td>
</tr>
<tr>
<td>Prof</td>
<td>41</td>
<td>Prof</td>
</tr>
<tr>
<td>Prof</td>
<td>24</td>
<td>Assoc</td>
</tr>
<tr>
<td>Prof</td>
<td>37</td>
<td>Assoc</td>
</tr>
<tr>
<td>Prof</td>
<td>35</td>
<td>Prof</td>
</tr>
<tr>
<td>Prof</td>
<td>37</td>
<td>Assoc</td>
</tr>
<tr>
<td>Prof</td>
<td>30</td>
<td>Prof</td>
</tr>
<tr>
<td>Prof</td>
<td>43</td>
<td>Prof</td>
</tr>
<tr>
<td>Assoc</td>
<td>27</td>
<td>Assoc</td>
</tr>
<tr>
<td>Prof</td>
<td>29</td>
<td>Assoc</td>
</tr>
<tr>
<td></td>
<td>Average h-index</td>
<td>38</td>
</tr>
</tbody>
</table>

Figures 1 and 2 illustrate the effect of using the hIa rather than the h-index when comparison research metrics across disciplines. They also show the differential levels of coverage across disciplines for the three main sources for citation data: Web of Science, Scopus and Google Scholar. Disciplinary differences between the databases are substantial. In the Web of Science, the h-index of the average Life Sciences academic is nearly 8 times as high as for the average Humanities academic and nearly 3 times as high as for the average Social Scientist. In Google Scholar these differences are reduced to 2.7 times as high for Humanities and only 1.5 times as high for the Social Sciences.
An even more striking picture appears when, instead of the regular h-index, we compare disciplines using the hIa. Using this metric dramatically reduces the differences between disciplines for any database. Even in the Web of Science, the difference between Science and Life Science academics on the one hand, and Social Science and Engineering academics on the other hand, is now relatively small, the latter only showing 25% lower metrics. In Scopus, four of the five disciplines now have very similar scores, whereas in Google Scholar the average for the Social Sciences is even marginally higher than the Life Sciences average, and substantially higher than the average for Engineering and the Sciences.
I want to know more. Can you suggest any further resources?

Yes, there are plenty of easy-to-read blogposts in the reference list. Below you’ll also find a list of freely accessible books, white papers and blogposts on topics more generally related to research impact and research evaluation. They provide you with an easy-to-read introduction to the field and plenty of academic references in case you want to dig deeper.

- https://harzing.com/resources/publish-or-perish/tutorial. Free online version of the Publish or Perish tutorial.
- https://harzing.com/publications/free-bibliometrics-articles. List of my articles in the area of Bibliometrics that are freely accessible from the publisher.
- https://harzing.com/publications/free-articles-on-journal-rankings. List of my articles in the area of journal rankings that are freely accessible from the publisher.
- https://harzing.com/blog/2019/01/fostering-research-impact-through-social-media. Recording - courtesy of Middlesex University - of a 1.5-hour presentation on the four C's of getting cited and an 8-step workflow on how to effectively disseminate your research.
- https://harzing.com/blog/2017/10/to-rank-or-not-to-rank. Overview of my research in the field of journal rankings, university rankings and citation rankings.
- https://harzing.com/blog/2016/11/presenting-your-case-for-tenure-or-promotion. Demonstrates how to make your case for tenure or promotion by comparing your record to a relevant peer group.
- https://harzing.com/blog/2017/11/making-your-case-for-impact-if-you-have-few-citations. Advice on strategies to demonstrate impact with a very low citation level.
- https://harzing.com/blog/2017/10/bank-error-in-your-favour-how-to-gain-3000-citations-in-a-week. Shows how even commercial data sources such as the Web of Science can contain inaccurate data.

Conclusion

In this chapter I have provided a brief introduction into the world of academic impact. Its main conclusions can be summarized as follows:

- There are many forms of research impact, of which academic [citation] impact is only one. Other forms include impact on policy, industry [managers], society, and students.
- Although by no means undisputed, the h-index is often used as a quick-and-dirty summary of an academic’s research impact.
- There are many reasons to care about citation impact. These include both instrumental reasons such as performance evaluation and educating your Dean, and intrinsic reasons such as contributing to academic discourse and finding collaborators.
- An academic can improve their citation impact through using the four C’s of citation analysis: competence, collaboration, care and communication.
- There are many sources for citation data [Web of Science, Scopus, Google Scholar, Microsoft Academic, CrossRef, Dimensions] and their respective coverage differs substantially by discipline.
- Citation levels vary dramatically across career stages and disciplines.
• Comparing citation data across career stages and disciplines is possible with the use of the hla, a citation metric that corrects for differences in academic age and co-authorship patterns.
• There are many free resources that can help academics to find out more about the topic.

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